Mapping the Sewee Shell Ring

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Acknowledgments

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Contents

Figures and Tables

Figures

Tables

Mapping the Sewee Shell Ring

Introduction

Shell rings are circular to semi-circular deposits of marine shell found along the South Carolina, Georgia and Florida coasts that date to the Late Archaic period, circa 4600-3000 B.P. Resembling elevated stands surrounding level arenas, the shape of rings have fascinated archeologists and other chroniclers since the 1800s. Surprisingly, few early maps or scientific studies resulted from this curiosity (cf. Moore 1897; Mckinley 1873). Until recently, only a handful of studies beyond walkover surveys had been conducted in South Carolina (e.g., Calmes 1968; Edwards 1965; Hemmings 1970; Trinkley 1980a). Of these, Edwards (1965) produced the first topographic contour map of an Archaic shell ring in which precision measuring instruments were used to some extent (Figure 1).[1] Edwards recognized the circular shape of the site but called it the Sewee Mound (8Ch45), conceding to tradition.

In nearly three full pages of his report, Edwards (1965) described the results and techniques he used to map, including a brief discussion of the "sections" that were "precisely measured" versus those that were only "estimated by 'eye'." Unfortunately, the actual maps he produced and to which his text refers have either been lost (Anderson and Logan 1981:54; Cable 1995:106; e.g., Edwards 1965, Figure 5; Trinkley 1980a:43) or otherwise lack labels and other definitions that would facilitate correlation of map features to his descriptions (Edwards 1965:unnumbered figure, likely Figure 3). Only one contour map remains (Edwards 1965:no page number, follows page 54, cf. Cable 1995), and for nearly 40 years, confusion over the shape and features of the Sewee ring has resulted.

Edwards likened the shape of the shell midden to that of an eagle's leg with talons: the shell on a "sand ridge" represented the leg, and the shell of the "ring" represented the talons (Edwards 1965:8). But his descriptions as to what is and is not the "sand-ridge" vary, and it is not always clear where the "sand ridge" actually lies. At one point, he states that the sand ridge "provide(s) the base for a midden ring" (Edwards 1965:37). Here he seems to suggest that the ring was built on an existing, natural deposit of sand. The reader is left wondering if the "sand ridge" lay in the shape of the ring it supported since elsewhere he states the "gap" in the ring consists not of the sand found in the sand ridge, but of the same "muddy sand as that of the mud-flat within the ring and around the midden" (Edwards 1965:9). Here he seems to indicate that only the ring and "sand ridge midden" seem to lie on a natural sand deposit, while the gap and plaza of the ring consists of natural marsh sediments. Yet, at another point he states that "Sewee Mound is a primarily oyster shell midden constructed upon the sand ridge and mud-flat" without distinguishing which parts of the ring were built on the separate landforms (Edwards 1965:8; cf 10, 11 where he states the ring lay only on "marsh mud") or what landscape features actually comprise the "Sewee Mound" site – both the ring and the nearby sand ridge? Figure 2 shows the various places Edwards envisioned a sand ridge, however inconsistently, a sand ridge.

Questions concerning the meaning behind Edwards' concept of a sand ridge are not just academic. In terms of understanding how the shell ring was built, ultimately the question of sand base versus mud flat base will have to be determined. In addition, whether the soil upon which the ring was placed was in situ, modified (e.g., leveled), or introduced needs also to be understood. At one point, Edwards suggests that at least part of the sand ridge was artificially constructed (Figure 2, probably Area 2; Edwards 1965:). We do address below the soil types we encountered in our probes and a single test. But we do not solve the riddle. Understanding the origins of soils beneath shell rings will be critical to understanding the use and construction sequence of the architecture (e.g., Russo and Heide 2002; Russo and Saunders 1999; Trinkley 1980).

Because Edwards does not always distinguish between the sand upon which he sometimes posits that the ring lies, and the sand that constitutes a separate and distinct sand ridge(s) (Edwards 1965:36), the reader is left wondering if Edwards believed the ring was part of a nearby sand ridge that also contains shell midden. Often Edwards treats the shell ring and the sand ridge midden as a single site, further confusing the boundaries of the ring (Edwards 1965:8, 9). For example, he suggests that the greatest length of "midden" stretches some 415 feet (ca. 135 meters) from north to south, but does not offer a diameter for the ring itself, which most archeologists identify as considerably less than 100 m (e.g., Gardner 1992:49; Hemmings and Waddell 1970; Russo and Heide 2001). This indicates that Edwards included both sites in his figures, seeing both the sand ridge midden and the ring as one, continuous site. Yet, he later he talks of the sand ridge midden as "leading" to the ring, implying, perhaps, not a single, unified site, but two distinct ones

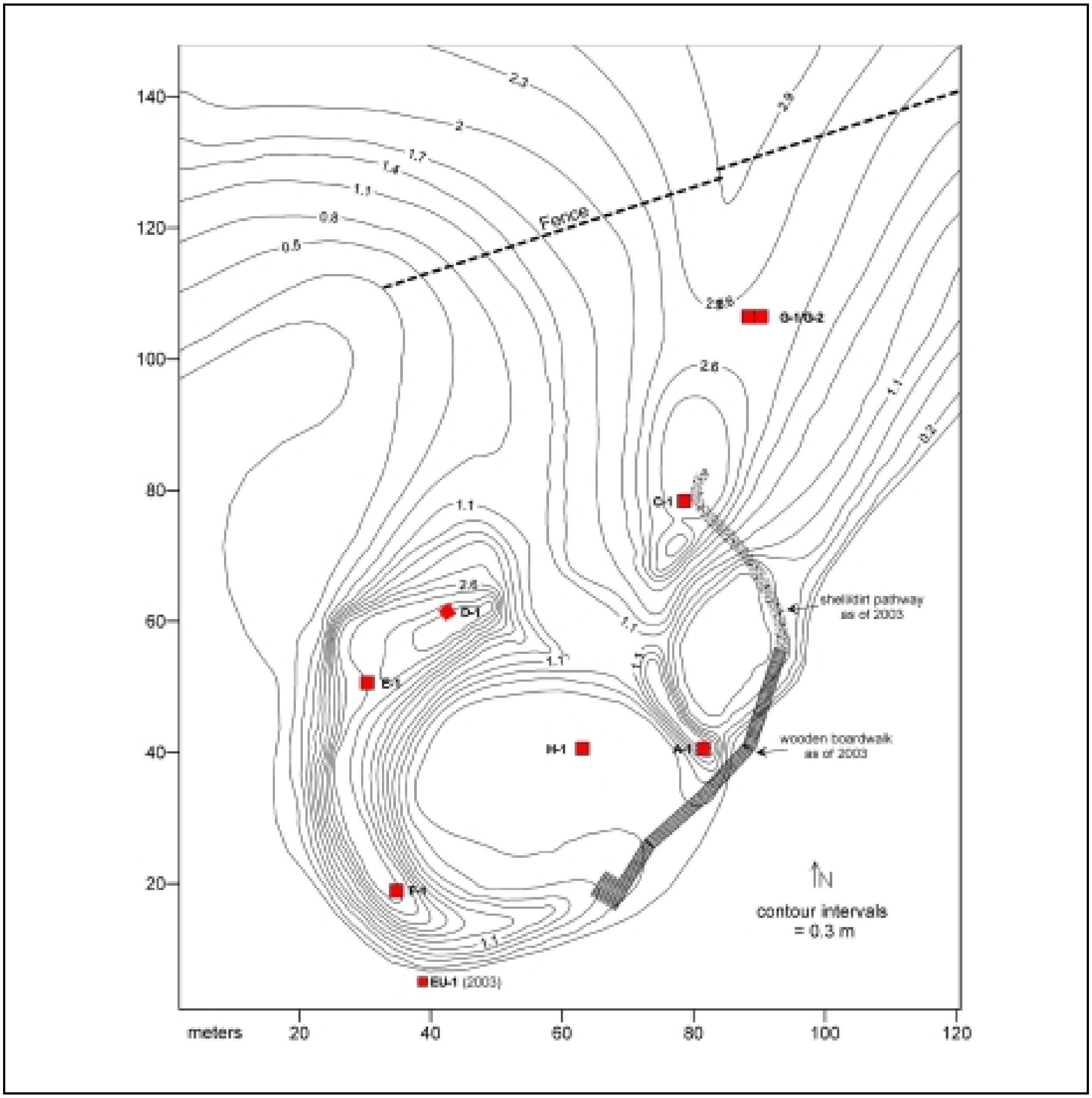


Figure 1. Sewee Shell Ring surface contour map (after Edwards 1965) with 1965 and 2003 excavation units and boardwalk and trail locations overlain.

(Edwards 1965:36). Confounding the issue further, while he suggests both the ridge and ring yielded Awendaw pottery suggesting temporal and cultural affinity, he also suggests that artifacts from a part of the sand-ridge indicate different periods of occupation from those in the ring (Edwards 1965:24).

While some of the reader's confusion over Edwards' descriptions can be attributed to the fact that there are no supportive graphics, others arise, like the "sand ridge" observations from poorly defined terms. For example, he suggests that "most of the portion of the west arc adjoining the sand ridge was removed long ago" (Edwards 1965:9), but his map, and other text, clearly indicate the removed portions of the ring to lie solely on the eastern side of the ring. Apparently what he means by "west arc" (at least at this point) is those parts of the ring lying west and south of his unit C-1 (Figure 1). But this is only a guess on our part. Certainly, the writing is often imprecise in the report (Edwards admits the report was a rush job, 1965:1). Together the many problems with the report make Edwards' conclusions about the site problematic relative to research and management issues of the ring.

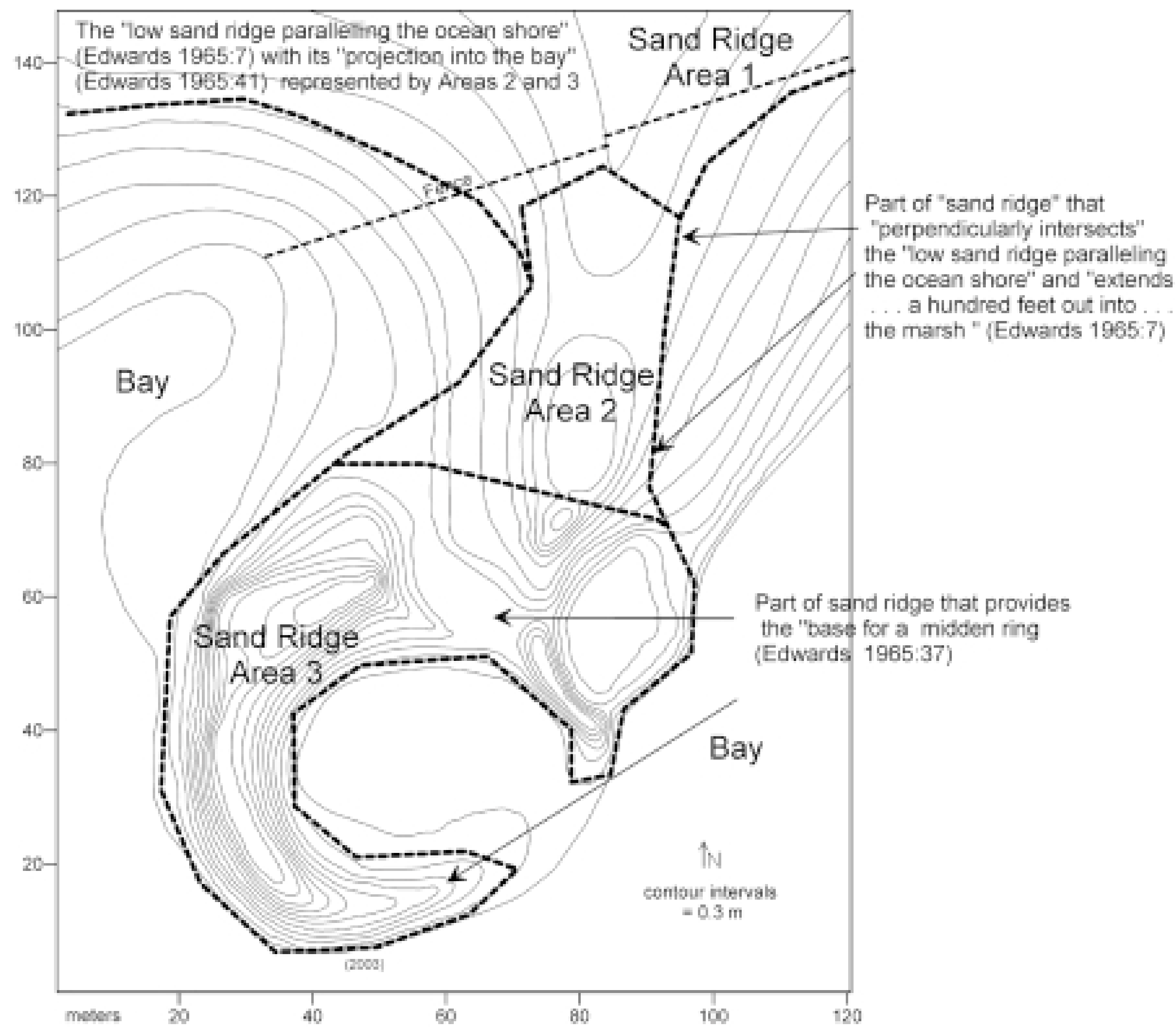


Figure 2. Edwards' (1965) descriptions of the sand ridge at Sewee Mound.

One of the problems with Edwards' map has nothing to do with its accuracy. Rather it is attributable to the kind of map it is, a surface topography map. While there are few maps of ring sites, most contour maps are of the surface topography. A common problem with this type of map is determining where the ring begins and ends (e.g., Fryman et al. 1980:43; Marrinan 1975:26; Russo 1994:98; Russo and Heide 2002:68; Trinkley 1980a:39). When rings are surrounded by generally flat landscape, their shape may be determined relatively accurately with surface topography maps (e.g., Hemmings 1970). But when the rings are located on a sloping surface (e.g., Russo 1991) or abut landscape features which also rise above the flat plane, such as with the "sand-ridge" found on the northern aspect of Sewee Shell Ring (Figure 2, Area 2), then determining the extent, height, volume, and shape of the ring becomes problematic. When rising sea level has buried portions of a ring beneath marsh sediments, or when shell deposits otherwise produce no surface signatures, the extent of shell deposits beneath the marsh or level plain cannot be ascertained with surface contour maps (Heide 2002:72; Russo and Saunders 1999; Russo et al. 2002).

To counter these problems, the authors have developed a method wherein the thickness of shell deposits is measured and mapped (Russo and Heide 2002; Russo et al. 2002). This allows the researcher/manager to identify midden features and distinguish them from the natural topography more easily. The Southeastern Archeological Center (SEAC) of the National Park Service entered into an interagency agreement with the USDA Forest Service to develop a shell thickness map of the Sewee Shell Ring. As part of the project, new surface contour maps were also drawn, a small sample of pottery was recovered, and samples for radiocarbon assay were obtained. This report presents the results of the project. It compares our findings on the Sewee Shell Ring into a broader archeological context exploring the use and construction techniques of similar sites in the Southeast.

Field Methodology and Results

Fieldwork at Sewee Shell Ring (Figure 3) was conducted by a crew of three from SEAC (the authors and Margo Schwadron) and a non-federal volunteer, William Beers, from April 3 to 8, 2003. The majority of the labor focused on probing and recording the thickness of shell deposits in the ring. The excavation of a single 1x1 m unit on the ring's southwestern edge was taken to the base of the ring. With this unit, we obtained organic samples suitable for radiocarbon dating and ceramics to help determine the relative time of construction of Sewee.

Probing and Mapping

Today the Sewee Shell Ring is surrounded by saltwater marsh for approximately 270° of its circumference except on the north side where it abuts Edwards' "sand ridge" (Figure 2, Area 2). From this area, a walking trail provides access to the site for visitors (Sewee is the only shell ring in the U.S. that is regularly open to the public for visitation).

To map the site, a rectangular grid was established that encompassed those portions of the ring which lay above marsh levels, with a little leeway given to accommodate within the grid the likelihood that some of the ring lay hidden beneath the shallow marsh to the east. To avoid having to set up in the middle of a tidal creek on the southeastern edge of the ring (Figure 4 and Figure 5), and to minimize the survey of the deeper portions of marsh east of the ring, the grid was set up 52º east of magnetic north, with the initial grid lines placed from a point in the shallow marsh southwest of the site along the arbitrarily assigned 1051 (sw to ne) and the 449 (sw to nw) lines (Figure 6). Many of the maps in this report are thus oriented 52º east of magnetic north, while others have subsequently been adjusted so that magnetic north is located at the top of the page. The reader should make note of each map orientation.

Because no elevation benchmark was near, beginning elevation was arbitrarily assigned at 10 feet (3.048 meters), which roughly related to the daily tidal high sea level at the site as evidenced by marsh growth. However, we were at the site during neap tide, and the low high tides were never observed to enter the plaza area of the ring, which lay between 3 and 3.2 meters elevations in our arbitrarily assigned levels and which also contained marsh vegetation in spots (mud flats in other spots). Subsequent to field work, and in all our maps presented in this report, we converted this elevation to zero to better reflect the sites topographic relation to "sea level," and to facilitate comparison to Edwards' map. The zero meter contour interval on the surface topography maps approximates the level in which the shell ring begins to be observable above the marsh as well as Edwards' (1965) zero elevation in feet, and probably roughly represents the extreme high tide mark at the site, up to a meter higher than we directly observed in our short stay. The reader should be aware, however, that the metric elevations of our surface topography maps do not represent actual meters above mean sea level.

Pulling off of these two lines, we established the remainder of the grid with compass and tape measure so that each point at five meters along each line could be measured for shell thickness and surface elevation (Figure 7, white and red dots). Vegetation on top of the ring was occasionally dense, and as a result, tape lines were not always run straight or perpendicular to the established grid lines. This resulted in the grid points being slightly askew of the grid north and east (Figure 7). This is not unexpected of the methodology, which is designed to provide uniform coverage of the area being mapped, not precision in grid point location (Russo et al. 2002). Pin flags were placed at five meter intervals along each grid line, and once the entire five meter grid was flagged, probing was conducted at every 2.5 meters, with the 2.5 meter marks being paced off between flags. Probing at 2.5 meters intervals was systematically followed. However, if a tree or other obstacle was in the way at the 2.5 meter point, we did not hesitate to offset the probe and elevation readings to obtain data from the nearest possible point.

Probing was undertaken following techniques discussed in Russo et al. (2002). In short, stainless steel probes measuring ½" in diameter and 1 meter in length, with additional attachments extending the probes up to 4 meters in length when necessary, were pushed through shell, soil, marsh and/or water at each grid point. There, the tops and bottoms of the shell deposits were measured and written on the pin flags at the 5 meter intervals, and on

Figure 3. Sewee and other shell rings located along the South Carolina Coast.

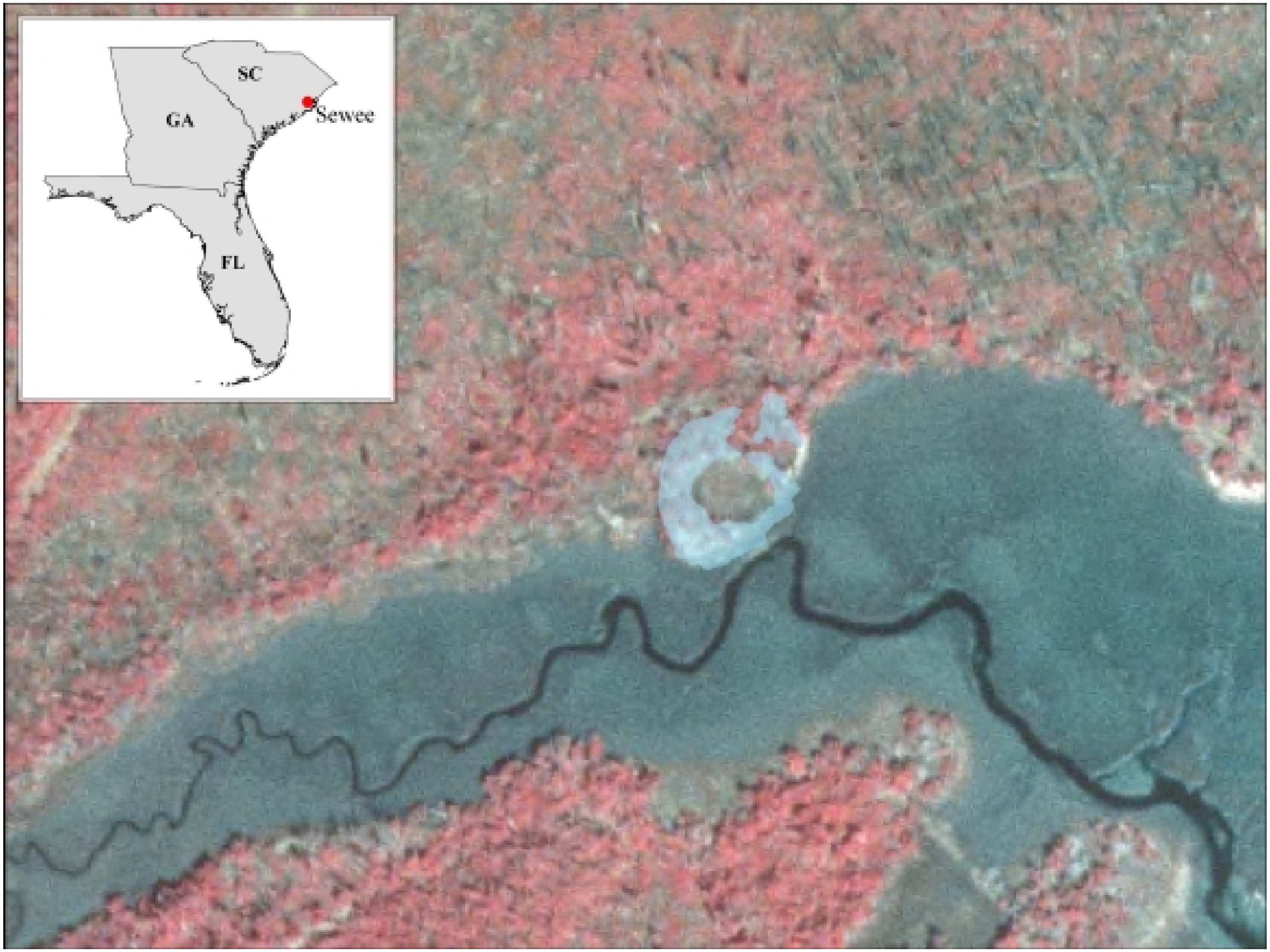


Figure 4. Aerial view of Sewee Shell Ring and surrounding marsh and forest.

Figure 5. Aerial view of Sewee Shell Ring with tidal creek and boardwalk highlighted.

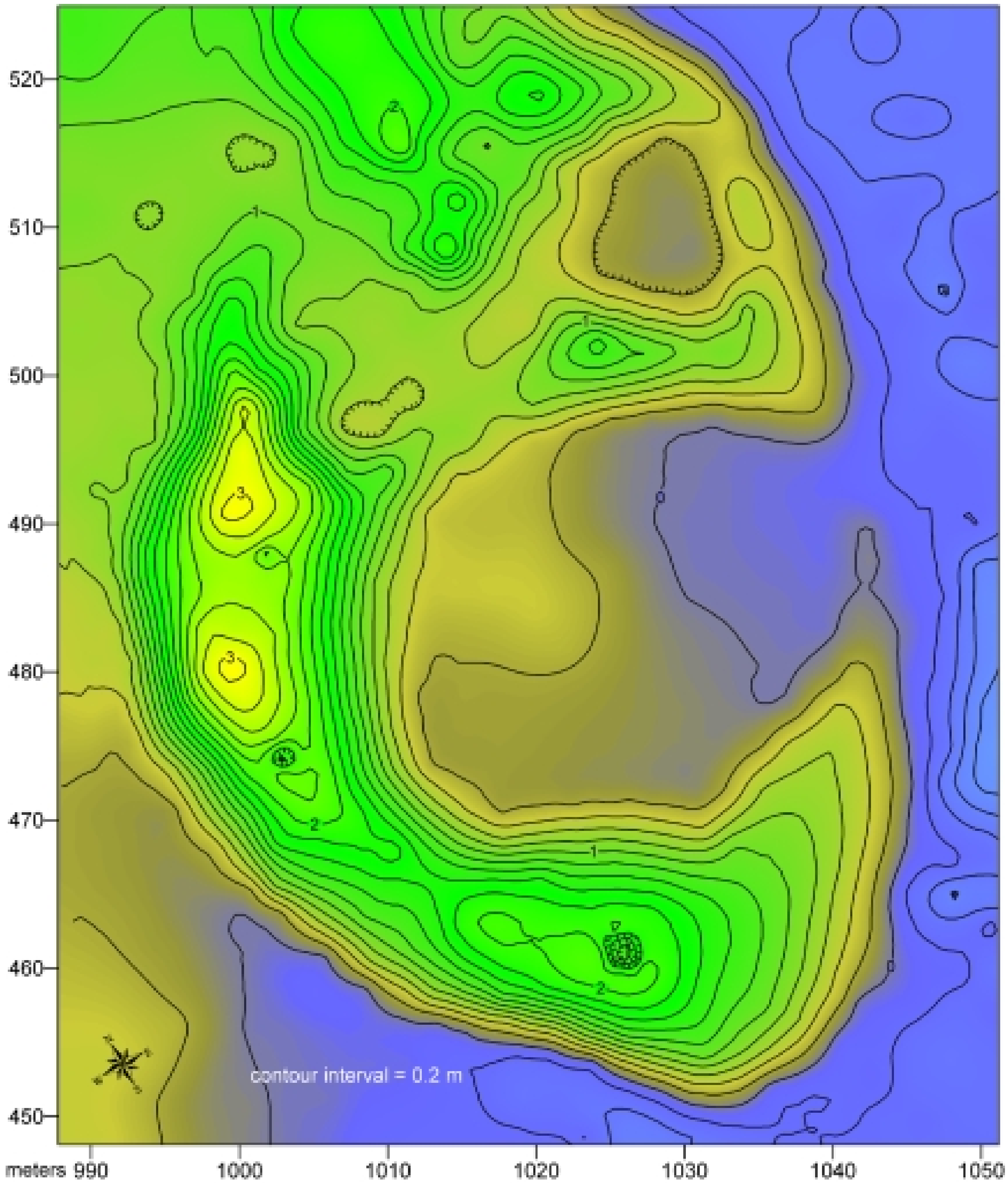


Figure 6. Sewee Shell Ring surface contour map, 2003.

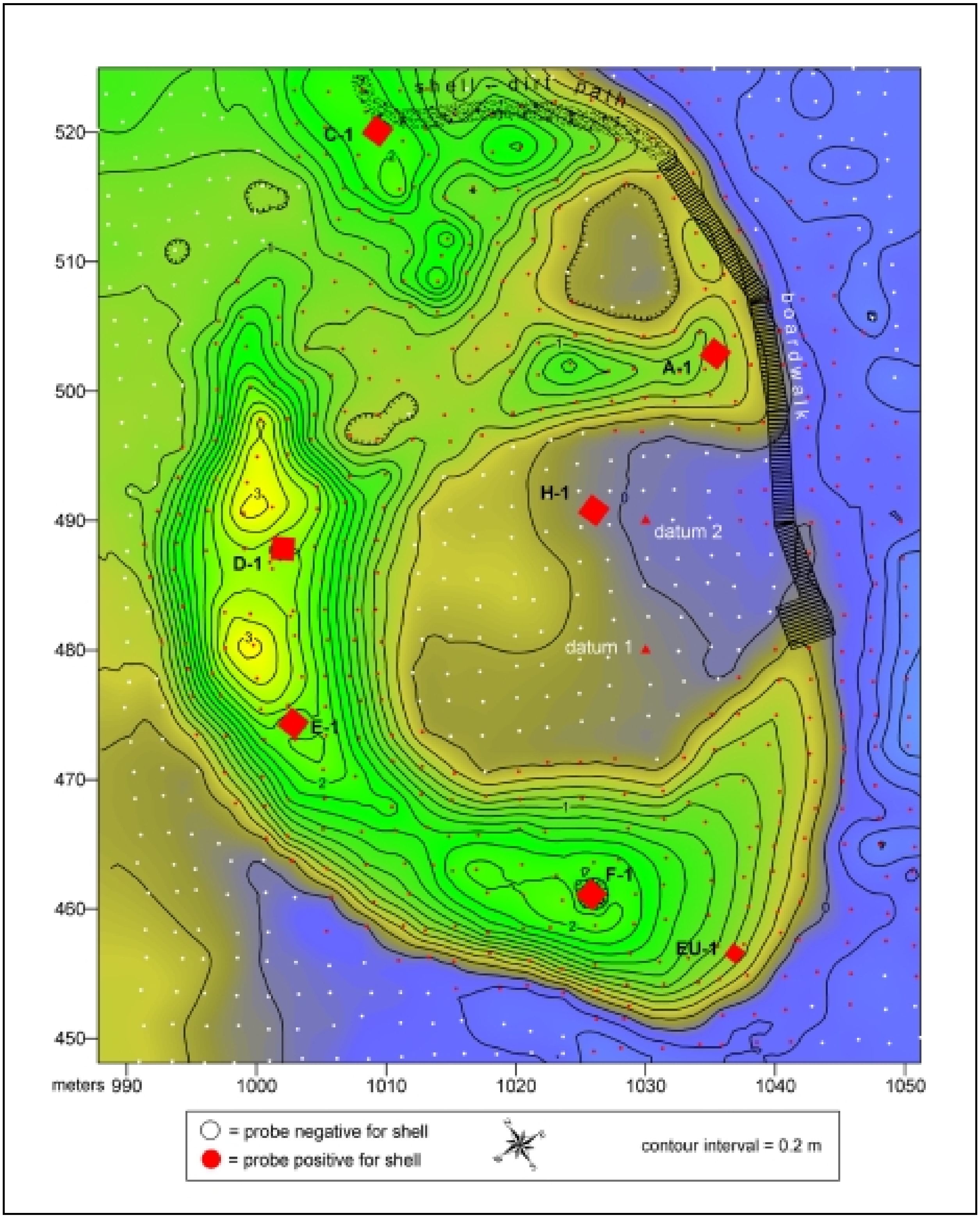


Figure 7. Sewee Shell Ring, color surface contour map, 2003 showing excavation units, probes, datums, boardwalk, and trail.

new pin flags, which were placed at the unflagged 2.5 meter intervals. For example, shell seen and contacted with the probe at the surface and extending to 1 meter, was recorded as 0-100 cm. Shell measured with the probe beginning at 20 cm below the marsh surface and ending at 40 cm below the marsh surface was recorded as 20-40 cm. Probes that did not encounter shell were recorded as No Shell (NS).

Based on resistance, sound, sight (of exposed surface layers), and feel of the probe, it has been shown that dense shell can be easily and reliably distinguished from other ground matrices such as sand, muck, and peat (Russo et al. 2002). Thin deposits of shell, shell less than 10 cm in thickness, and, of course, non-shell features such as charcoal deposits or soil filled pits, cannot be reliably identified with the probing technique. Consequently, the shell thickness maps should be viewed as defining the limits of dense shell deposits, but not necessarily the limits of less dense shell or other midden or other archeological remains. Once the data were entered on the pin flags, the transit/recording crew would take elevation and shell thickness readings at each point for entry into the transit data collector. These data served as the basis for the surface topography and shell thickness maps in this report. Shell thickness for each probe was determined by subtracting top from bottom elevation readings of shell deposits. A total of 756 points were probed, of which 455 were positive for shell and 301 were negative. Most of the negative probes occurred in the marsh surrounding the ring and the central plaza (Figure 7).

The total station used to record the elevation and shell thickness data was moved frequently due to visibility being limited by dense brush, marsh vegetation, and the shell ring itself. These temporary datums were not permanently marked in the field, but were recorded in notes. However, upon completion of the mapping, a permanent datum and backsight datum were placed at the site in the plaza (Figure 7). The datums were 12 inch lengths of ¼” rebar that were pounded into the soil. About 1" of the datum was left exposed. A Trimble Pathfinder Pro XR GPS unit was used to record the location of Datum 1 and the backsight datum 10 meters to the north (Datum 2). The location at which the excavation unit we placed was also recorded. A total of 120 GPS readings were averaged for each point location for the datums. The data were then downloaded and differentially corrected to achieve an expected accuracy within 1 meter (Table 1).

Excavation Unit

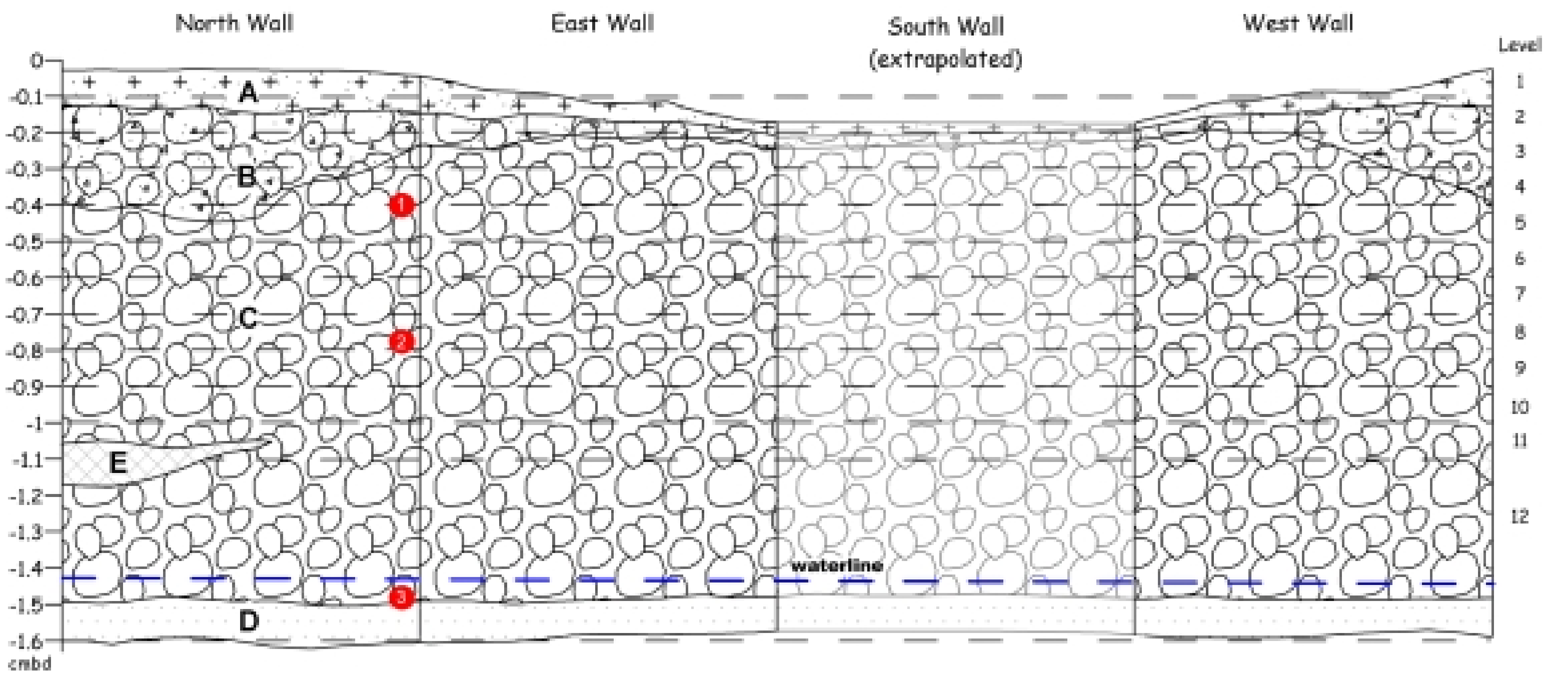
A 1 x 1 m unit (EU-1) was excavated in the ring (Figure 7) in order to obtain samples (e.g., oyster shell, charcoal) for radiocarbon assays and ceramics for absolute and relative dating of the ring respectively. The location for the unit was chosen based primarily on practical considerations. With limited time, crew, and funds, we could only excavate a single unit of limited size and depth. Based on the depth of the shell as determined by probes, the absence of vegetation that might slow excavation, and limited surface disturbance, a location was chosen for the unit in the southwest portion of the ring where no previous excavations were known to have been placed. This location was about 12 meters down slope from Edwards’(1965) F-1 unit.

The unit was excavated in arbitrary 10 cm levels to 110 cmbd. Between 110 and 160 cmbd, soil and shell were removed as one level, with no artifacts being recovered from 150-160 cmbd, stratum D, the below-ring sand stratum. All excavation materials were screened through ¼” hardware cloth. The identification of artifacts, features, and stratigraphic contexts below 45 cmbd was hindered by the presence of a sticky, brown, clay, which covered the shell and made screening ineffective. In these levels, we hand sorted the midden to recover artifacts. The base of the shell deposits was reached at 150 cmbd, 5 cm below the standing water level. Vertical control was maintained using a line level and tape measure attached to the northwest corner of the unit. Excavation of the lower levels of the unit as a single 50cm level was a chosen strategy due to limited time and increasing water intrusion in the deeper depths of the unit. An additional 10 cm of soil was excavated below the lowest shell deposits to see if any non-ring artifacts might be encountered. At 160 cmbd a probe was used to see if more shell was present, however none was encountered in the next meter of soil (i.e., to 2.6 cmbd) and excavations were halted.

From the north wall of the unit, shell samples were collected from the top (33-48 cmbd), middle (78-80 cmbd), and the base (148-150 cmbd) of the ring. Walls were cleaned and profile maps of the north, east, and west walls were drawn. The south wall profile was drawn by extrapolating between the east and west wall strata (Figure 8). Upon completion of excavations, the unit was backfilled with the shell spoil from the unit. Both a GPS and transit location were recorded for the unit (Table 1; Figure 7).

Table 1. GPS Readings From Excavation Units and Datums at Sewee Shell Ring

Datum Coordinates	Easting	Northing
UTM17, NAD83	629823.6367	3651771.134
UTM17, NAD27	629805.7288	3651562.687
Lat/Long WGS84	79°36'37.33041"	32°59'47.87817"



Stratum A - Crushed and whole oyster (80%) with dark grayish brown (10YR4/2) fine sandy loam (20%)

Stratum B - Whole and crushed oyster (90%) mixed with very dark brown (10YR2/2) sandy loam (8%) and periwinkle and mussel (2%)

Stratum C - Whole oyster (90-98%) mixed with dark grayish brown (10YR4/2) silty clay (1-9%) and occassional periwinkle and mussel (1%)

Stratum D - Brown (10YR4/3) sand to fine sand mottled with occasional clumps of gray clay.

Area E - Black (10YR2/1) charcoal and oyster lens

1 GX30186, 4010 +/-70

2 Radiocarbon sample not submitted

3 GX30187, 4120 +/-70

Figure 8. Sewee Shell Ring, Excavation Unit 1 profiles, April 2003.

The smallness of the excavation provides only limited insight into how this area of the ring was constructed. Although we identified four stratigraphically separable contexts in the unit profile, most differences seen among these strata seem to have been formed post-depositionally. From top to bottom, dumping episodes cannot be distinguished, the oyster valves are large, whole, and uncrushed except for the surface of Stratum A (0-12 cmbd). Stratum A contained both crushed and whole oyster in a fine sandy loam. This stratum was obviously disturbed, probably from recent visitor walkovers, previous nearby excavations, and other unknown historic activities. An iron fragment and 22 shell casing in level 2 (Table 2) demonstrated that the upper 20-30 of the unit contain modern materials. But we cannot rule out the possibility the surface was crushed partly during prehistory.

Stratum B (12-45 cmbd) was composed of some crushed, but mostly whole, oyster with occasional periwinkle and ribbed mussel mixed within a very dark brown, sandy loam. This stratum does not appear to be disturbed, at least to the extent that historic intrusions can be identified. Stratum C (45-150 cmbd) contains mostly whole oyster with interstices filled with dark grayish-brown silty clay. Periwinkle and ribbed mussel were present in the midden as well. Stratum D (150-160 cmbd) consists of brown sand to fine sand upon which the ring was built. Throughout the excavation, charcoal was present, but more so in Area E (ca. 110 cmbd), an isolated area within the Stratum C matrix. Similar features were noted by Edwards (1965:14) during his excavations. Flecks of charcoal were removed from Area E embedded within the clay matrix for later extrication in the laboratory. The charcoal, however, was too fragile for recovery of a sample sufficiently large for a conventional radiocarbon date.

Aside from the increased amount of crushed shell in Stratum A, only differences in soil color and particle size distinguish the three strata of shell deposits. Soil from Stratum C at 90-100 cmbd consisted of a silty clay; from Stratum B, of sandy loam; and Stratum A, of fine sandy loam (Figure 8). The silty clay in Stratum C lacked sand. We speculate, its origin is likely connected to the marsh muck surrounding the site. That this clay is not in the upper level of the unit suggests either pedogenesis has removed it to lower levels, or that tidal action introduced it in the lower levels of the unit, but not the upper levels. Unfortunately, Edwards (1965) is almost silent on the subject of soil and shell content in the strata he identified in the ring. Our observations do not entirely agree with his that the ring did not contain "clean" oyster shell, but rather was filled with "muddy, mucky soil with a high humus content" throughout, but "especially" in the upper foot of the midden (Edwards 1965:12).[2] Our unit did not reveal either mud or muck soils in the uppermost levels, but, rather, sandy loams. The clay loam, which is probably what Edwards means by "muddy muck" is found throughout the lower level (C) of the unit.

Neither do our observations support another of Edwards' conclusions. He suggested that the base upon which the shell ring was built consists of "marsh mud" (Edwards 1965:10, 11); whereas we found Stratum D to consist almost purely of sand (ca. 95%) with only minor amounts of silt and clay. Unfortunately, is not consistent in identifying the underlying soils, at one point synonymizing "underlying marsh mud" with "wet, muddy sand" (Edwards 1965:11). The importance of identifying upon what soil type the shell ring was placed lies in understanding the use for which the ring was built. It the ring was placed directly upon marsh "muds" or silty clays daily inundated by tides, it is doubtful that a plaza consisting of the same soil would lend itself occupation, dancing, or other public activities suggested for the use of the ring. Sand, however, particular sand above the influence of daily tides would better accommodate such activities.

In summary, based on our excavation unit, as well as *some* of the observation by Edwards, we suggest that the ring seems to have been built on a sand foundation. Whether this sand was a pre-ring, prepared surface or a natural "sand-ridge" as Edwards sometimes suggested, or whether it is uniformly underlying the ring remains to be answered. Whole oyster appears as thick deposits placed directly on the sand with little evidence of "living" activities such as breaking, crushing and the inclusion of other non-shell organics from pedestrian traffic and food processing. Exceptions in our unit include Stratum A (crushed shell, the prehistoric origin of the crushing being in doubte) and Area E (increased charcoal). We note that even the few "darker" layers Edwards identified were rarities in his units, and he suggests relative to the deposits of oyster shells that "layers did not contrast with each other at all sharply and were thus barely if at all discernible during excavating" (Edwards 1965:14). This reflects the situation in our excavation unit as well as shell rings in which vertical profiles have been drawn or described (e.g., Heide 2003; Russo and Heide 2002; Russo and Saunders 1999; Saunders 2002a).

Radiocarbon Dates

Funds were sufficient to send shell from the upper and lower levels of Excavation Unit 1 to Geochron laboratories for radiocarbon assay. Oyster shell obtained from the north wall profile between 33-48 cmbd had a conventional age of 4010 ±70 B.P. (Table 3). Ceramics associated with this date included Awendaw Finger Impressed (n = 1), (a

Table 2. Artifacts and Other Materials from Excavation Unit 1, 2003

Provenience	Pottery and other material	Number	Grams	Pottery Totals
Level 1, 0-10 cmbd	Vertebrata	10	9.2	
	Thom's Creek Plain	14	79.73	
	Thom's Creek Plain (shell scraped)	4	13.17	
	residual	29	29.87	**47 N, 122.77 g**
Level 2, 10-20 cmbd	22 rim fire shell casing	1	0.58	
	Iron fragment	1	2.07	
	Oyster shell with hole	1	48.63	
	Ariidae	5	2.81	
	Mammalia	1	0.29	
	Testudines	2	0.87	
	Thom's Creek Finger Pinched	1	2.68	
	Thom's Creek Plain	26	209.85	
	Thom's Creek Plain (shell scraped)	6	46.46	
	residual	31	35.15	**64 N, 294.14 g**
Level 3, 20-30 cmbd	Osteichthyes	2	0.31	
	Testudines	3	2.53	
	Awendaw Finger Impressed	1	14.08	
	Thom's Creek Plain	21	92.56	
	Thom's Creek Plain (shell scraped)	6	57.66	
	residual	37	34.26	**65 N, 198.56 g**
Level 4, 30-40 cmbd	Osteichthyes	6	1.15	
	Ariidae	3	0.48	
	Aves	1	2.63	
	Thom's Creek Reed Punctated	1	5.51	
	Thom's Creek Plain	7	29.22	
	Thom's Creek Plain (shell scraped)	1	2.89	
	residual	13	10.84	**22 N, 48.46 g**
Level 5, 40-50 cmbd	Awendaw Finger Impressed	3	90.39	
	Thom's Creek Plain	9	100.86	
	Thom's Creek Plain (shell scraped)	1	4.9	
	residual	5	6.63	**18 N, 202.78 g**
Level 6, 50-60 cmbd	Mammalia	1	0.32	
	Awendaw Finger Impressed	2	23.02	
	Thom's Creek Plain	11	75.63	
	Thom's Creek Plain (shell scraped)	5	33.77	
	residual	7	4.98	**25 N, 137.4 g**
Level 7, 60-70 cmbd	unanalyzed vertebrata/invertebrata	na	na	
	Awendaw Finger Impressed	1	12.02	
	Thom's Creek Plain	1	15.46	**2 N, 27.48 g**
Level 8, 70-80 cmbd	Thom's Creek Plain	10	76.4	
	Thom's Creek Plain (shell scraped)	12	191.13	
	residual	3	2.74	**25 N, 270.27 g**
Level 9, 80-90 cmbd	Thom's Creek Plain	4	52.2	
	Thom's Creek Plain (shell scraped)	3	17.57	
	residual	4	4.12	**11 N, 73.89 g**
Level 10, 90-100 cmbd				no artifacts
Level 11, 100-110 cmbd	Thom's Creek Plain	2	9.21	**2 N, 9.21 g**
Level 12, 110-160 cmbd	Thom's Creek Finger Pinched	2	26.92	
	Thom's Creek Plain	2	14.28	**4 N, 41.12 g**

Table 3. Radiocarbon Dates from 2003 Sewee Excavations

Unit/cmbd	Lab #	Material	^{13}C	Measured Age	Conventional Age	Calibration[a]
EU1/33-48	GX30186	oyster	-1.8	3630	4010±70	4153 (3964) 3777
EU1/150	GX30187	oyster	-2.3	3740	4120±70	4342 (4122) 3910

[a]Marine reservoir correction 36 +/-14 based on the Marine Correction Database found at http://www.qub.ac.uk/arcpal/marine/. Dates were calibrated using Calib 4.3 and are reported as follows: maximum age (intercept) minimum age.

variant of Thom's Creek Finger Pinched [Trinkley 1980b:22 , 1983:44]); Thom's Creek Plain (n = 35); and a sherd tentatively identified as Thom's Creek Reed Punctate (n = 1). A second date derived from oyster came from the base of the shell ring at 149 cmbd and had a conventional age of 4120 ± 70 B.P. Ceramics associated with this date included Thom's Creek Finger Pinched (n=2) and Thom's Creek Plain (n=2). (Note that both the shell for the date the finger pinched sherds and one of the Thom's Creek Plain sherds were obtained from the north wall profile of the unit at 149 cmbd. The other Thom's Creek Plain sherd from this level came from 125 cmbd while cleaning the unit profiles.) Both of these dates are among the earliest dates for Thom's Creek Finger Pinched ceramics and contrast with the reported date of 3295 ± 110 years B.P., as a date for the manufacture of Thom's Creek Finger Pinched wares (Trinkley 1980b). The surprisingly older dates indicate that Thom's Creek Finger Pinched may have been manufactured earlier than previously thought, and that Sewee is one of the earliest shell rings in South Carolina (Table 4; Figure 9), not one of the youngest (Baldwin 2000:23; Trinkley 1980a:316).

Material Culture

Due to limits on time and funds, crew were instructed to collect only ceramics and other artifacts. Unmodified bone and shell were generally not collected, save in instances where positive determination of possible modification was not possible in the field. In these cases, some non-artifactual materials (e.g., bone, charcoal, shell) were saved. In the laboratory, artifacts and these other materials were hand washed and sorted by category (ceramics, metal, plant, bone, shell). Prehistoric ceramics were identified to type. Ceramic sherds smaller than ½" in size were classified as "residual" (Table 2), while larger sherds were typed according to temper and surface decoration criteria following Trinkley (1980b). These analytic data were entered into an Access® database and will be submitted with the ceramics and other artifacts to the South Carolina Institute of Archaeology and Anthropology in accordance with an exsiting agreement with the USDA Forest Service, Francis Marion and Sumter National Forest.

Historic Artifacts

Two historic artifacts were recovered in level 2 (10-20 cmbd), Stratum A. Historic materials included a corroded piece of iron and a .22 shell casing (Table 2).

Ceramics

From Excavation Unit 1, 285 ceramics were recovered (Table 5) of which 129 were residual (<½"). The remainder of the collection consisted of Thom's Creek Plain (n = 144), Thom's Creek Reed Punctated (n = 1), Thom's Creek Finger Pinched (n = 3), Awendaw Finger Impressed (n = 6), and Thom's Creek Indeterminate (n=2). Twenty six percent (n = 38) of Thom's Creek Plain sherds showed signs of shell scraping on either the interior surface, exterior surface, or both. Shell scraping was also present on a few decorated sherds. Two Thom's Creek sherds looked as if they may have been decorated, but any surface decoration was obscured by erosion. We typed these sherds as indeterminate. In terms of the types and relative abundances, the ceramic assemblage is similar to what Edwards found in 1965. However, we recovered a relatively higher percentage of decorated sherds (6 percent of the assemblage not including residuals), while of Edwards' estimated 10,000 sherds, less than 2 percent were decorated (Cable 1995:110; Table 6). (We note, however, that no actual counts were ever given by Edwards, and we include Trinkley's (1980b) sample (n=335) of Edwards' collection in Table 6 to provide a case of real quantification. By level, Thom's Creek Plain was present throughout our unit. Finger Pinched and Impressed pottery was also present from top to bottom, but in far less quantities (Table 5).

Faunal Remains

Our field methodology was designed to identify and record only abundant shellfish found in the ring. This effort revealed that oysters were the dominant shellfish, with periwinkles and ribbed mussel occasionally present (Figure 8). No hard clams, conch, or scallops were identified in the unit (cf. Edwards 1965:17,44), though these species were seen occasionally on the surface of the midden. The research strategy was not designed to collect

Table 4. Radiocarbon Dates from South Carolina Archaic Shell Rings

Sample #	Provenience	Material	^{13}C	Measured Age	Conventional Age[a]	±[b]	Reference
Auld Shell Ring (Yough Hall), 38Ch41							
M-1209	Upper level	oyster	0	3770	**4180**	130/148	Williams 1968:330-331
Coosaw River Shell Ring Complex, 38Bu1866							
GX29192	Ring 1, EU1 base	oyster	-2	3420	3790	70	Heide 2003
GX29193	Ring 2, EU2 base	oyster	-2.1	3190	3560	70	Heide 2003
GX29527	Ring 2, EU2 top	oyster	-1.8	3230	3610	70	Heide 2003
CAMS87990	Ring 2, EU2, 90-100 cmbd	quahog	0	-	3800	30	Elliott 2002
GX29194	Ring 3, EU3 base	oyster	-2.5	3440	3810	70	Heide 2003
Fig Island Shell Ring Complex, 38Ch42							
Wk-9746	Ring 1, TU2, 90cmbs	oyster	-1.1	3467	3861	46	Saunders & Russo 2002
Wk-10103	Ring 1, TU2, top	oyster	-0.9	3420	3816	54	Saunders & Russo 2002
Wk-10105	Ring 1, TU1, top	oyster	-0.5	3550	3953	47	Saunders & Russo 2002
Wk-9762	Ring 2, ST 4, Feature 4b	oyster	-0.9	3714	4112	50	Saunders & Russo 2002
Wk-10102	Ring 2, ST 4, 30 cmbs	oyster	-0.3	3602	4009	55	Saunders & Russo 2002
Wk-9763	Ring 3, TU5, Posthole test	oyster	-0.6	3627	4030	50	Saunders & Russo 2002
Wk-9747	Ring 3, TU2, Feature 1 base	oyster	-0.8	3594	3993	49	Saunders & Russo 2002
Wk-10104	Ring 3, TU 1, 23-30 cmbs	oyster	-0.4	3667	4074	48	Saunders & Russo 2002
Ford Shell Ring Complex (Skull Creek), 38Bu8							
I-2849	Ring 1, 27"bs	oyster	0	3120	**3530**	110/130	Buckley & Willis 1969
I-2850	Ring 1, level 9, 56-57"bs	charcoal	-25	3585	**3585**	115/135	Buckley & Willis 1969
I-3047	Ring 2, level 4, 18-24"bs	charcoal	-25	3890	**3890**	110/130	Buckley & Willis 1969
Lighthouse Point, 38Ch12							
UGA2904	North half Feature 33, L-2	charcoal	-25	2885	**2885**	175/188	Trinkley 1980a
UGA2903	South half Feature 33, L-2	charcoal	-25	3180	**3180**	65/95	Trinkley 1980a
UGA2901	230R60, L-2	charcoal	-25	3190	**3190**	70/99	Trinkley 1980a
UGA2902	230R70, L-2	charcoal	-25	3275	**3275**	55/89	Trinkley 1980a
UGA2905	North half Feature 37, L-2	charcoal	-25	3345	**3345**	70/95	Trinkley 1980a
Sea Pines Shell Ring, 38Bu7							
I-2848	20-26"	quahog	0	3400	**3810**	110/130	Buckley & Willis 1969
I-2847	0-6"	conch	0	3110	**3520**	110/130	Buckley & Willis 1969
Sewee Shell Ring, 38Ch45							
GX2279	NE Quadrant, C-1, 2' bs	oyster	0	3295	**3675**	110/130	this report
GX30186	EU1, 33-48 cmbd	oyster	-1.8	3630	4010	70	this report
GX30187	EU1, 150 cmbd, ring base	oyster	-2.3	3740	4120	70	this report

[a]Dates reported in original source only as measured (uncorrected), have been corrected and placed in bold. 410 years were added to measured shell dates; 0 years to charcoal (Stuiver and Polach 1977:358).
[b]The first number refers to the standard error for the measured age, and the second number to the standard error for the conventional age based on formula from Stuiver and Polach (1977:358). Place holders with only one number refer to the standard error for the conventional age only as provided by the laboratory.

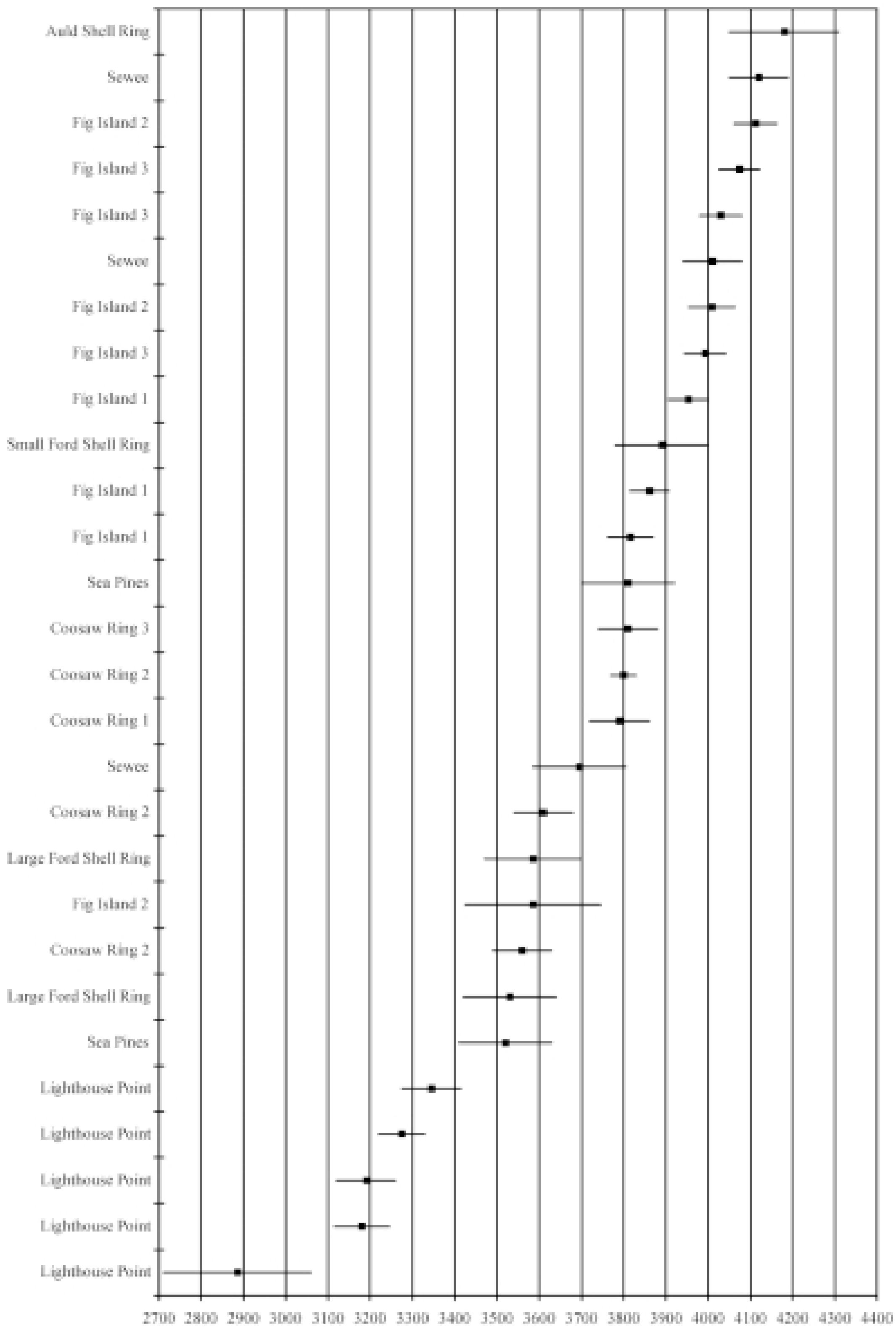


Figure 9. Conventional radiocarbon dates from South Carolina Archaic shell rings.

Table 5. Ceramics by Level, 2003 Excavation Unit 1

Level/cmbd	Thom's Creek Plain	Thom's Creek Plain Shell Scraped	Thom's Creek Reed Punctate	Thom's Creek Finger Pinched	Awendaw Finger Impressed	Thom's Creek Indeter-	Residual
1/0-10	14	4					29
2/10-20	26	6		1		2	31
3/20-30	21	6			1		37
4/30-40	7	1	1				13
5/40-50	9	1			3		5
6/50-60	11	5			2		7
7/60-70	1				1		
8/70-80	10	12					3
9/80-90	4	3					4
10/90-100							
11/100-110	2						
12/110-160	2			2			
Total	106	38	1	3	7	2	129

Table 6. Percentages of Ceramics by Type: 2003 versus 1965 Collections

Type	% 2003	Edwards % 1965[a]	Trinkley % 1965[b]
Thom's Creek Plain	68	80	95 (78?)
Thom's Creek Plain Shell Scraped	24	18	(17?)
Thom's Creek Reed Punctated	<1	<0.5	1.5
Thom's Creek Finger Pinched	2	<0.5	4
Awendaw Finger Impressed	4	<0.5	0
Other	1	<1	0
Sample size	156	10,000	335

[a]The 1965 percentages are estimates based on Edwards' (1965:24) descriptions and Cable's (1995:110) summary. Note that the 10,000 figure may include residual sherds. The 10,000 may also include artifacts other than pottery (Edwards 1965:26, cf.19; cf. Cable 1995:109). We cannot determine the accuracy of the 10,000 sherd estimate.

[b]Trinkley (1980b:20-21) analyzed 335 sherds from Sewee, but did not report the context from which they came. Presumably, these sherds were from one or more of Edwards' (1965) collections. In Trinkley's table he did not calculate which sherds had been "shell scraped" from the Sewee sample, but notes that from all his samples from 14 sites, 17% of the Thom's Creek Plain wares were shell scraped. Hence, the parenthetical figures in this column.

faunal samples save those for radiocarbon assay. However, in some cases, shell or bone that could not be determined as modified or that could not be identified to species in the field was saved for identification in the lab. We washed all such collected faunal specimens and identified them in the laboratory. The consequent faunal collection from Unit 1 (Table 2) is thus, by no means, representative of the total variety of fauna present in the excavation unit or the larger site.

We note that throughout the unit, bone was present, and it was occasionally abundant. We agree with Edwards (1965:16) that most bone remains were likely lost through the ¼" mesth, or went unseen while hand sorting. Most fragments we came across were of small fish, most often, sea catfish. Most of the bone remains could only be typed to class. None were modified in any way. While Edwards (1965) recovered a large number of bone tools from Sewee, including ornate bone pins, we recovered none. The remains we did recover included mammal, fish, turtle, and bird (possibly turkey). Species level identification was possible for some of the catfish fragments, but little else could be identified to such a specific level, and we have listed the catfish remains only to family (Table 2).

Note that samples of shell were kept for analysis from upper levels, but were not collected from lower levels. For example, periwinkle and land snails were kept from level 2 to indicate they had been found in that level. The presence of these species in lower levels, however, was simply noted on the field forms. These shell are not included in Table 2, but were included in the deliverables to the Forest Service with submission of this report. Aside from the radiocarbon samples and the coincident shell attached to the charcoal samples from Area E, only one oyster shell was collected. It came from level 2 and had a hole in it indicating possible human modification (the absence of fresh breaks indicates it was not perforated by our crew during excavation or probing). Another possible shell tool was a conch shell discovered on the ground near our excavation unit. Use-wear was present on its anterior surface. A digital image was taken of the conch but it was left in place at the ring. The image was included on CD as part of the photographic record submitted to the Forest Service as a final deliverable. We note that the absence of modified shell from our unit is largely an artifact of the unit's size. While Edwards found a number of shell tools in his 1965 excavations, he excavated over 30 cubic meters while we excavated only 1.6 cubic meters (Table7).

Finally, a sample of charcoal was obtained from Area E imbedded in a clay/oyster matrix. Upon processing in the laboratory through 1/16″ mesh, the sample yielded a number of bone and shell fragments as well as charcoal and whole oyster valves. These were not identified or listed in Table 2. They were submitted to the Forest Service as part of the final deliverables.

Table 7. Sizes and Depths (m) and Volumes (m^3) of Excavation Units at Sewee

Unit	Size	Unit Depth	Midden depth	Unit Volume	Midden Volume	Edwards 1965[a]
A-1	1.52 x 1.5 2	1.10[b]	1.07	2.54[b]	2.47	9, 11
C-1	1.52 x 1.5 2	1.22	0.97	2.82	2.24	11
D-1	1.52 x 1.5 2	2.48[b]	2.43	5.73[b]	5.61	9, 11
E-1	1.52 x 1.5 2	2.45[b]	2.40[c]	5.66[b]	5.44[c]	11
F-1	1.52 x 1.5 2	2.74	2.67	6.33	6.17	11
G-1	1.52 x 1.5 2	1.22	0.61	2.82	1.41	11
G-2	1.52 x 1.5 2	1.22	0.58	2.82	1.34	11
H-1	1.52 x 1.5 2	0.61	0.00	1.41	0.00	11
EU1	1 x 1	1.60	1.50	1.6	1.50	
Total				31.73	26.18	

[a]Edwards (1965) did not calculated the volume of his excavations. In fact, he only rather obliquely reported the depths of units and their midden contexts. The reader is provided with the page numbers of his report from which we obtained data to determine midden and unit depths.
[b] We estimated unit depths based solely on the sentence referring to units A-1, D-1, and E-1 that states that due to incoming water, "the excavation could not be continued very far beneath the midden." (Edwards 1965:11)
[c] Note that Edwards (1965) did not list the depths of all his E-1 units or the midden within it. In this case we estimated midden depth based on our probes of shell thickness near the unit.

Discussion

Our mapping and excavations produced six data sets that provide insight into the period of use, cultural association, nature of construction, and function of the Sewee shell ring. These data include faunal remains, pottery, observations on excavation unit strata, shell thickness and topographic maps, and radiocarbon dates.

Subsistence and Seasonality

Because we did not target faunal analysis as a focus of the project, the faunal data we collected is of a limited nature, consisting mostly of observations of general abundances on the surface of the ring and within the excavation unit. These indicate that oyster was the most commonly consumed shellfish species followed by periwinkle and ribbed mussel. Hard clam and conch were rarely encountered. This observation agrees well with the much larger sample collected by Edwards (1965:16-17). However, we stress that both ours and his interpretations of subsistence are impressionistic observations. To date, no objective quantification of faunal materials from the Sewee shell ring have been reported.

Edwards' (1965:17) impressions of the vertebrate remains also parallel ours. Catfish were the most abundant remains. But both ours and his reports note that most fish remains were likely lost through the ¼″ mesh. Other fish Edwards noted included drum and gar, and he noted turtle, alligator, bird and deer bone in varying amounts. Together these species indicate that the inhabitants of the ring subsisted consistently on oyster with punctuated inclusions in their diet of other saltwater shellfish and fish species. Freshwater fish and turtles were also consumed, but to a lesser extent, as were deer and other terrestrial animals. Edwards (1965:48-49) suggested that such a diet indicated occupation of the site from March to November, a time when the marsh water surrounding the site was warm enough to wade in. He posited that the site was abandoned in winter because it was too cold and the surrounding forest wood too wet to provide sufficient heat for warmth.

We note that Edwards' speculation lacked any support in terms of actual seasonal measures of faunal remains. At the contemporary Fig Island shell ring complex, measures of seasonal parasites indicated collection of oyster occurred from autumn to winter (Russo 2002:149). Winter, of course, includes the cold months Edwards hypothesized that Sewee inhabitants would abandoned the site to seek the warmth and sustenance from interior forests. To date we can conclusively state that no biological evidence has been reported that clearly demonstrates that Sewee was occupied seasonally or that it was occupied permanently throughout the year. However, the fauna and botanical remains that can be measured for seasonality and thus provide insight into this question have been identified (Edwards 1965:17) or are likely to be found in the site and await recovery and analysis (e.g., hickory nuts, hard clams, catfish, drum, turtles, oyster/odostomes, scallops).

Pottery and Radiocarbon Dates

As noted above, we obtained two radiocarbon assays from Sewee that indicate that the ring is one of the first built in South Carolina, between 4120 and 4010 years B.P. (Figure 9). In contrast to our dates, a sample submitted for assay to the same lab (Geochron) in 1971 by Robert Stephenson of the South Carolina Institute of Archeology and Anthropology (SCIAA) yielded a much earlier date of 3295 ± 110 B.P. (GX2279), a date, if accepted, would make it one of the last rings built in South Carolina. To understand the 800 year difference between the dates, we approached Geochron for the original report on its assay of Stephenson's sample. Although Stephenson's date had been cited in numerous publications (e.g., Anderson and Logan 1981:54; Espenshade 1989:49; Sassaman 1993:237; Sassaman and Anderson 1995:45, 49; Trinkley 1980b:14), the context, material dated, and whether or not it had been corrected for C13/12 isotopic fractionation was information that had not been published. After SCIAA released proprietary rights, Geochron sent us and SCIAA copies of the report.

The original Geochron report (dated 6/14/71) indicated that the radiocarbon ag was derived from "oyster shell" with a sample name of "38CH45/C-1." We obtained from Geochron a cover letter dated 5/16/03 authored by Rob Yriat stating that "we looked at our worksheets for calculating the age of the sample. There is no indication of any ^{13}C correction. No measurement of the carbon SIRA value was made at the time." We subsequently found the original report in SCIAA files with a hand written note on it stating: "NE quadrant, 2.0', occupation of Sewee Mound Shell Ring. Also dates Awendaw pottery in S.C." We do not know who authored the handwritten note, but the statement "dates Awendaw pottery in SC" reflects an idea forwarded by Trinkley (1980b:14).

From these data we were able to determine that the 3295 ± 110 B.P. date was an uncorrected date based on oyster. The only provenience data provided on the original report and notes from SCIAA indicated that the oyster came from the Sewee shell mound/ring site, perhaps somewhere with or within a "NE quadrant" at a depth of two foot. We wondered if the "C-1" in the sample name indicated a unit designation. Because the sample was submitted in 1971, any unit from which the sample came would have had to have been excavated before 1971. Stephenson did not visit the site until 1973 (Cable 1995:112), so we assumed the sample was not associated with his visit, but with an earlier excavation of which SCIAA held shell samples. The only two previous investigations of the ring were by SCIAA staff, Edwards (1965) and Hemmings and Waddell in 1970. Of these two, only Edwards had excavated any units. Edwards' C-1 unit lay in the northeast quadrant of the site, and he had dug the unit to a depth of 4 feet. Oyster was present in the midden as deep as 43 inches. While Edwards collected only charcoal for radiocarbon dating (1965:33), ample samples of oyster were collected for faunal analysis and stored at SCIAA. In lieu of data indicating otherwise, we suggest that Stephenson submitted to Geochron oyster that had been collected from Edwards' C-1 unit, two feet below the surface, near the bottom of the shell midden. Why oyster and not the designated charcoal samples were chosen for analysis is not clear.

Radiocarbon dates taken on shell must be corrected for isotopic fractionation to make them comparable to radiocarbon dates derived from charcoal and other botanical remains. Radiocarbon laboratories working in the Southeast have found that Archaic dates derived from oyster shell from the Archaic period between 3000 and 4000 years ago generally date to between 360 and 410 years earlier once isotopic fractionation is conducted, that is once the dates are "corrected" and "conventional" dates obtained. The two uncorrected dates we obtained from Geochron for our excavation in 2003 were actually 380 years younger than the conventional ages (Table 4). Using 380 years as a correction factor to estimate the conventional age for Stephenson's date produces an age of 3675 ±110 B.P. Given two sigma, the date could be as old as 3895. This compares well to the youngest date of 4010 ±70 B.P. from EU-1, which, given two standard deviations, could date as recently as 3870, or roughly contemporaneous with Stephenson's date. This is certainly the simplest interpretation of the GX2279 date.

Arguing against the C-1 radiocarbon assay as dating Thom's Creek pottery and occupation is the fact that more recent, "better fired," stamped pottery was found in the C-1 unit (Edwards 1965:24). Edwards never presented precise tabulations of the types or numbers of sherds from each of his units or from the two separate aspect of the site, i.e., the ring and the sand-ridge midden. It is possible that the date from C-1 may be evidence that at least part of the midden was deposited <u>after</u> the construction of the ring. But even at its broadest range, the date reflects a Thom's Creek period occupation, not more recent periods such as Deptford (Edwards 1965:28). In addition, if our interpretation is correct, and the radiocarbon sample came from a depth of two feet, we note that the deepest stamped sherds came from only one foot in depth. Most likely, we simply will not be able to determine if the more recent radiocarbon date from C-1 is culturally significant without obtaining more data.

Ultimately, we need to determine if the area between the C-1 unit up to the G units are physically or temporally associated with the shell ring. Figure 1 shows that the C-1 unit is situated on the periphery of the disturbed area of the shell ring and along the present-day visitor trail (see below for a discussion of the disturbed area). As such, it may actually be part of another midden that Edwards identified as stretching along a "sand ridge" approximately from C-1 to G-1/G-2. This area of midden lay outside our project and is, consequently, not fully described by our maps (e.g., Figure 6). While Edwards interpreted the stamped sherds to indicate more recent occupation on the "sand ridge," he interpreted at least the lower levels of this sand ridge midden to date earlier than the ring itself, (based primarily on the fact that he found clay "spherical fired clay objects" <u>beneath</u> the sand ridge midden, but not in the ring, and he thought that such clay objects predated pottery in the area). To arrive at this conclusion, he interpreted Thom's Creek sherds found in the same sub-midden matrix as the "spherical fired clay objects" as intrusive from the shell midden above (Edwards 1965:260). While there may be an earlier component, we now know fired clay objects are at least partially contemporary with Thom's Creek pottery (e.g., Sassaman 1993), and the temporal occupation of the sand ridge midden remains still requires resolution.

With the minor exceptions noted above, Edwards (1965:18, cf. 24) reported that "all pottery made by the occupants of Sewee Mound can be assigned to a single series, the Awendaw," a series now termed Thom's Creek (Anderson 1982:260; Sassaman and Anderson 1995:44;Trinkley 1983). (Note we have kept the "Awendaw" label for the Finger Impressed we recovered, but it might better be termed Thom's Creek Finger Impressed if Trinkley [1980b:24] is correct about its connection to Thom's Creek Finger Pinched). It is clear that Thom's Creek pottery manufacturers built and used the shell ring. This conclusion is supported by our small sample of sherds, all of which were identified as types related to the Thom's Creek series (Table 5).

Relative to pottery, both radiocarbon dates from EU1 were directly associated with Thom's Creek Finger Pinched variant ceramics. This is important because the previous uncorrected date from Sewee (3295 B.P. ±110) has been used as the chronological marker for the manufacture of Thom's Creek Finger Pinched wares (Trinkley 1980b:14). Our new dates set that manufacture date back as much as 495 years, to 4120 B.P. (conventional) or 3740 B.P. (uncorrected). This date is particularly interesting because it reflects an uncorrected oyster shell date of 3770 ±130 B.P. from Yough Hall that was rejected as dating Finger Pinched pottery (Trinkley 1980b:14), apparently because it appeared to be too early (Williams 1968b:330-331). With the new dates from Sewee, the Yough Hall date warrants reconsideration as does the earliest date for manufacture of Thom's Creek Finger Pinched. [3]

While a number of archeologists have generally viewed Finger Pinched varieties as a late Thom's Creek phase phenomenon (Anderson 1982:250, 1983:32; Sassaman and Anderson 1995:42; Trinkley 1980b:14, 287), others have linked it to earlier Thom's Creek deposits in specific contexts (Anderson 1982:261; Waddell 1965:84). Waddell (1965:84) was the first to discuss the type at length (which he called Awendaw Punctate), and he suggested the Yough Hall date was "valid for the upper level of the Yough Hall Ring; but Awendaw Pottery will probably prove to have been made several hundred years earlier." Waddell (1963:3, 1965:82) actually suggested that the Awendaw Punctate was the earlier phase of Thom's Creek Punctate making it contemporary with Stallings Island. But Waring and Williams (1968a:318, 321; 1968b:330-331) argued strongly against this idea, the prevailing notion being that Thom's Creek post-dated Stallings Island. It seems that Waddell has won this argument, as it is now widely accepted that the two pottery types overlapped in time (e.g., Sassaman 1993; Trinkley 1980b:24). As for Thom's Creek Finger Pinched, the new dates from Sewee support Waddell's other contention, that the type appeared relatively early in the development of the Thom's Creek series. Adjustments for isotopic fractionation of the Yough's Hall and Sewee dates indicate that Finger Pinched pottery dates to even earlier times than previous supporters of the idea had suggested (Table 4).

Shape, Construction, and Function –New vs. Old Maps, New vs. Old Ideas

Edwards' 1965 report on Sewee shell ring was intended to be a preliminary assessment of the site that would be followed by a fuller accounting of his investigations (Edwards 1965:1). Unfortunately, that follow-up accounting never appeared and all copies of the preliminary report that we have been able to obtain lack many of the maps, sketches, and profiles cited in the text. As such, reconstructing the ring's structure based solely on Edwards' descriptions is often difficult (Anderson and Logan 1981:54). While nearly 40 years later, the preliminary report represents one of the most detailed ruminations on the shape, construction techniques, and function of a shell ring that has ever been written, support for Edwards' ideas cannot be objectively rendered due, in part, to the limitations of the extant portions of the preliminary report.

In total Edwards considered seven functional possibilities for the ring: 1) a tradition of Archaic cultures; 2) a religious, ceremonial structure; 3) a fort; 4) a semi-permanent village; 5) a wind-break; 6) a dike; 7) shell refuse from a village located on a wooden platform covering the central plaza; and 8) a fish trap

Outright Edwards dismissed the "tradition" argument as facile, not really a function as much as a label. He was equally dismissive of any ceremonial explanation for the ring, although it is not clear exactly why. Reflective of archeological theory of the time, he contended that the builders, being simple hunter/gatherers, were not sufficiently organized or otherwise capable of socially complex endeavors such as long distance voyage or trade, long term storage of foods, or the long range planning or tenacity required for building a ring as a large scale public works project (Edwards 1965:31, 35-36, 39, 45). (Oddly, he envisioned that although the culture may have not been capable of a large scale ceremonial structure, a single, remarkable "primitive genius" may have been able to come up with the idea, and apparently persuade the culture to build it, not for ceremonial purposes, but for utilitarian ones [Edwards 1965:38, 40-41]).

After rejecting the ring as a ceremonial structure, Edwards dismissed the fort idea (the "sand ridge" overlooking the ring would have made it ineffective, he argued). The idea that the central area held a village that was surrounded by the ring, which served as a wind-break against cold winter winds or as a dike against storm waves was also summarily cast off because the gap in the ring would have left the village subject to both environmental hazards. Similarly, he dismissed the wooden platform idea because it did not account for the gap in the ring, nor the differential height of the midden, the relative even distribution of shell along the inner ring edge, or the absence of shell beneath the plaza. He reasoned that shell must have surely fallen between gaps in the platform, and therefore should be present in the ring's center (but his tests showed it was not). And, deferring to his default argument, because the massive size and shape of the circular platform would had to have been maintained consistently over a long time, a platform was likely beyond the capabilities of its culturally limited builders (Edwards 1965:36)

Ultimately, Edwards settled on the fish trap hypothesis to account for the construction and function of the ring. He argued that sea level was higher at the time of the construction of the ring and the tide flowed in and out twice daily. By placing a gate in the gap on the ring, the ring builders could close it as the tide retreated and capture all the fish trapped within the ring. He suggested that one advantage of this hypothesis over the others was that it did not require of the builders any planning or long term construction effort (which, he argued, was beyond the ring builders' capacities). Rather, the ring started out as a net enclosure in the same spot, then evolved into a wooden fish weir whose interlaced walls were ultimately replaced by shell when a "primitive genius" got the bright idea that shell was more permanent and needed fewer repairs than wooden weirs.

It did not seem to bother Edwards that he had no evidence for net use or a wooden fish weir, or that many of the arguments he used against alternative functions of the ring could equally be applied against the fish trap hypothesis – differential height of the midden along its circumference, regularity of the inner edge, absence of shell in the center. None of these were explained by the fish trap hypothesis. At one point, in fact, he contradicts his earlier argument that no shell existed in the plaza area and suggested that shellfish were deposited in the central area encircled by the ring in order to attract fish (Edwards 1965:38). He overcame his earlier notion that the culture did not have the wherewithal to built such a monumental structure, by invoking his deus ex machina, the "primitive genius." Apparently, upon seeing the wooden fish trap, it was not much of a jump for the genius to come up with the substitution of shell for wood.

Edwards' fish trap hypothesis has been soundly, and rightly, we believe, criticized (Anderson and Logan 1981; Cable 1995; Trinkley 1985), and our intent is not to beat a dead horse. Rather we hope only to summarize and reinforce earlier critiques to help put the idea to rest, for it is this idea, perhaps, more than any other that has captured the public imagination (based on informal interviews with visitors to the site). For Edwards the fish trap hypothesis resolved a number of issues concerning the ring that he thought were crucial – it explained the gap in the ring, the ring's height (at least a meter in all places to hold in water), and its orientation and location.

Edwards spent a lot of print explaining that the orientation of the gap in the ring was at the exact optimum angle for the collection of fish – "a compromise between the intersection of the ring and a line perpendicular to the coast and bisecting the ring, and a similar point on a bisecting line perpendicular to the shore of the embayment" (Edwards 1965:38). He argued that such perpendicularity results in the optimum orientation because pounding waves within the estuary (embayment), in which he supposed the shell ring lay, would be weakest at the gap, and that would somehow encourage fish to enter. Unfortunately, to make his fish trap work, he needed sea levels substantially higher than they stand now, and he did not know what we now know – that at the time the ring was built, sea-level was actually lower than it is today and the site was likely sitting well above even the highest normal daily tides (Cable 1995:108; Colquhoun et al.1981:146). The site's function as a fish trap was, thus, physically impossible during the time it was built. It did not lay in an embayment. In terms of the hypothesis explaining the ring's height and location in the estuary, a fish trap actually offers no advantage over any of the other possible functions – it was not submerged by daily tides and thus it required no great height to keep fish in.

Edwards' preoccupation with explaining the "gap" or "hiatus" in the ring, more than any other feature, likely leaned him toward the fish trap hypothesis. However, as our shell thickness maps demonstrate (Figure 10 and Figure 11), there really is no gap in the shell ring, only a section where today the shell lies mostly below high tide, but during the time it was constructed, stood at least a meter above ground level (cf. Gardner 1992:49). Where the supposed gap lay on the southeast side of the ring, there lies as much as 1 meter of shell beneath the marsh surface. Such low spots are not unique among shell rings that lie within marsh environments today and, which are subject to storm surges or daily tides (Russo and Heide 2002; Russo and Saunders 1999). It has been proposed at these rings, as well as at Sewee (Cable 1995:108) that tidal and storm waters have worked to open or expand these areas as sea level has risen and breached the ring walls, flooding formerly dry, central plazas. This is not to suggest that all "openings" in rings were once closed walls of shell. Other rings have shown gaps to be intentional constructions (e.g., Dickel 1992; Russo 1991; Russo and Saunders 1999; Russo et al. 2002). But care and investigation are warranted when determining whether a ring circle was once closed or not, because other "semi-circular" rings presumed to contain breached and destroyed walls (e.g., Cable 1995:108), have proven, upon investigation, to lack evidence of breach (Russo 2002:89-90).[4]

The probe data suggests that Sewee was built in the shape of a closed circle, not the open C-shape that archeologists have assumed (Edwards 1965; Gardner 1992:49; Hemmings 1970; Stephenson 1973; cf. Cable 1995:111). Despite some quarrying activity on the northeast side, the ring still contains a continuous circle of shell, although the northeast disturbance has resulted in a considerably asymmetrical circle (Figure 12). Great depressions containing little or no shell characterize these areas of the ring (Areas A and B, Figure 12), and a small arm of shell extending north of the ring places shell outside the general boundaries of the circle of shell (northern portion

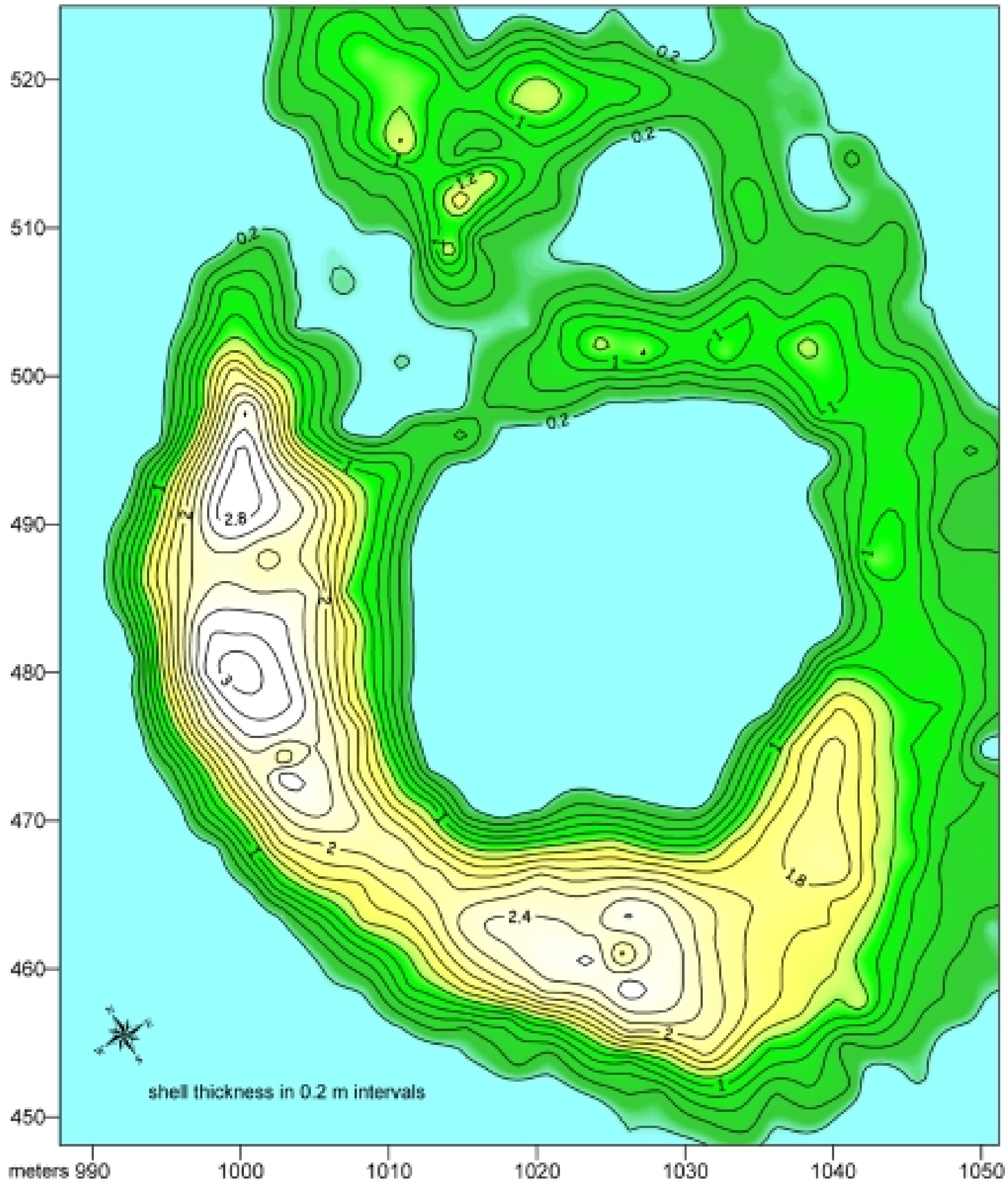


Figure 10. Sewee Shell Ring, shell thickness contour map.

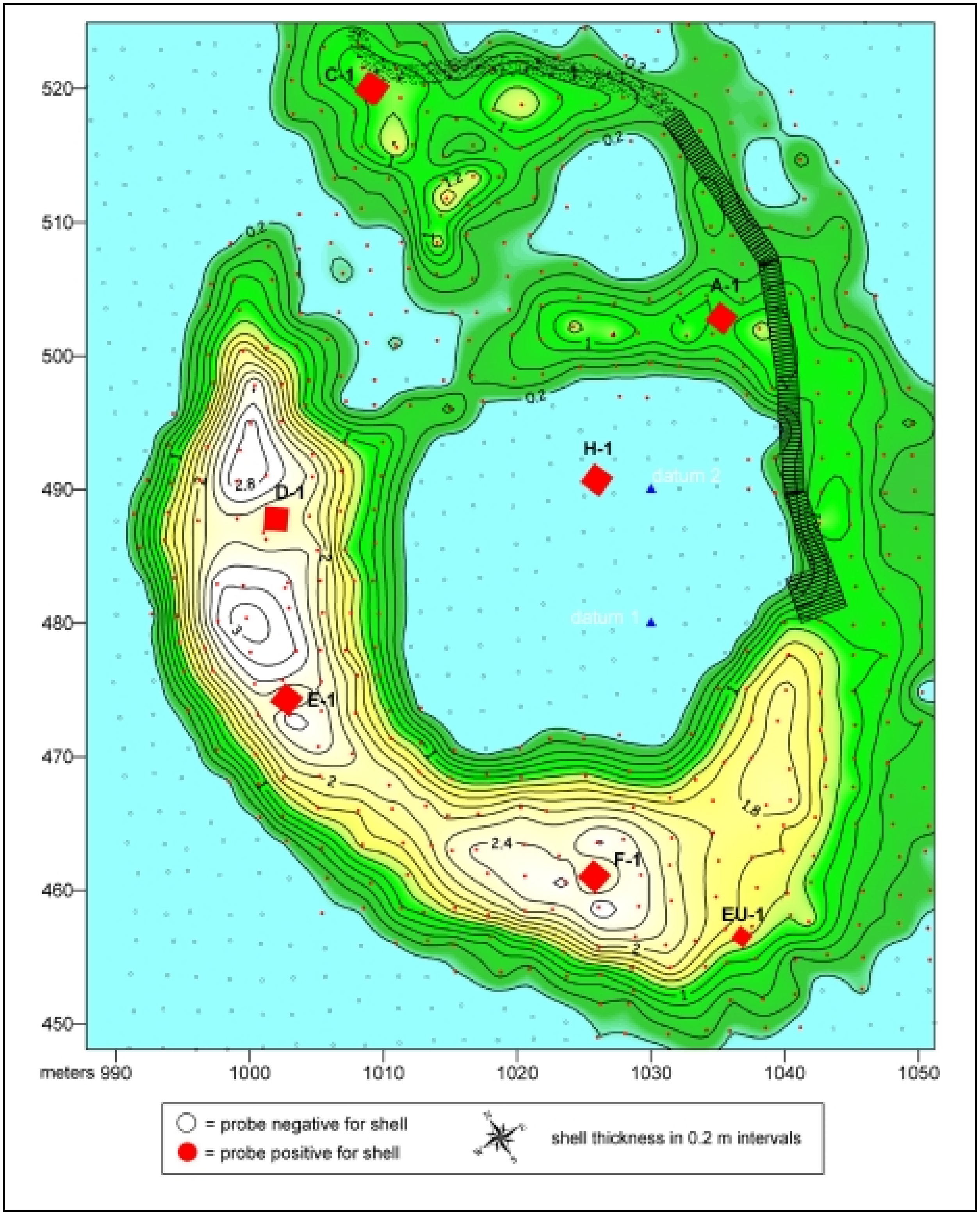


Figure 11. Sewee Shell Ring, shell thickness contour map with boardwalk, excavation units, datums and probes.

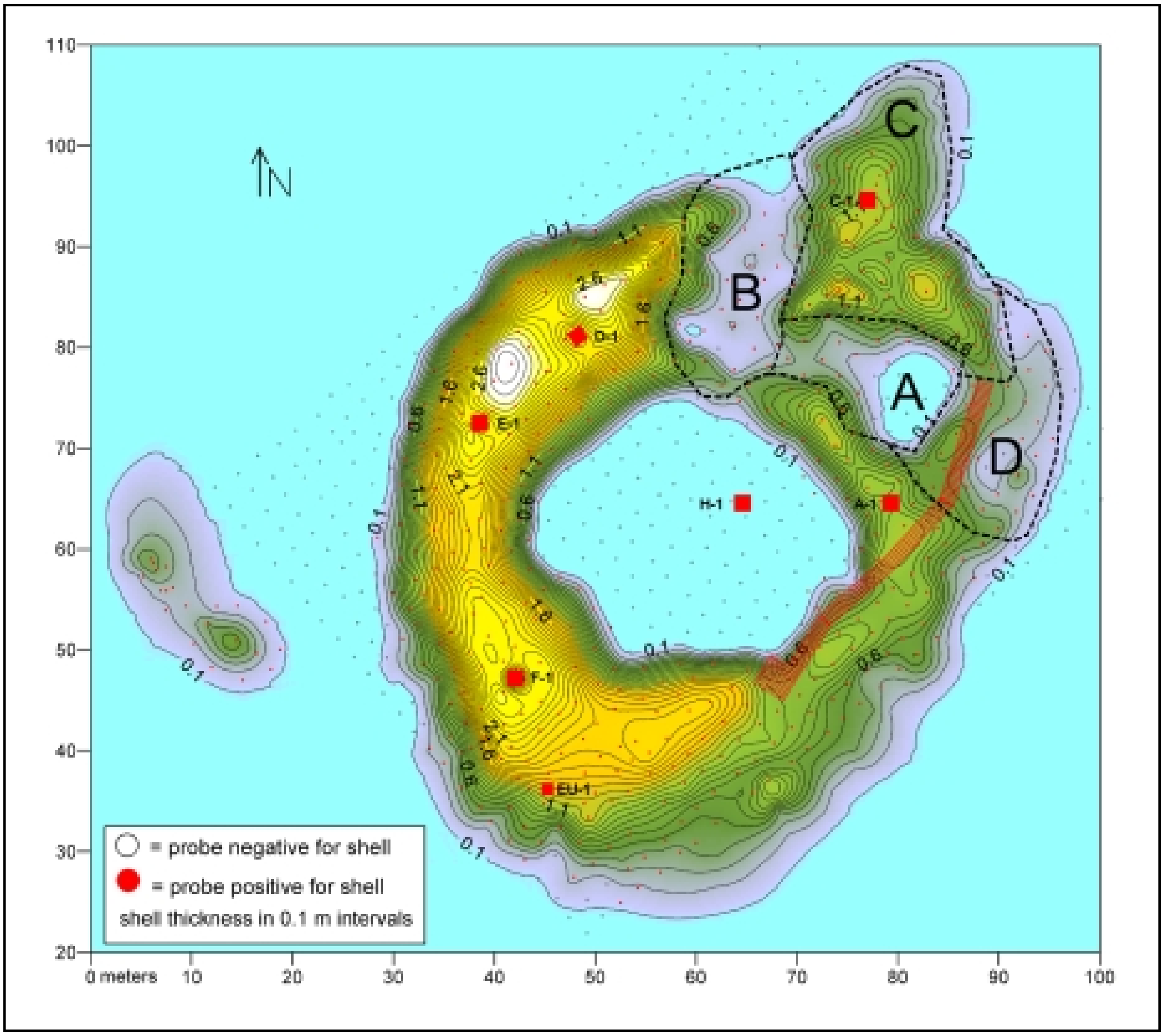


Figure 12. Sewee Shell Ring, shell thickness contour map showing areas of disturbance (A-D), probes, adjacent southwest shell deposit, limits of probes, and extrapolation of contour lines.

of Area C, Figure 12). This arm may be undisturbed midden connecting the ring to the "sand ridge" midden Edwards identified to the north, or it may be, in whole or part, spoil or road construction associated with the mining of shell.

In either case, the true shape of the ring has been impacted by the mining activity causing some difficulty in reconstructing the ring's original shape. While the quarried areas today topographically represent the lowest points in the circle of shell above marsh levels (Areas A, B and D, Figure 12), Edwards posited that at one time, these areas must have contained the highest points in the shell ring. He states that while "the long west arc of the shell-ring is fairly narrow and quite high . . . the much shorter east arc is very much broader and originally higher than the west arc" (Edwards 1965:8). He thought the disturbed area in the northeast section of the ring, we presume somewhere between A-1 and C-1, may have once contained as much 5 meters of shell (Edwards 1965:9). Unfortunately, Edwards does not inform the reader as to why he believes the highly disturbed eastern arc was once higher than the western arc. We assume the "broadness" of this area, in part, accounts for his suggestion of great height. At excavation D-1 on the west arc the base of the ring is about 17 meters, while at excavation C-1 on the east arc the base is somewhere between 23 and 30 meters. We assume that Edwards reckoned that if a 17 meter base can support a midden 3 meters high on the west arc, a 30 meter base could have supported a much taller mounding of shell on the east arc. He supports his contention of great height in the eastern arm by noting that "the undisturbed portion" of the ring in this area, though today, of minimal height, is still very steep (Edwards 1965:9). Yet our measures show this area to be certainly no steeper, and possibly less steep than any of the steepest portions of the ring in the west ring wall (Figure 7).

While shell deposits are quite extensive (i.e., "broad") in the northeast portion of the ring, they may not reflect the shell's original distribution. The possibility of great lateral disturbance here combined with the intersection with the "sand ridge" midden leaves the question of original shape of the ring at this point rife with unsolved questions. Note that areas A and B in the disturbed area generally lack shell except for a thin scatter due, presumably, to the removal of the shell by heavy machinery (Figure 12; Edwards 1965:9). But area C consists of varying depths of shell with relatively deep piles up to a 1.4 meters thick. Are these push piles from quarrying activities or remnants of midden left undisturbed by mining operations? If push piles, the ring base here may be disturbed significantly and the broadness owes nothing to former ring height. If in situ midden, the ring base may support Edwards' contention of a broad base. Only more data can answer this puzzle.

In lieu of this data, we conclude that the original ring shape was a closed circle that ranged in thickness on the southeast side at over a meter (now buried beneath the marsh) to over three meters on the northwest side. It is possible that the height of shell deposits on the southeast portion of the ring may have been greater at one time, but have been subsequently been reduced by tidal erosion. The exact shape and height of the northeast area of the ring, at this point, cannot be determined, but it was part of a closed circle of shell that made up the ring. This area's outward lateral extent of shell may, today, be exaggerated by disturbance.

Comparison of the 1965 and 2003 maps

Comparing our surface topography map to that of Edwards, a few differences are apparent. Based largely on the likelihood that we took more readings in the field and produced our map on a computer program (Figure 12), our map evinces more detail and surface variation in the ring than does Edwards' (cf. Figure 1 and Figure 13). Edwards' map from the 60N point to the north, and from the 20N point to the south appears distorted. Above 60N the disturbed area north of unit A-1 is more elongated to the north (Figure 1) than we observed (Figure 12, Area A) and Edwards' ring apex between E-1 and D-1 is broader and less steep. Overall, Edwards' map displays less variation in surface topography in the disturbed areas than our map indicates.

Although the general shapes and location of features are similar in both maps, the differences between the two are quite large. For example, placing the location of our excavation on Edwards' map, EU-1 ends up in the marsh, well off the ring (Figure 1). In Figure 1, which was drawn from Edwards' contour map, and in Figure 11, we have overlain Edwards' excavation units along with the path and boardwalk and our EU-1, which, of course, were not present when Edwards drew his map. We relocated and mapped Edward's excavation units D-1, E-1, and F-1. Consequently, their spatial relationships to EU-1 and the boardwalk and path are accurately depicted in both Figures 1 and 11. The relationship of the other features (A-1, C-1, G1/2, and H-1) were drawn after Cable's (1995) redrawing of Edwards 1965 map and their spatial relation to other features may not be as accurate. The overlay suggests that Edwards' map of the ring near EU-1 is too narrow across the base (compare Figures 1 and 11), and that is why EU-1, which was placed on top of 1.5 meters of shell, is shown lying in the marsh on Edwards' map (Figure 1) where no shell is indicated.

Because we measured contours within the marsh, our map also shows more surface variation in the plaza and marsh than Edwards' map (cf. Figure 1 and Figure 7). While these variations may have no relation to cultural aspects of the site, at least two may be significant. One is the high spot in the plaza (20 cm above the general plaza level, Figure 7) just west of H-1. This location is near the base of the highest extant elevation in the ring (near D-1). A similar high plaza elevation has been noted in Fig Island 2 (Heide 2002:82; Hemmings 1970:13), also at the base of the highest shell elevation. Both high spots consist of sand, not the marsh muck that surrounds each site. Whether they were constructed by humans, or are the result of tidal reworking of sands in the plaza is a question to be answered with more study.

Another potentially significant feature revealed by our maps, but not clearly described on Edwards' map, is the slough between the ring and the western oyster shell midden (cf. Figure 1 and Figure 13). Separating the two shell deposits is a shallow slough with no shell in its base (compare Figures 12 and 13). The absence of shell between the two features, ring and midden, indicates they were likely never a single architectural construction of shell. Combined with data on the shape of the western shell midden (Figure 12 and Figure 14), it does not appear that the midden is a shell ring, and certainly not a conjoined ring in the manner of Skull Creek (cf. Cable 1995:112). In summary, we believe that our surface topography maps are more reflective of reality than that of Edwards, in part

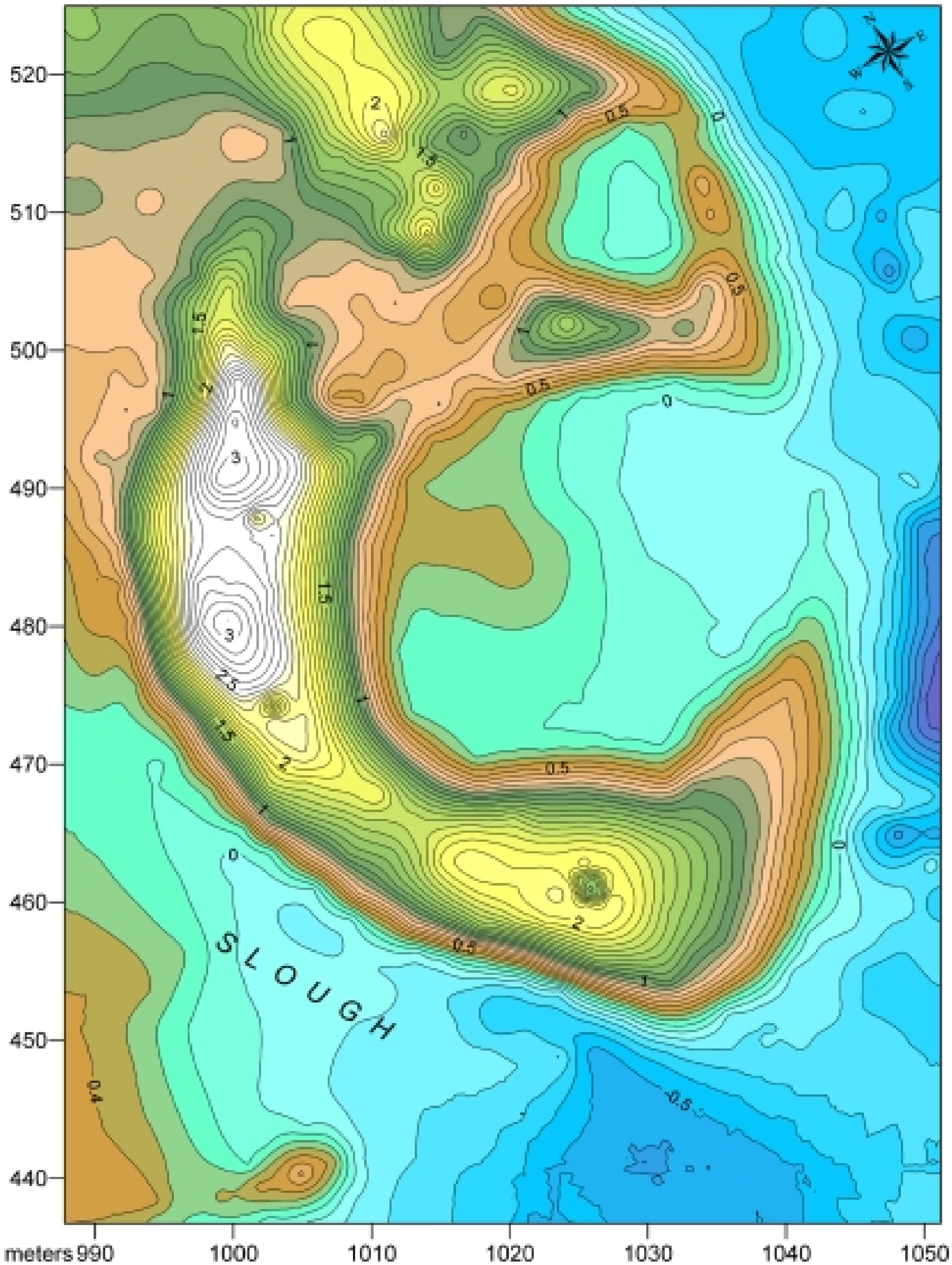


Figure 13. Sewee Shell Ring and adjacent shell deposit, surface contour, April 2003 highlighting slough between the two features.

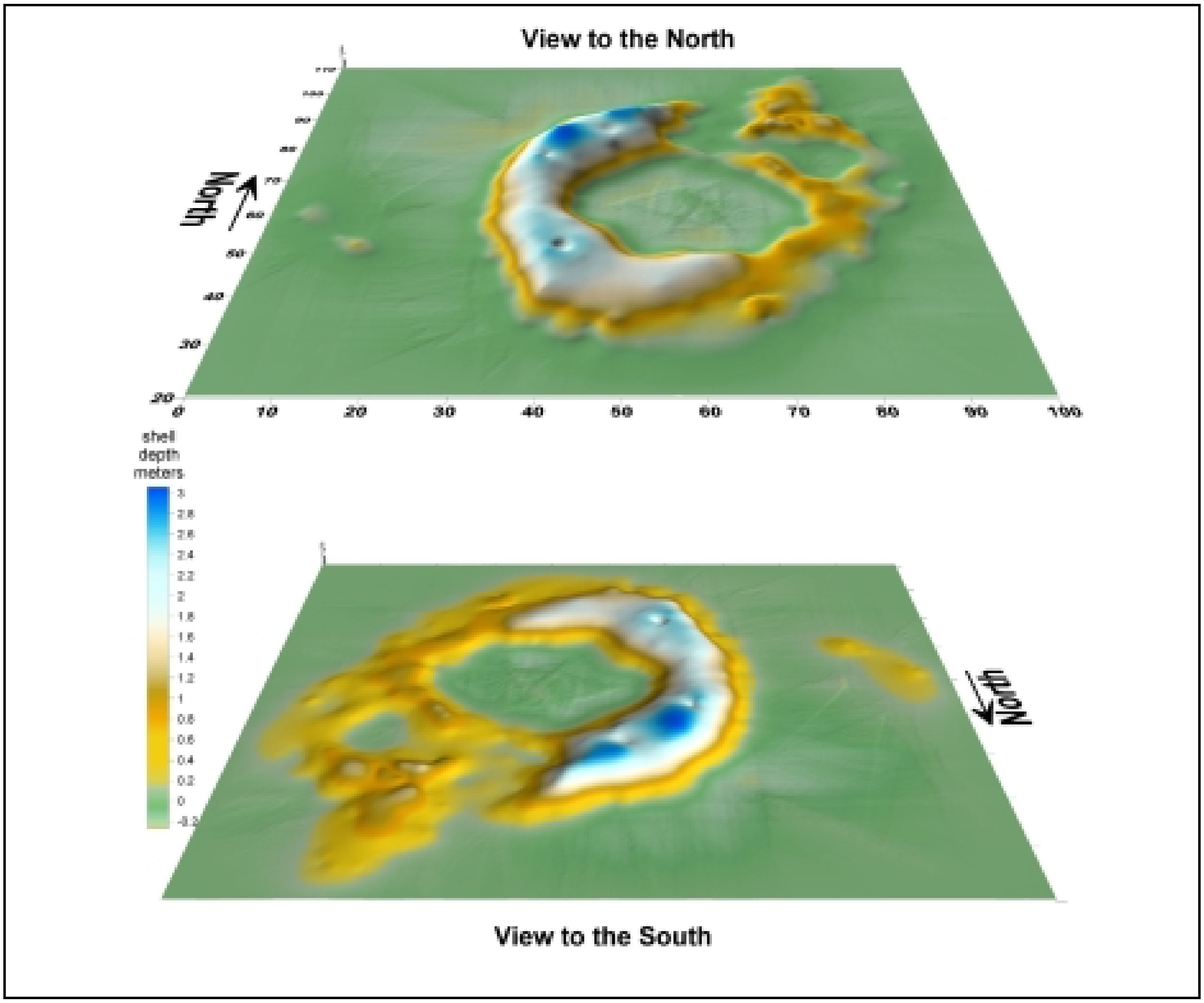


Figure 14. 3-D surface views of shell deposits of Sewee Shell Ring and nearby shell midden.

because we gathered more data and we gathered the data systematically. The number of points upon which Edwards collected elevation readings is unknown, but we suspect is fewer than we took. In addition he "eyed" many of these and he does not indicate a systematic coverage of the site anywhere in his description of his methodology. This is why his depiction of the disturbed areas of the ring appear less detailed and somewhat distorted.

Despite these facts, both Edwards and our maps suffer from similar problems inherent in surface topography maps. As the reader can see by comparing the two Sewee maps (Figure 15 A, B), neither accurately define ring boundaries. The north side in both Edwards' and our map is problematic, with no clear contour indicating the end of the shell ring. Along the southern and western sides of the ring, the steepness of the ring slopes is apparent in both maps and serves to distinguish fairly clearly where the ring begins above the relatively level marsh. Edwards has improved this visibility by not including any contours in the marsh. This is a subjective decision. The cartographer has assumed that the ring begins above the marsh. We subjectively accomplished the same goal by coloring contours (Figure 13). Without the color, contours tend to blend and obscure the ring from the surrounding marsh (Figure 15 B).

Shell thickness maps solve these problems to a great degree. Every contour line clearly evinces the horizontal and vertical distribution of shell, not marsh, sand ridges or other topographic features (Figure 15 C). If a shell ring is defined by the distribution of shell, then shell thickness contours maps provide a better graphic representation of shell rings. They show exactly where

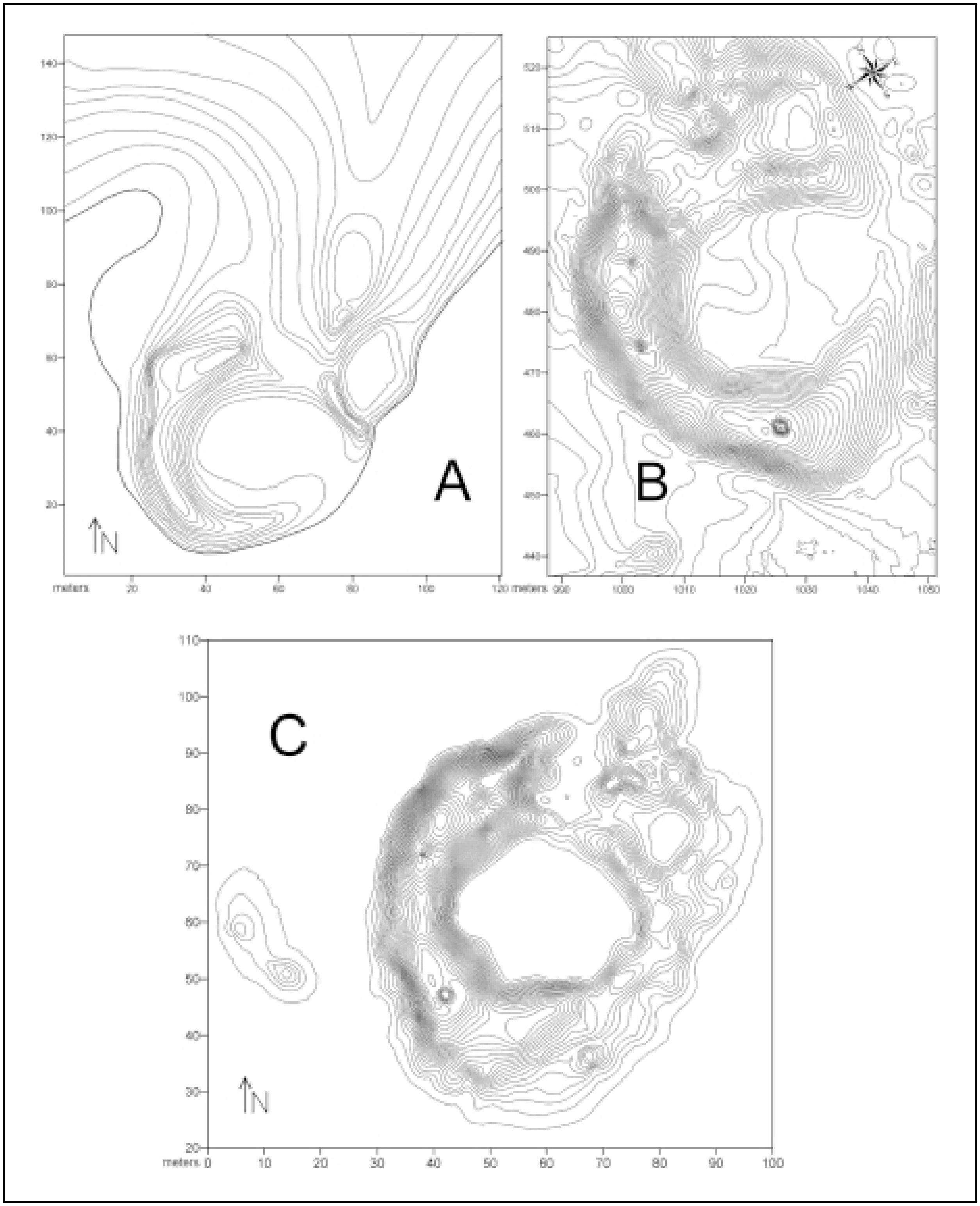


Figure 15. Sewee Shell Ring, comparison of surface contour maps A (30 cm contour intervals, after Edwards 1965) and B (10 cm contour intervals, 2003) to shell thickness contour map C (10 cm contour intervals, 2003).

shell is and is not, and display the depth of the deposits without confusing those elevation readings with natural, non-shell topography.

But while shell thickness maps solve the major problem of defining shell ring limits, they cannot distinguish between overlapping or abutting shell deposits, as we suspect may occur on the extreme northern edge of the map (Figure 15 C). This is where Edwards suggests that the "sand ridge midden" meets the shell ring midden. Which part of the shell in this area belongs to each site cannot be determined with probes alone.[5]

Using the shell thickness data and the program Surfer® we calculate the volume of shell in the ring to be 2900 cubic meters. This estimate is not far off from Edwards' (1965:50) estimate of "midden" at 90,000 cubic feet or 2,548 cubic meters. However, Edwards' calculations were for the volume of midden he guessed was there before modern quarrying activity hauled away much of the northeast quadrant of the ring; whereas, we included only extant shell deposits, not the shell that has been quarried and removed from the site. It is unclear whether Edwards included any or all of the "shell ridge" midden in his calculations, but we can certainly surmise that he did not include the midden we identified with probes that lies below the marsh. In our estimate of volume, only the shell described by our probes for the ring described in Figure 14 was measured. We excluded from our estimate the shell midden southwest of the ring. Estimating that up to ¼ of the shell has been removed from the ring, 3,600 cubic meters of shell may have originally existed in the ring. Few other rings have had measurements of their shell volume calculated, but Sewee seems to be one of the larger of the single rings in South Carolina in terms of volume and shell thickness (Table 8).

As stated, because Edwards never mentioned where he believed the ring began and ended, it is difficult to determine how large he thought the ring was. Hemmings and Waddell (cited in Cable 1995), however, indicated on their 1970 sketch map that the greatest ring exterior diameter measured 64.6 meters, only a bit more than the smallest measure of diameter we took (Cable 1995:111, 113; Table 8; Figure 16). The largest diameter measure we took, excluding the area abutting the "sand ridge midden," was 75 meters including the disturbed area and 73 meters outside the disturbance (Figure 16). Their map also showed that the base ranged between 14 and 22 meters in width (Cable 1995:111, 113). While the smaller width agrees fairly well with our measures including the shell distribution beneath the marsh, we found that greatest base (wall thickness) was larger at 28 meters in the disturbed area (excluding the "sand ridge" area) and 27 meters in the undisturbed areas (cf. Cable 1995:113 and Figure 16; see Glossary for a more detailed discussion of metric attributes). In the northeast quadrant where the "sand ridge midden" abuts the ring and where disturbance has occurred. the base width even exceeds 30 meters, we suggest this area not be included into any discussion of ring size until it is better studied. In short, the shell thickness map identifies most metric attributes of the ring as larger than previous studies had estimated.

Table 8. Metric Comparison Among Ring Sites Measured for Shell Distribution (in meters)

Ring	Shell Volume (m^3)	Greatest Shell Thickness	Greatest/Least Ring Diameter	Greatest/Least Plaza Diameter
Sewee	2,900[a]	3.15	75 /61	31/25
Coosaw 1	742[b]	1.73	64/32	34/22
Coosaw 2	742[b]	1.73	62/49	23/22
Coosaw 3	460[a]	0.64[a]	58/50	34/25
Fig Island 1	22,114	5.5	157/111	24/18
Fig Island 2	2,178	2.05	85/75	54/50
Fig Island 3	1.202	1.85	44/49	27/22
Guana	4,000	1.30	180/135	145/100

[a] This ring metric has been significantly reduced by modern disturbance.

[b] Coosaw 1 and 2 are conjoined rings whose total volume equals 1,483 m^3. The estimated volume of each ring has been derived simply by dividing the total volume in half. Alternative methods for determining volume would include assigning the shared wall to one or the other ring, or dividing the volume of the shared wall between the two. The estimate for each individual ring given here serves only to provide the reader with an approximate volume for comparison to other rings.

Aside from the mined area and the tidally eroded area east of the ring (the condition of which is unknown), the rest of the ring is in relatively good shape (i.e., not severely looted nor highly eroded). Three of Edwards' 1965 units were relocated and mapped (i.e., F-1, E-1, D-1). We think we found Edward's A-1 unit, but did not remap its location in the field. Rather, A-1, as well as C-1, G-1/2, and H-1 locations on our maps are based on Edwards' 1965 map. All of Edwards's units that we identified in the field contained insufficient backfill. As a result, depressions up to a meter deep and spoil piles up to a meter high are visible (Figure 12 and Figure 13).

Although, Edwards did not measure shell thickness across the site, he does suggest that a point northwest of D-1 was the "highest present elevation" at nearly 5 meters above "estimated mean sea level (apparently his "0" elevation). Unfortunately, his map shows only 3.6 meters (ca. 11 feet) as the highest elevation. Nonetheless, the slightly lower-lying D-1 unit itself did have 2.6 meters midden depth, which he states is the thickest/highest deposit of extant shell. Our probes indicate that the area west of D-1 contains up to 3.15 meters of shell representing both the deepest and tallest deposits of shell.

In order to test the accuracy of our probe readings, we compared them to those shell depth descriptions of Edwards' provided from his excavation units. This served both to confirm his descriptions of shell depth and to act as a control for our probe readings on shell depth (Table 9). All of our probes are within 10 cm of depths recorded by Edwards, suggesting a high degree of accuracy for the probing technique. We note relative to D-1 that Edwards (1965:9) remarked that shell thicknesses varied by up to

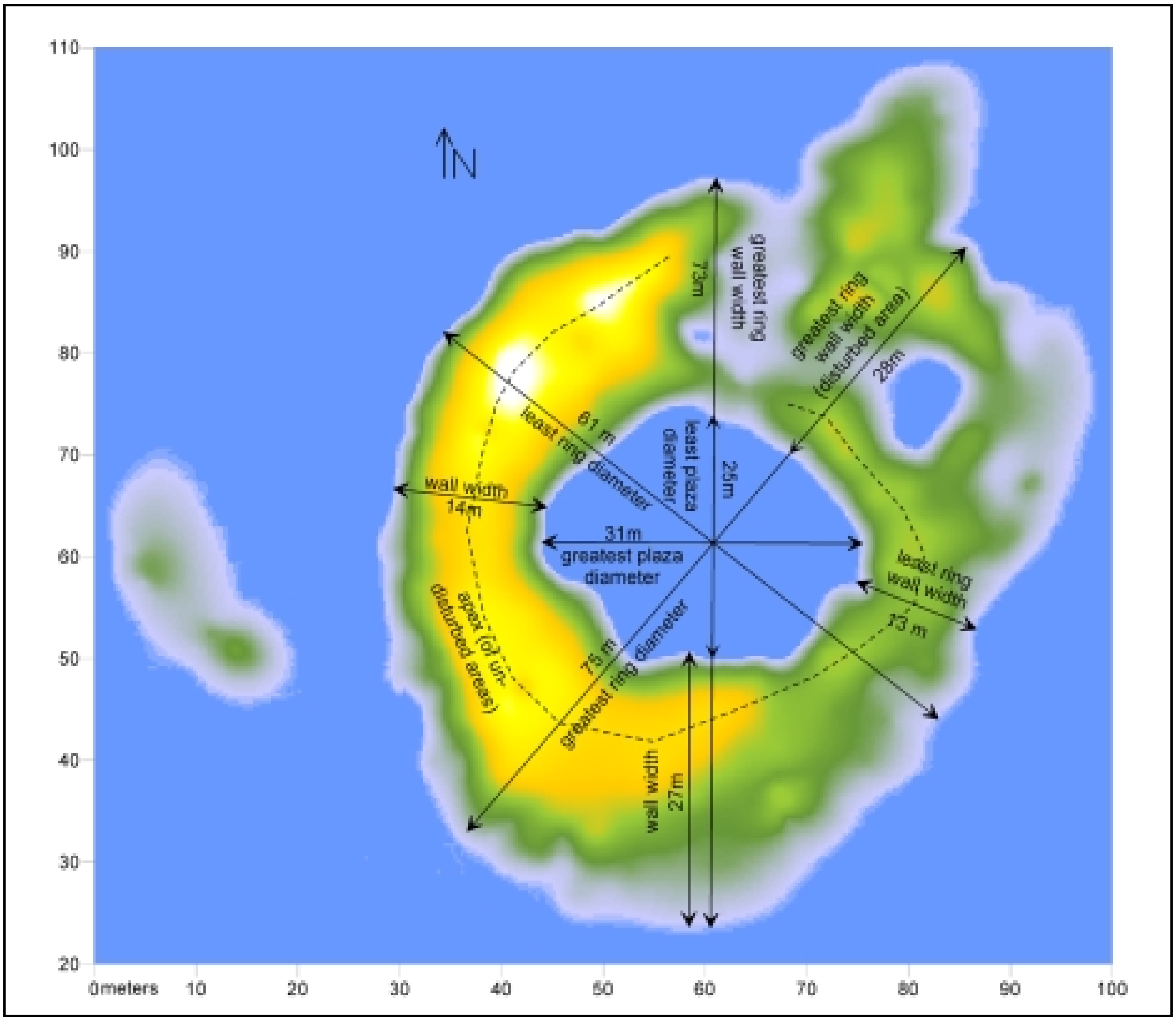


Figure 16. Metric dimensions of Sewee Shell Ring.

20 cm in the unit. Edwards did not note the thickness of shell in unit E-1.

Comparing Sewee Data to Theories of Shell Ring Construction and Function

Now that more accurate cartographic representations of the Sewee shell ring exist, and now that more data and literature on shell rings has been produced over the last 40 years, we can offer a more informed argument for the function and techniques used in construction of Sewee than was possible in Edwards' report. While the kinds and distributions of pottery and other material culture are typically used to interpret function of sites, we have limited amounts of this data for Sewee. Therefore, we focus our discussion on shape and construction features of shell rings in general, and Sewee in particular.

Today three primary theories have been offered to account for the shape and method of construction of Archaic shell rings from South Carolina to Florida. The first, termed the gradual accumulation theory, suggests that shell rings functioned as living places for small groups of individuals made up of nuclear families. These families lived on top of the level surfaces of shell rings in individual houses 3-5 meters in diameter, spread equally 3-5 meters apart. No single house and no individual stood out or above the remaining village population because the ring builders were egalitarian in social organization. The circular shape of the ring befit such egalitarianism perfectly because its geometry was symmetrical – no single point in a level shell circle is distinguishable from another (cf., Russo n.d.; Trinkley 1985, 1997). All locations in the ring are equal in terms of geometry and social status.

The "gradual accumulation" of the theory refers to the way the shell was deposited in the ring. With domiciles located on top of the ring, the shell from daily meals accumulated beneath the houses and otherwise underfoot. Shell ring builders did not have separate garbage dumps. The rings themselves served both as garbage dumps and habitation sites, the height of the rings of shell increasing due to the gradual accumulation of shell and other refuse through time. Proponents of this theory thus suggest that the shell in shell rings can be distinguished in profile by horizontal layers consisting of crushed shell, bone, and other aspects of material cultures whose broken nature, in part, is derived from the continual treading of villagers carrying out their daily living activities. Other features in a shell rings would include roasting and storage pits (now filled with shell), hearths, and post molds of homes and other minor structures (Trinkley 1975, 1980a, 1985, 1997).

In opposition to the gradual accumulation theory Cable (1997) offered the ceremonial mound theory. Basing his theory on evidence from Sewee and two profiles from excavation units at two other shell rings (Calmes 1967), as well as his own work at a possible ring site (Cable 1993), he suggested that the unusual shape of the midden was "intentional," not the result of the haphazard discard of refuse underfoot. At Sewee, he suggested that families lived not on the ring, but at some distance "around" it as evidenced by small middens (to the north). These families employed the "domestic refuse" from their home sites to construct the ring for ceremony and other public activities of the larger group. In contrast to the gradual accumulation of domestic refuse underfoot, Cable suggested that the construction of the ring was a short-term community affair, a public works as it were, not the result of daily accumulation, but of community-wide building efforts every 10-20 years.

Under the ceremonial theory, the method of ring construction consisted of two phases. Apparently, after unconsolidated shell was placed in a circle during a feast at the ring, it was held in place, "capped," or "stabilized" with the crushed, heavily organic refuse brought to the site from the surrounding homesteads. Cable (1997) concluded that in profile a ring would evince the original "massive," central ring of "unconsolidated" shell "capped" with thin, domestic residue. He suggested that bands of clean, relatively whole oyster (recurrent feast refuse?) were overlain by the thinner layers of darker, crushed domestic refuse ("capping" deposits) on the slanting interior and exterior walls of the ring. In his terminology, the layers were thus stratified "horizontally" rather than vertically, on top of the original shell ring. With this method the ring grew wider, and to a lesser extent, higher (Figure 17).

To compare the descriptive capacity of each model of ring construction, the reader needs to understand the

Table 9. Comparison (in meters) of Described or Drawn Thickness of Shell in Excavation Units to Contour Lines of Shell Depth as Determined by Probes (Figure 8)

Measures of shell thickness	A-1	C-1	D-1	F-1	H-1	EU-1
Excavation Units	1	1	2.3 to 2.5	2.7	0	1.5
2003 probes	1	1	2.2	2.6	0	1.4

evidentiary limits and goals of each of the theorists—neither the gradual nor the ceremonial theory were based on abundant, and/or clearly described, understood, or applicable data; and each theorist initially excavated or reviewed the literature on rings, not to gain insight into ring structure, but examine other archeological problems. This is not to say their studies were incompatible with modeling ring functions. But the data behind their theories, as well as their predictions, do not wholly, or even partially, agree with other archeological findings. Many, but not all, of the features Trinkley linked to the gradual accumulation have been found at other ring sites, but they do not constitute the preponderance of construction in shell rings. And the layout of the architectural features Cable predicted for shell rings has yet to be corroborated.

To begin with, Cable's theoretical impetus was to gain an understanding of the unusual distribution of pottery he had found at one site he thought might be a remnant shell ring (Cable 1997, 1993).

> "Through my own analysis of pottery types from the various stratigraphic contexts of available shell rings I have found that the deposits were laid down horizontally rather than on top of another, a pattern which would better fit the capping process that would occur if the rings had been intentionally constructed." (Cable 1997).

That is, Cable, right or wrong, initially identified the distribution of pottery, not shell, as being laid down "horizontally" through time. He later, and logically, assumed the shell in which the pottery laid would have to chronologically accompany the pottery. Seeing in two profile drawings from Calmes' (1967) excavations at the Skull Creek and Sea Pines shell rings the possible "horizontal" distributions of shell, Cable posited his ceremonial theory. In Cable's view, deposits of shell were added to "symmetrically and concentrically" as "massive," "intentional building episodes" to the original ring as periodic construction projects on the ring (Cable 1997). Under this scenario, pottery of more recent origin would be located on the outside and inside walls of rings ("symmetrically and concentrically") while older pottery would be limited to the initial ring located at "apex" or midpoint of the final shell ring (Cable 1997; cf. Cable 1993:179,180,189).

It is important to note, that while he cites Calmes' (1967) profiles in support of his theory of the "horizontal" layering of shell in ring construction, he did not examine the pottery distribution from either site, in part, we assume, because neither of the rings had been excavated in a manner that could be used to test the theory of pottery distribution. That is, no cross-cutting trench was excavated that would allow for the recovery of pottery from all locational aspects of the ring. Rather, isolated, small excavation units were dug, and only in limited parts of

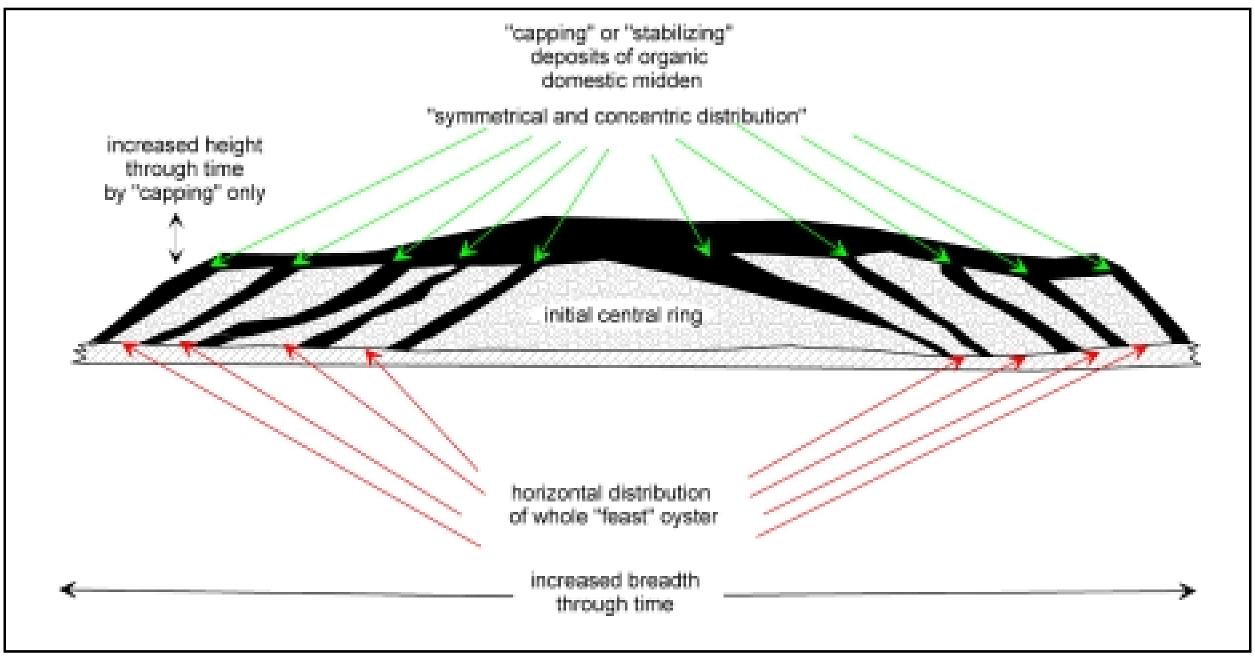


Figure 17. Idealized crosscutting ring profile showing horizontally deposited shell building stages as suggested by Cable (1997).

the ring. Consequently, there is no evidence from either ring that earlier or later pottery is found distributed "horizontally" as Cable suggests. In terms of the shell being distributed "horizontally" in "concentric and symmetrical" rings, we believe this is a misinterpretation of Calmes' profiles (see below).

Cable's "analysis of pottery types from various stratigraphic contexts of available rings" most likely refers to the Spanish Mount site (Cable 1993). A close look at the ceramic distribution he describes from the site, however, suggests that Spanish Mount does not exhibit the full pattern suggested for ceremonial rings. Spanish Mount is an eroded, mounded shell midden that Cable considered to have originally been a shell ring (Cable 1993). The model he described to explain the pottery distribution in the mound differed somewhat from his proposed ceremonial model in several respects. For one, he suggested the ring was "laterally accreted" (Cable 1993:179), a term more suggestive of gradual accumulation than formal stage construction. The "accretion," however, is "horizontal" rather than vertical, but the order in which the ring was built, however, is not symmetrical or concentric as predicted by the ceremonial theory. According to his horizontal seriation of pottery from the site, pottery (and presumably shell) was deposited near the outermost edge of the site first (Unit A); then somewhere near the "apex" or middle (Units C and D) came the next deposit of ceramics (presumably in a concentric ring); then deposits between these two followed (Unit B); then the outermost deposit (Trench 11); and finally the interior wall of the ring (Trench 2) completed the construction (Cable 1993:179-180; Figure 18). Thus younger ceramics were found on the inside edge of the ring.

As with his ceremonial theory, Cable viewed Spanish Mount as being built, at least in part, by the use of midden deposits from other, older sites that were used to "cap" and "stabilize" the ring. But in the case of Spanish Mount, these midden layers were not horizontallly deposited (slanted) cappings as the ceremonial model predicted, but were laid on top of the ring, as an upper strata used to "stabilize" the surface for habitation (Cable 1993:183). How such addition of midden to the ring would serve to "stabilize" it is not explained, but it is this capping that brought older pottery to the upper strata of the ring and offered an explanation for Cable as to how older pottery, seemingly out of chronological sequence, came to be deposited at Spanish Mount.[6]

Whether Spanish Mount was a shell ring or not remains open to interpretation. But to date, there are no supporting data from any confirmed shell ring, including Sewee, that evinces earlier pottery in one part of a ring wall than is found in adjacent parts of the wall. Nor is there evidence that older pottery overlays younger on a ring-wide basis. In part, this is because at Sewee (Edwards 1965) and other shell rings in South Carolina (Calmes 1967; Trinkley 1985), excavations have not been conducted that are susceptible to testing Cable's theory of artifact distribution. Usually, only small excavations have been placed, often near the central portions of ring walls, and not on the interior and exterior slopes in the same ring. Here, and even where cross-cutting trenches have been placed, such as at Rollins (Russo and Saunders 1999), Fig Island (Saunders 2002a) and Sapelo (Waring and Larson 1968), pottery was not recovered or reported in such a manner as to allow comparison between interior, exterior or central portions of the ring wall. One important exception is the Guana ring in northeast Florida. It is one of the few rings where test units were placed in all three areas (interior, exterior, apex). There, no differences in age or distribution of ceramics were noted among these locations (Russo et al. 2002). The Orange pottery seemed in stratigraphic order, with only small amounts of more recent pottery overlying it. In general, the "reverse stratigraphy" or anomalous horizontal distribution patterns Cable found at Spanish Mount and endeavored to explain through a rather convoluted series of deposit episodes has not been identified at any shell ring. Vertical stratification is the norm (Heide 2003; Marrinan 1975:206-216; Russo et al. 2002; Saunders 2002a; Waring and Larson 1968:274).

There is little support in the archeological record for certain aspects of Cable's and Trinkley's theories, they do offer insight into the construction and function of shell rings. Employing aspects of these, as well as grounding from spatial (GrØn 1991) and feasting theories (Hayden 2001), we offer a third model of ring building and function that is parsimonious in explaining common ring features. We recognize that in general shell rings have shown evidence that suggests they are places of both habitation and ceremony, (an idea suggested by Waring and Larson in1968), not simply one or the other. In ethnographic literature, people who live in circular villages with central plazas use those plazas for conducting feasts and other ceremonies such as dances, games, funerals, and oratory in societies with levels of organization more complex than simple hunter/gatherer egalitarianism (i.e., in transegalitarian or simple chiefdom societies) (Russo n.d.). To build a plaza requires community agreement, but not necessarily a monumental effort in construction. Rather, the simple act of arranging households around a central loci may suffice (e.g., Shoenauer 2000; cf. Heckenberger et al. 1999).

In circular village settings, domestic and public ceremonial spaces may exist side by side, with the level of individual

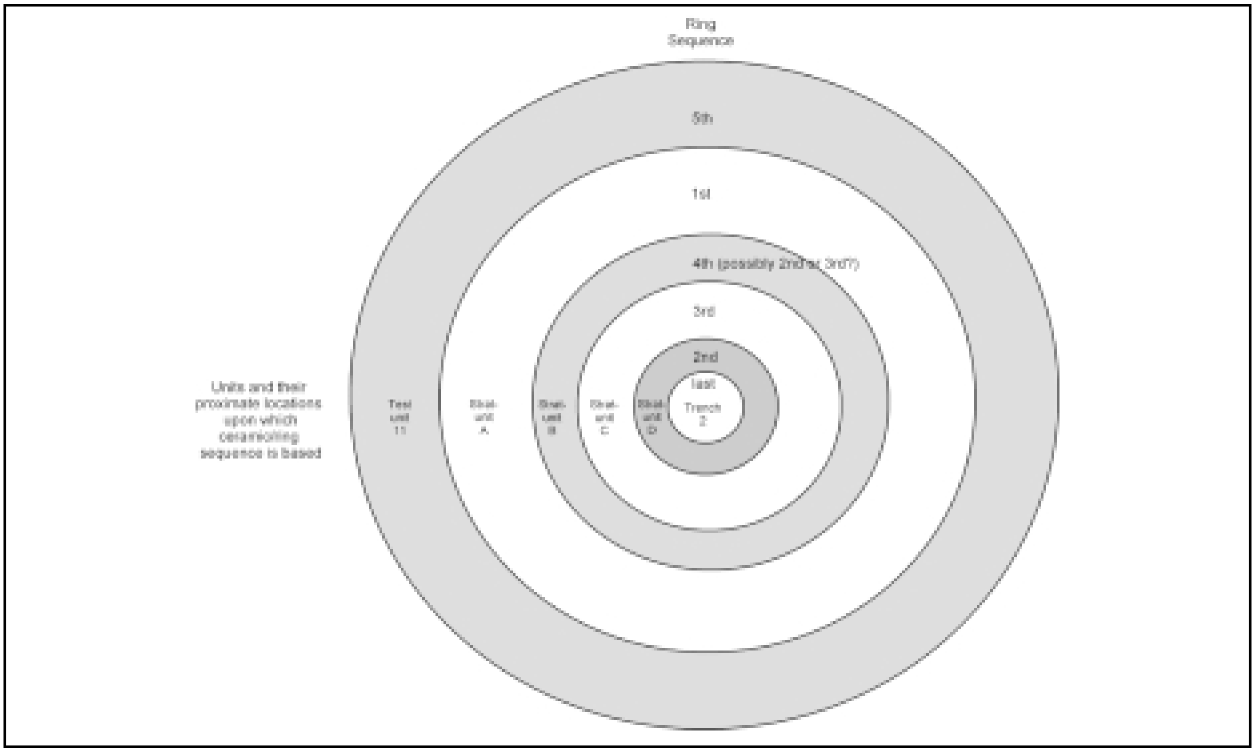


Figure 18. Proposed sequence of ceramic/shell deposits in concentric rings at Spanish Mount (after Cable 1993).

versus public involvement in the construction of the plaza and surrounding features varying among cultures. We suggest that rings represent public arenas, the extend to which ceremonial versus domestic use occurred likely varied among sites and cultures. Some rings may have been exclusively used for ceremony, but this case has yet to be proven. The very shape of the ring with its open, public central plaza, however, precludes the possibility that rings were used exclusively for non-public, domestic activities.

At Sewee, Cable's (1997) idea that the ceremonial ring would have been separate from the domestic landscape is certainly possible based on Archaic settlement patterns found elsewhere. There is ample evidence that separate houses or villages existed near shell rings (Michie 1976; Russo 1991; Russo and Heide 2002; Russo and Saunders 1999; Russo et al. 2002). There is no evidence, however, that this precluded habitation from also occurring at the shell rings themselves, a fact with which Cable (1997) concurs.[7] Unfortunately, the idea that surrounding sites associated with the Sewee shell ring are "small artifact concentrations" of "residences," which apparently lack or contain little shell because the households brought all their domestic shell refuse to "cap" or "stablize" the ring (Cable 1997), contrasts with other evidence that at least some surrounding sites contain shell and that most surrounding artifact concentrations have little to no evidence of Thom's Creek associations. Most artifacts from these sites are not contemporaneous with the ring (Gardner 1992). At other rings, however, contemporaneous sites which surround them contain substantial quantities of shell (e.g., Michie 1976; Russo 1991; Russo et al. 1993). So if outlying sites were the source for shell for ring construction (an idea we think still requires testing), the expectation that they should completely or largely lack shell is not supported by current evidence.

The idea that the ring, as a public monument, would have been built in a short time as a "massive stage," community-wide project also lacks substantial evidentiary support. The stage concept of ring construction reflects archeologists' views of more recent Southeastern prehistory where chiefs directed or compelled the populace to build mounds in large-scale construction stages. These stages may be evidenced in profile as largely homogenous deposits of soil. While large-scale "piles" of oyster shell up to 3 meters in height have been identified in shell rings (e.g., Saunders 2002a; Russo 1991; Russo and Saunders 1999; Waring and Larson 1968), none have ever been shown or suggested to represent stages of construction uniformly found throughout the ring. In part this is because studies undertaken on rings have been limited to a few small excavation units, or, at best, trenches across single ring walls. Such excavations can reveal the height and width of piles of shell, but not their breadth or extent of their distribution around the ring. As Cable (1995:109) has complained, archeologists' failure to expand excavations to determine if the shell deposits extend around the circumference of the ring as a single building stage precludes testing this aspect of his theory. However, in the few cross-cutting trenches that have been placed in shell rings and in smaller excavation units, it is clear that the mounded deposits seen in one profile, are not of uniform height in the opposing wall profiles (e.g., Figure 19; Calmes 1967, Figures 4 and 5; Russo and Saunders 1999, Figure 4; Saunders 2002a:104, 106 110). That is, deposits of largely uncrushed shell slope in multiple directions suggesting features similar to the sloping sides of piles rather than to continuous, uniform deposit of shell surrounding the ring as a single building episode.

The data from trench profiles and smaller excavation units at ring sites suggest that piles of various sizes were placed next to, on top of, and in between gaps between other piles during ring construction. Cross-cutting trench profiles show that large piles of oyster shell form the base infrastructure of the ring upon which other piles or deposits are placed atop or on their slopes (e.g., Russo 1991:271; Russo and Saunders 1999:9; Saunders 2002a:106, 110; Calmes 1967, Figure 2; Waring and Larson 1968:272). The resultant large piles that make up the bulk of shell seen in ring profiles may, thus, consist of many smaller piles (which may or may not be clearly discernable) and may include thinner layers of soil, shell, or other organics variously interpretable as living floors or cappings, or lenses constituting smaller dumping or piling episodes. Finally, a certain kind of feature may represent humus accumulations in shell piles, often seen as slight differences in quantity and types of soil included in otherwise identical deposits of shell. The point is that excavations in rings have consistently revealed in profile the height and sloping signatures of piling or heaping, rather than uniform, circumferential building stages expanding laterally as uniform stages from the apex of the ring.[8]

Figure 20 shows, perhaps, the best recorded example of how most profile drawings suggest shell rings were constructed. From a trench placed across the western wall at Rollins shell ring, activity at the site is revealed in sub-ring contexts where sterile sand was impacted by a variety of human activities resulting in the darkening of the soil with organic inclusions, the constructions of pits that were subsequently filled in with charcoal, shell and soil, and the piling of small deposits of shell subsequently covered in soil (Figure 20). In this zone, features from later activities also intrude. From here, the phases of ring construction in which large quantities of shell were deposited began. Phase 1 shows that initial deposits were spread across nearly 8 meters of land to the east and west to a maximum depth of about 80cm (Figure 19). These were capped with a thin layer of soil (Phases 2 and 3, Figure 20), perhaps representing natural wind blown soil accumulation at a time of site abandonment, or intentional human deposition. The soil, however, was not universally found across the ring profile, but only on top of the highest portion of the shell pile. Subsequently, two piles of shell (Phases 4 and 6, Figure 20) were alternately placed with a thin layer of soil (Phase 5, Figure 20) separating them. The whole pile was then capped with another pile of shell (Phase 7, Figure 20), which contained more soil than the earlier piles. It is unclear if this soil was introduced through aeolian processes, suggesting inclusion after site abandonment, or if there simply was more soil included in the last deposits of shell. In either case, the core piling represents the Group 1 association of piles and features represented in Figure 19, which constitute the initial large pile that made up the ring in this section of the site.

Subsequently, Phases 8-11 were deposited on the western flank of this shell heap to nearly double the width of the ring at this point, without increasing its height much, if at all (Figure 20). It is evident that the associated piles and features constituting Groups 2 and 3 (Figure 19) were laid down after Group 1 was deposited because they lean against that deposit (first Group 2, then Group 3 against it). Because of the lean, they do not display the typical conical "pile-shape" Like Group 1, both these groups were overlain and separated from each other by deposits containing less shell and more soil and/or organics other than shell. As with Group 1 "capping," these suggest either an extended time between deposits or anthropogenic input for unknown cultural/social reasons. For an alternative to this piling sequence see Figure 21.[9]

The thin soil/shell strata as well as the sloping shell features separating the Group piles at Rollins are similar to features found in Calmes (1967) and interpreted by Cable (1997) as evidence of symmetrical and concentric stage construction. But those at Rollins clearly show asymmetrical construction sequences (from east to west) resulting from periodic piling of shell. In the trench, at least three large pile features are evident extending up to 2 meters in height (Figures 19). These large piles were constructed from numerous smaller pilings or dumps of shell, only some of which, we suspect, were visible to archeologists 4000 years later. At other, smaller rings, trench profiles show a single large pile constituting the core of the ring in that area. Sometimes the single pile may only be apparent, due to the lack of detail provided by the archeologist (e.g., Calmes 1967, Figure 2; Hemmings in Saunders 2002a:106). But detailed drawings of trench profiles also show that single core piles made

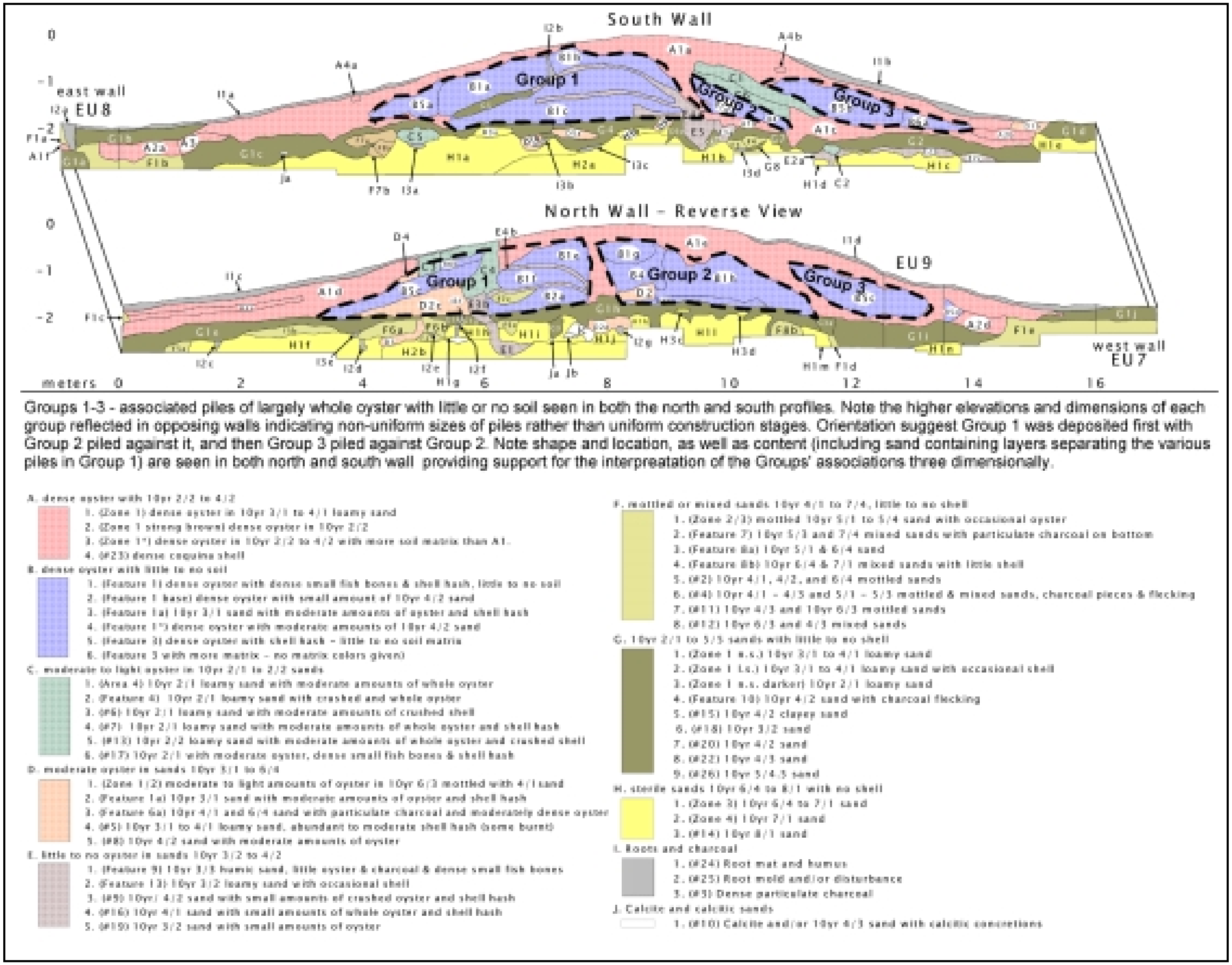


Figure 19. Crosscutting ring wall trench at Rollins shell ring showing grouped piles (after Russo and Saunders 2002).

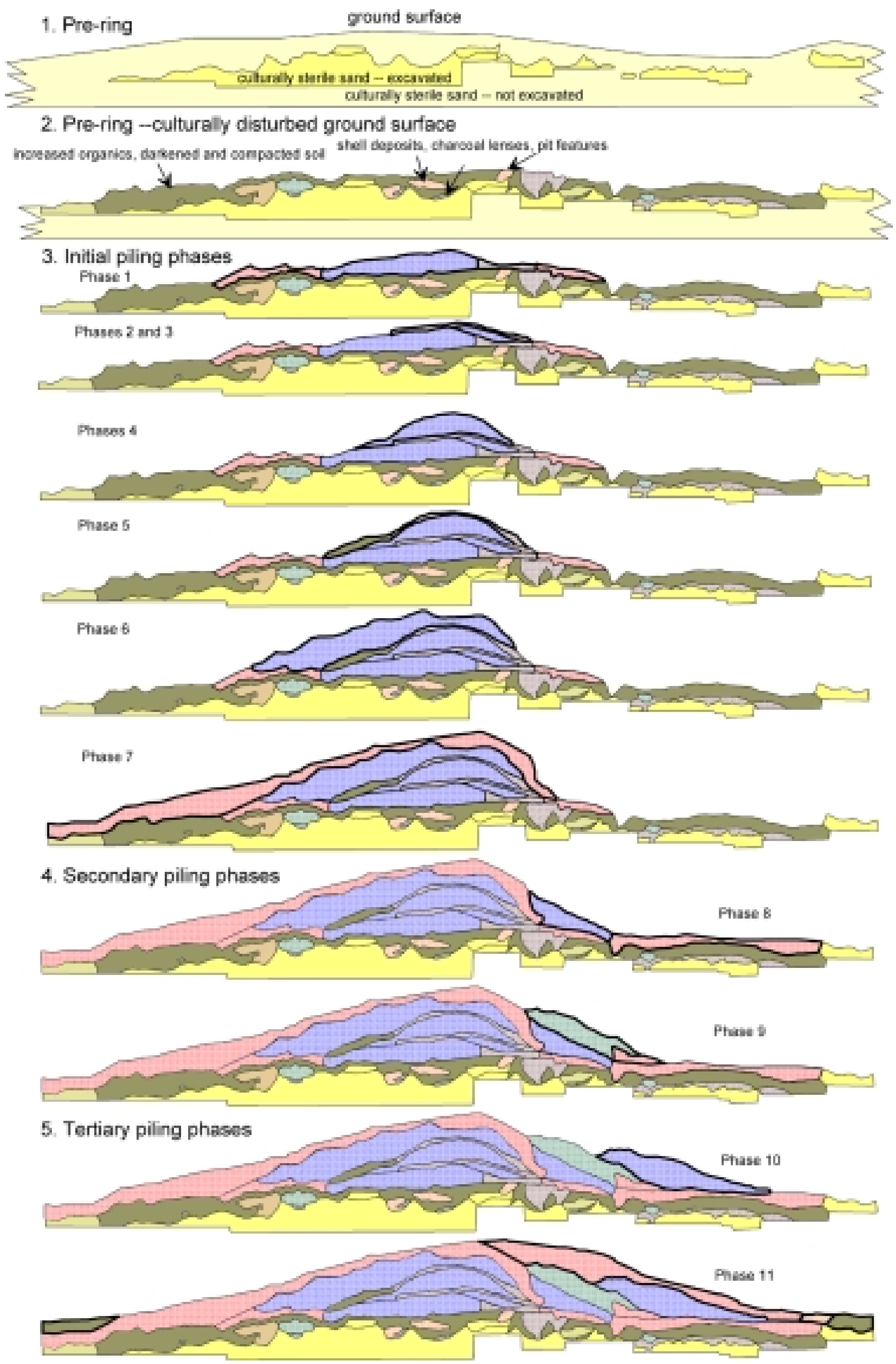


Figure 20. Sequence of piling as viewed in south wall of Rollins shell ring trench (after Russo and Saunders 1999).

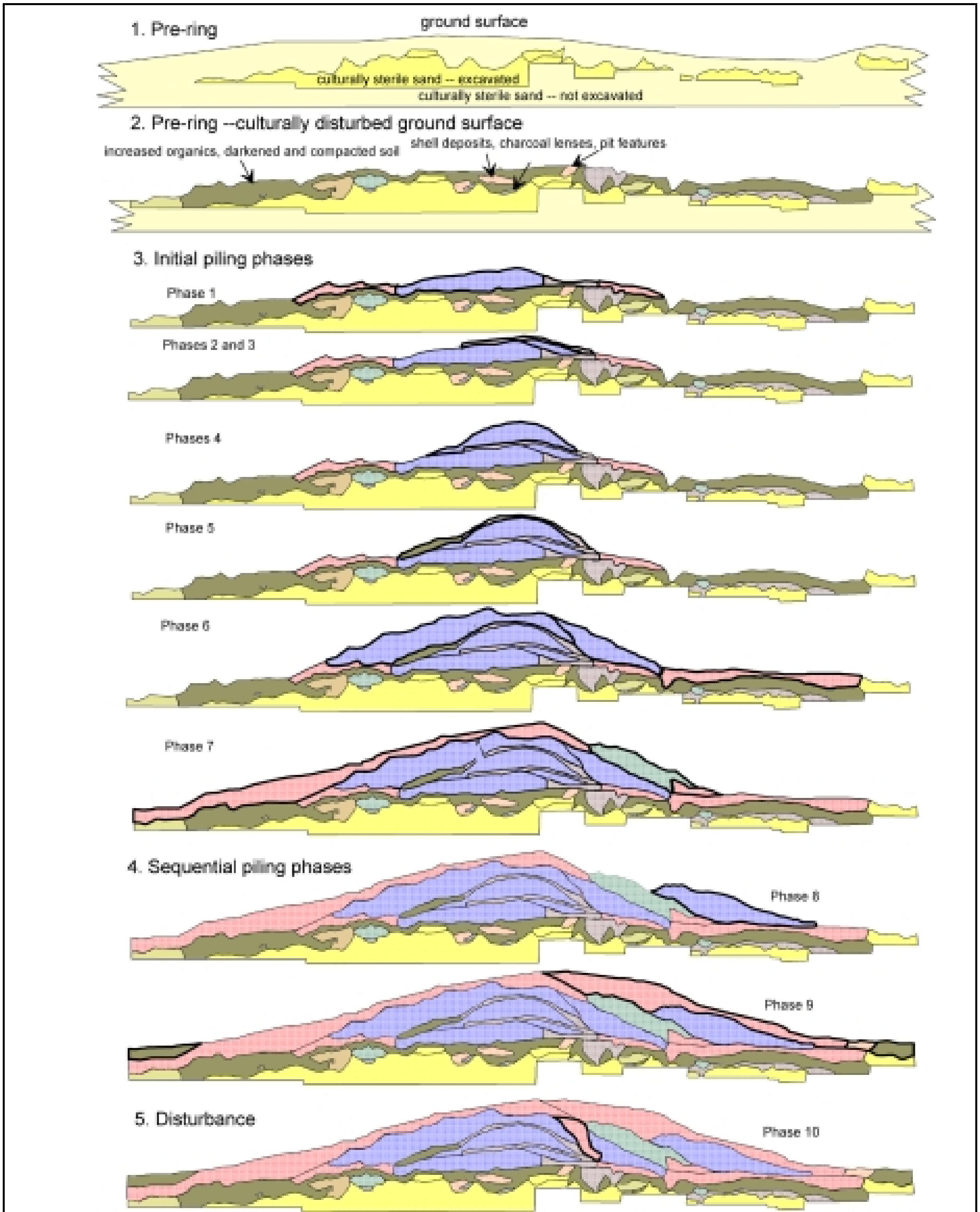


Figure 21. Alternative sequence of piling as viewed in south wall of Rollins shell ring trench (suggested by Saunders, personal communication; after Russo and Saunders 1999).

up of numerous shell features distinguishable only by slight differences in soil color or abundance or minor organic inclusions are also used to construct rings (Russo 1991:271; Saunders 2002a:110). In these, no evidence of purposeful, "concentric and symmetrical" construction is to be found.

But "concentric and symmetrical" is not the only way to build ceremonial structures. The size and shape of the shell rings alone is sufficient to support the idea that rings reflect the scope and scale of public works indicative of ceremonial functions and monumental purpose (Russo n.d.). Construction of such public works does not necessarily require a single, focused episode of building. They can be the result of the accumulation of material over an extended time, a theory posited for the building of mounds at the Horr's Island shell ring site (Russo 1991, 1994) as well as at Poverty Point (Gibson 2000). In this sense, ring construction is gradual. We believe the piles are primary deposits of shell resulting from public feasting at rings. The stratigraphic integrity of ceramic sequences, the frequent absence of crushed shell, soil and other evidences of secondary redeposition in the piles provides additional support for primary deposition.[10] This is not to say that rings do not evidence episodes of building that seem to represent secondary deposits of shell quarried from other sources as opposed to in situ deposits of primary refuse (e.g., Saunders 2002a:101).[11] But the majority of ring volume is comprised of primary deposits.

The periodicity of piling in rings remains problematic. Shell deposition in rings was certainly frequent enough that numerous piles are virtually indistinguishable from each other, suggesting little time elapsed between dumping episodes. But it was infrequent enough that separate groupings of piles can be distinguished from each other if the archeologist takes time to record minor differences in the shell and soil matrices. Seasonal studies identifying the times of year the rings were occupied may help resolve this issue. A number of rings have indicated year-round or multiple seasonal occupation, suggesting nearly continuous piling activities probably occurred (Russo 1991, 1993). But the kind of accumulation the multiple piles of shell reflect differ from the gradual accumulation scenario suggested by Trinkley (1997) and interpreted by Cable (1997). We suggest the volume in the ring is represented by large piles of shell, mostly the result of large feasts. Whereas Trinkley suggests that the main volume came from remains of daily meals of nuclear families that were scattered and trampled underfoot (Trinkley 19985; 1997).

This idea of gradual accumulation as the primary building mechanism behind shell rings is somewhat problematic, in part, for the same reason associated with the strictly ceremonial theory – studies used to support the theory are insufficient. The two studies that linked the Lighthouse Point and Stratton Place rings to the theory, never actually explored the shell strata and features in the rings themselves. Rather the studies were designed to explore the plaza area and features <u>beneath</u> the rings (Trinkley 1980a:166, 250). In fact, even if analysis of ring structure had been a goal, it was not possible at either site. At Lighthouse Point, the shell ring had been virtually destroyed by the time Coe and Trinkley arrived in 1975 to place their test units (Trinkley 1975:3). These tests were "designed to collect information useful for environmental reconstruction and to test for subsurface features," not to determine how shell rings were built (Trinkley 1980a:166). Later 1979 excavations were designed to continue the work, but emphasis was shifted to the southern part of the ring where there "appeared relatively little over-laying disturbed midden" (Trinkley 1980a:181) – that is, very little shell ring. A similar situation was obtained at Stratton Place, where that midden had also been substantially disturbed, and where excavations were centered primarily in the plaza (Trinkley 1980a:251). The result of this goal orientation to plaza and sub-ring contexts was the recovery of important data on sub-ring and plaza features, which, unfortunately, provide little insight into the structure of shell ring itself.

It is somewhat ironic that these two sites have provided the data for a theory of ring construction and function when the above-ground rings themselves were not the focus of study. Nonetheless, having found numerous food processing features, posts, and food remains beneath the midden, Trinkley (1985:117) concluded from his studies that the data "indicate that the shell rings were gradually formed habitation sites, with occupation taking place on the rings." He states in reference to shell pits found under the ring, that they likely occurred in the shell ring above, having "blended" together to make up the bulk of the shell in the ring midden. In a few areas where he was fortunate enough to have found the bottom-most layers of shell ring still extant, he noted that the shell was "highly crushed" and intermixed with bone, pottery, other artifacts and soil that occurred in lenses (Trinkley 1985:112). By gradual accumulation, then, he hypothesized that the ring grew through the accreted layers of "crushed" shell and associated matrix, as well as the "blending" of shell filled pit features – all features he commonly found in bottom-most ring or sub-ring contexts..

Unfortunately, in those few places where a small layer of bottom-most ring midden remained (usually less than 30 cm), the profiles drawings show "shell" as an undifferentiated layer (Trinkley 1985: 110-111) despite textual descriptions of "numerous pockets of shell," "sand lenses," and "banded and frequently crushed" shell (Trinkley 1975:8; 1980a:169). As Trinkely (1975:7-8) states, this was because his goal was to get to the subsurface features, and not enough time could be detailed for the excavation and recording of ring midden features. Science is goal oriented or it is nothing, and Trinkley's goals were clearly stated (we should all be so clear in describing our goals for investigation). Unfortunately, it did result in an absence of graphics to support the theory of ring accumulation, which in turn has made it difficult to bring the theory into correspondence with observable facts at other sites with extant ring remains.

Cable (1997), for one, interpreted Trinkley's idea of accumulation as resulting in numerous thin, horizontal bands of crushed shell, as opposed to the slanted bands interlayered with dense, loosely consolidated shell that he had observed in Calmes' (1967) profiles. Consequently, he rejected the idea of gradual accumulation (Cable 1997). But banding in crushed layers was not the only feature Trinkley suggested constituted rings. He identified blended, shell-filled pit features as making up a large portion of the shell ring (Trinkley 1985:112). It is the suggestion that shell pit features, and not piles of shell, make up the great volume of shell in rings that differentiates Trinkley's observations on ring construction from other studies (e.g., Calmes 1967:11; Hemmings 1970a; Russo 1991; Russo and Heide 2002; Russo and Saunders 1999; Waring and Larson 1968 cf. Trinkley 1980a:183). Using only sub-ring and plaza data, Trinkley, of course, did not observe the piling of shell that is universally found in other rings. So confirmation or dismissal of piling as a technique for ring building could not be substantiated with his studies.

At one point Trinkley (1980a:183) states that the heaping of shells had been "hinted at" in his earlier work at Lighthouse Point. But the reader is unclear as to what is meant by "hinted at" or by "heaping." Perhaps, relative to this point, in an earlier work Trinkley mentions that "numerous small heaps consisting of single species of shellfish probably represent the remains of a single meal" (Trinkley 1975:8). By "heaps" in this context he seems to mean lenses of snails, or small piles, but not the large piles of oyster shell other researchers have found in shell rings. In the end, readers can conclude that the activities that accumulated to form rings in the gradual accumulation theory posited by Trinkley included banded, crushed lenses of shell and debris of living floors; the filling of shell pits; and the relatively small-scale "heaping" of non-oyster, shell features. But as he states, the use of large piles could not be confirmed given his limited goals (Trinkley 1980a:183).

Despite the absence of piling in Trinkley's theory, all other markers for "gradual accumulation" that he forwarded have been found at other rings, both below and <u>within</u> the shell matrix of the rings themselves. Data from Sapelo, Rollins, and Horr's Island substantiate Trinkley's findings relative to sub-ring and plaza strata and features. At these sites, posts, pit features, hearths, bands of crushed shell, stained, organic soils, and living surfaces, have been found below the shell ring (Russo 1991, 1994; Russo and Saunders 1999; Waring and Larson 1968:271). Crushed shell strata, hearths, lenses of materials representing various aspects of food processing, and banded strata representing "living floors" or humic layers have also been found above the sub-ring soil matrix within the shell ring itself (Calmes 1967; Russo 1991, 2002; Russo and Heide 2002; Russo and Saunders 1999; Russo et al. 2002; Saunders 2002a; Waring and Larson 1968:273).

However, the one feature that Trinkley hypothesized made up a great portion of the shell in rings – shell filled pits – have actually rarely been described <u>in</u> shell rings (e.g.,Waring and Larson 1968:273). Although pit features have been assumed to exist in the shell strata of rings (Cable 1995:109; Russo 1994:97-99; Trinkley1985:112), such features have usually been found <u>below</u> rings or in plazas (e.g., Flannery 1943:150; Hemmings 1972:60; Calmes 1967:9-10; Russo 1991:271, 1994:97-99; Russo and Saunders 1999; Russo et al. 2002; Trinkley 1985:103-104; cf. Cable 1995:109). The absence of pit features in rings has been attributed to the assumption that pit features are indistinguishable from the shell matrix of rings because they are comprised of the same materials (Trinkley 1980a; Russo 1991). If true, it will be difficult to test Trinkley's idea of pit features as major building blocks of shell rings. In contrast, we argue that all shell rings have shown evidence of piling of shell, and it is likely that piling of shell, not shell-filled pit features, make up the bulk of shell volume in rings.

Aside from pits, then, all of the features and strata that have been suggested as part of the "gradual accumulation" of rings, have been identified in rings. These aspects of the theory have been proven. However, rather than rings being made up of these features, they have always been found interbedded with deposits referred to as "dense," "clean," "whole," "unbroken," "loosely"- or "un-consolidated," oyster shell. These are relative terms, as the oyster shell they describe is rarely completely clean, always broken to some extent, and occasionally consolidated into a single mass. Some amount of soil, however, minor is always mixed with the shell; the shells have to have been broken, or at least disarticulated to accommodate the consumption of their flesh; and chemical reactions with standing water may result in their consolidation (e.g., Russo and Heide 2002). But relative to other features in rings, these oyster deposits have little soil, and, at least superficially, appear to contain relatively little of other kinds of shell and faunal remains except as lenses or other features. Depending on the excavation technique (i.e., small unit versus trench), the "clean" oyster shell appears in profile as strata of varying thickness, or as piles of varying size. In either case, it usually comprises the bulk volume of the ring as seen in profile (e.g., Calmes 1967; Heide 2003; Russo and Saunders 1999; Russo et al. 2002; Saunders 2002a; Waring and Larson 1968).

We suggest that unconsolidated oyster that appears to lie in horizontal strata is usually an artifact of archeologists' narrow window into the ring, often limited to one or two meter squares of an excavation unit. When the view is expanded to a long trench, the tops of these strata usually slope indicating piling or heaping rather than horizontal layers. Also in the large view (i.e., cross-cutting trenches) these piles may reveal internal features, shell indistinguishable from the surrounding matrix except in slight differences of soil color or amount or other faunal remains. Analogous to basket loading in earth mounds, the differences are likely attributable to source collection variation as well as pedogenic activity.

The gradual accumulation theory did not start or end with Trinkley (1997). The concept had been forwarded years before it was formalized. Waring and Larson (1968) as well as Calmes (1967) identified accumulation of refuse as the key component accounting for construction of shell rings. But they included large scale piling as a critical aspect of ring construction.

But what was the source of these large piles of oyster shell? Obviously, oysters were collected from local estuaries for consumption, and their shell discarded in piles in the ring. But why were they discarded in piles rather than underfoot or as uniform stages around the circumference of the ring? We suggest that the social organization of ring builders was transegalitarian (Russo n.d.). It differed from that hypothesized by Trinkley (1985) who saw ring builders as egalitarians organizationally incapable or uninterested in building public works of a grand scale because individuals and kin groups largely saw each other as equals in their daily lives. As such, the society had developed social leveling mechanisms to prevent any one individual from gaining greater material or prestige than the others. The material culture found at Thom's Creek sites, both rings and other site types supports this idea, with little to no differences observable among or within sites in terms of the kinds of artifacts recovered.

But in transegalitarian societies, difference in material and social gain may be tolerated under specific social settings. In the public and ceremonial arena of the ring, competition for prestige, resources, marriage partners, or socio/political alliances was tolerated as evidenced in the differential distribution of shell. All rings, including Sewee, contain areas where more shell was deposited, and areas where less shell was deposited. These areas often lie opposite each other in the circle of the ring. We suggest that various locations in the ring were occupied or controlled by different groups or individuals, and that those areas with more shell represent the areas controlled by the more empowered participants in ring ceremonies, i.e., those most capable of, through dint of their own labor, or the obligated labor of others, accumulating greater quantities of shell (Russo n.d.). As opposed to uniform stage construction reflective of a single leader enforcing a community-wide public works, individual piles of shell of varying sizes that make up shell rings represent the efforts of competing individual endeavors.

The piles themselves result from feasts held at rings. In transegalitarian societies, feasting is a common activity used, in part, as a socially bonding mechanism for the society at large (Hayden 2001). These feasts are always held in public view (hence the public plaza surrounded by the public ring), and are hosted by individuals or sub-groups who may compete for prestige with other potential hosts by holding successively larger feasts. We suggest that it is the public view of feasts that accounts for the piling of shell. Here, the success of the feasting endeavor is reified in the piles of shell the host and other participants accumulate. The larger the piling, the more successful the feasters' efforts.

That feasts account for the great pilings found in shell rings does not preclude the long-held belief that families actually lived on the ring and may have eaten their daily meals there (Trinkley 1997; Waring and Larson 1968). To date, the preponderance of evidence suggests that shell middens are made up of two broad categories of shell, and to a limited degree, other material. One is the great piles of shell, and the other are relatively thin strata (and we emphasize "relatively") and small features, which may, in part, reflect daily maintenance activities. Daily maintenance features include hearths for heating food and body; post molds reflective of structures of varying sizes; lenses of shell representing small-scale eating episodes; crushed shell reflective of activities associated with living floors, traffic paths, incidental food discard, or other activities; and, perhaps, pit features reflecting a sub-class of food preparation and discard features. These features and strata are those that have been referred to as accumulating gradually (Trinkley 1997; Cable 1997).

Within the life of the ring, they may be usefully seen as gradual. But individually, the rate of accumulation among these features likely varied widely. We may, for example, see a crushed layer of shell as having taken years to accumulate, whereas a lens of shell from one meal could have been deposited in less than an hour. Thus, it might be better to refer to these ring construction features collectively and individually as resulting from daily maintenance activities rather than gradual accumulation.

It is the abundance of maintenance features that is most suggestive of daily living activities on the ring. The smaller scale of those features associated with eating, as opposed to the larger piles, suggests smaller scale activities. One difference between the refuse of daily meals gradually accumulating in lenses or crushed layers, and the heaping of large piles of oyster shell is the rapidity of deposition and the absence of subsequent disturbing activities often found in the former. Most archeologists contend that the minimal breakage, limited organics other than oyster shell, and fewer artifacts per volume in the oyster piles compared to living floors indicates rapid accumulation. Except for the surface, the oyster shell found in piles is, in practical terms, sealed off from subsequent breakage encountered elsewhere on the ring where daily maintenance activities continue (i.e., in the living floors, “banded” and “crushed” strata) (Cable 1997; Calmes 1967; Edwards 1965; Russo and Heide 2002; Russo et al. 2002; Saunders 2002a; Waring and Larson 1968).

We have suggested elsewhere that the large piles of oyster reflect larger scale feasting activities. But in reality, we do not yet know the time period the large piles of shell represent. They could result from a single massive feast held in one day, a series of smaller feasts held over a period of days or weeks, or longer. While the presumption is that these large piles of “clean” oyster contain relatively little else other than oyster shell, frequently daily maintenance or other small-scale features (e.g., lenses of oyster with different soil matrices, or lenses of different shell species, or ash deposits) found within large piles of oyster indicate that within the time frame it took to deposit shell in large piles, smaller, (e.g., meals, sacrifices, offerings) events persisted. While archeologists have traditionally viewed these smaller events as evidence of single episodes of consumption by nuclear families, (Trinkley 1997), they could equally be smaller aspects of large scale feasts. We suspect that many of the larger piles of oyster shell seen in profiles represent the refuse from a number of small and large scale feasts and other consumptive activities that may have extended over years. Unfortunately, the archeological methods to distinguish between the remains of consecutively deposited refuse from oyster feasts (in the absence of cultural or natural transformations aiding interpretation), makes identifying the size of single feasting episodes problematic.

We suggest that rings are constructed through the accumulation of shell and other materials resulting from special, ceremonial feasts as well as daily living activities. In this respect, aspects of both the gradual accumulation and ceremonial theories are supported with the data from shell rings, including the data from Sewee. By definition, in the open arena of the shell ring, all meals are open to public scrutiny, and, hence, represent feasts (Hayden 2001). As such, regardless of size, the discard going into ring construction is most efficaciously viewed as the resulting from “feasting accumulation” as opposed to the “gradual accumulation” in whicht the accumulation of shell has traditionally be seen as having resulted primarily from the daily maintenance of nuclear families. Consumption, whatever its size, was on public display in the rings and that display was part of the ceremonies held at rings, whatever those ceremonies may have been. Some ceremonies may have been held daily, such as communal meals, while others, such as mating or material trade festivities, were held less frequently. But the consumption of food in the public forum of the ring made all meals at the ring aspects of community feasting as opposed to family dining.

How does the data from Sewee stand up to this theory of feasting accumulation? The shape of the ring is irregular, highly piled on the west with opposing low-lying deposits on the east. This distribution supports our idea of unequal feasting activities being held. It contrasts with the model of low-lying, flat topped, rings upon which egalitarian nuclear families settled, equally distributing themselves around a ring where they consumed their daily meals (Trinkley 1985; 1997). While Edwards (1965) suggested that profiles in his units showed slanted/vertical banding, our single unit did not. Rather, it revealed a deposit of oysters shell from top to bottom reflecting only differences in the amounts and kinds of soil include in the matrix. In other words, despite its small size, the unit profiles suggest that piling, not vertical banding, made up that portion of the ring. If investigators are ever fortunate enough to locate Edwards’ lost profile drawings, we suspect the small size of his units may still prevent us from knowing how Sewee was constructed overall. That puzzle awaits larger scale investigation.

Will the Circle be Unbroken? – Recommendations

The primary goal of this project was to develop maps of the Sewee shell ring that would help solve the mystery of its shape and, by extension, help determine its function. The primary puzzle with which archeologists have struggled is whether the ring was a closed, complete ring or an open, C-shaped ring. Most archeologist have assumed the ring has always been open (e.g., Edwards 1965; Gardner 1992:49; Stephenson 1973). In contrast, Cable (1995:111) believed it to have once been a closed ring with the east side subsequently opened through tidal erosion. Our data show that Cable was largely on target, but that tidal erosion has not completely removed midden from the "gap." Much of the ring still remains in place beneath the marsh sediment in the supposed gap.

Understanding whether or not a gap was intentionally placed in the ring is critical to understanding the ring's original function. As we have argued, without the gap, Edwards' (1965) idea that the ring functioned as a fish trap cannot be supported. With the ring closed, Trinkley's concept of an egalitarian village seems viable. However, the absence of evidence of gradual accumulation and the differential distribution of shell within the ring (i.e., some areas containing greater and higher amounts of shell than others) argues against the idea that nuclear families living as equals evenly distributed the refuse of their daily lives underfoot resulting in the unintentional construction of the ring. This leaves the idea of the ring as a ceremonial center.

Typically, those who view rings as ceremonial structures remark on the symmetry of circular form as evidence of their purposefulness or ceremonial function that distinguishes rings from utilitarian, amorphous shell middens commonly found in the region (McKinley 1873; Moore 1897; Waring and Larson 1968). We note, however, that closed circles are not restricted to strictly ceremonial architecture. Both the closed and open circular layout is a common settlement plan for egalitarian and transegalitarian villages (e.g., Fraser 1968; GrØn 1991; Heckenberger et al. 1999; Schienh vel and Bell-Krannhals 1996; Schoenauer 2000). So whether or not Sewee is a closed or open circle of shell, its function as a place of ceremony or habitation cannot be described solely by its shape. As stated, the structural evidence at Sewee and other rings suggests that Sewee was both an architectural setting where living activities (small-scale food preparation, consumption, and discard) and ceremony (large-scale feasting and symbolizing) took place. The open, public arena of the plaza, as well as the elevated positions along the tops of the ring, (if these were, indeed, occupied) allowed all inhabitants and ceremonial attendees to see who had the most or who was the most generous, or who became most indebted. A person's or group's social status could readily be symbolized by the amount of shell and other material remains associated with their physical position in the ring.

But the ring also symbolized the status of its builders to outsiders. As closed, often tall constructs, shell rings were exclusionary edifices. While the unbroken ring served to symbolize the unity of the social group within, it simultaneously served as a barrier to entry from the outside (Sassaman 1997). In the long run, this architectural feature may have caused closed ring communities unanticipated problems. Constructing closed circles of shell preclude the possibility of accommodating expanding populations. If populations grew, are ring attendees otherwise expanded, there was no room in a fixed circle for the increased population. This may be why multiple ring sites such as Coosaw, Fig Island, Sapelo and Skull Creek exist.

However, with an open ring, expansion can be accommodated on the open ends of the circle. In Florida where rings are areally much larger than those in South Carolina and Georgia, the rings are laid out in characteristically open-ended U- or C-shapes. This plan better accommodates population expansion and is symbolically more inclusive than a closed circle plan. The fact that rings in South Carolina are smaller and distributed at closer intervals than those in Florida likely speaks to social entities in greater competition with their neighbors than those found in Florida (Heide and Russo 2003).

While there is a statistical tendency for closed circular communities to be egalitarian and open circular communities to be more socially complex, there is no one-to-one causal relation between social structure and community shape. We have suggested that shell rings may hold evidence of early markers of increased social complexity in the U.S. (Russo n.d.; Russo and Heide 2002; Russo and Saunders 1999). This evidence, however, may not be the traditional markers archeologists use to identify hierarchical relations such as the differential distribution of exotic and rare goods, specialized burials, and separate and elevated positions of status found in Late Woodland and Mississippian mound sites. Rather, in transegalitarian societies where food is the chief currency and social mechanisms often work to keep status differentiation to a minimum, evidence of socially accepted status differentiation may best be explored in the unequal distribution of food. Despite the misconception that shell rings are symmetrical constructs, every shell ring that has been mapped demonstrated unequal distribution of shell around its circumference. At Sewee, more shell is found in the western portion than the eastern. This is likely no accident of construction. The builders of the ring purposely placed more shell in the western than eastern sections of the ring. If we are correct that different individuals, kin groups, or sodalities were located around the ring, and that the shell reflects their efforts of production, then differential access to food, wealth, and status is reflected in the distribution of shell in the ring. More food, more pottery, special pottery and the differential distribution of other material goods may provide clues as to the social make-up of the ring inhabitants.

That is the future of archeology at Sewee. We need to explore the distribution of material goods and food remains in order to understand the social organization within the ceremonial village as well as the outlying sites that interacted with the ring. Elsewhere we have suggested that low-lying shell remains in ring walls represent lower status positions whose character may be reflected in material remains other than quantity of shell (Russo n.d.). Not only the ring itself, but the plaza may be a source for evidentiary support of social organization. We know from ethnographic studies that higher ranked individuals in circular communities held physical locations both within the circle surrounding the plaza, and those portions of the plaza adjacent to them (e.g., Heckenberger et al. 1999; Russo n.d.; Schienh vel and Bell-Krannhals 1996). Despite evidence that plazas are "clean" and sterile landscapes, they are not totally vacant of material remains, and archeology may reveal differential use of the plaza in causal or epiphenomenal relation to ring formation.

By definition, transegalitarian societies may act to suppress highly stratified social distinctions among their members. So social distinctions in the archeological record at ring sites may be extremely subtle. It will take well-thought out research strategies to identify signs of incipient social stratification. To begin at Sewee, comparison of the material culture in the east side deposits lying below the marsh to those of the elevated deposits in the west side of the ring would serve well to test the hypothesis that status differentiation is linked to the amounts of shell in specific positions in the ring. Excavation of the wet aspects of the ring on the eastern side would also allow determination of the degree of tidal disturbance, as well as open the opportunity for recovery of preserved biological remains such as found at Oxeye (Russo and Saunders 1999). Being the only shell ring in the U.S. with open access to the public, Sewee represents a unique site capable of informing the public about the time in prehistory when hunter-gatherers first settled down and began the evolution towards more complex forms of social organization.

Research Recommendations

1. Undertake soils tests to determine the original landscape upon which Sewee shell ring was placed.

2. Place a trench(es) crosscutting a wall of the ring to determine the method of construction.

3. Obtain ceramic and other artifact samples from various locations in the ring to identify any differential distributions that may be linked to social status.

4. Determine the season(s) of site occupation through faunal and botanical analyses.

5. Determine the degree of disturbance on the northeast side of the ring; attempt to identify the boundaries, if any, between the "sand ridge midden" and the ring.

6. Open a large block excavation in the plaza to identify original land surface and use.

Management Recommendations

The current trail and boardwalk seem to have had no deleterious effects on the ring other than the disturbance caused by the original post holes. Visitors often leave the trail and boardwalk and walk around the ring. An unplanned path is the result. It is evident along the upper portions of the ring. This foot traffic, undoubtedly, has the effect of crushing the shell in the uppermost layer that lie beneath the path. Whether or not this activity sufficiently impacts the site to warrant some protective strategy by the Forest Service is a management question that should be considered.

On this subject we note that neither Edwards (1965) nor our study identified features in the uppers surface that could have potentially been impacted by modern foot traffic. That the upper layer had been impacted by historic activity, in part by foot traffic, is undoubtedly true, as our excavation shows. But that damage is done and the intensity of ongoing visits to the ring is probably not sufficient to warrant any protective action. The importance of allowing the public free access to the site greatly outweighs any additional damage to the site from foot traffic.

We noticed no evidence of looting at the site, and we covered every square foot of the entire ring. Nonetheless, the Forest Service should maintain regular surveillance and if foot traffic on the ring increases to an unacceptable level and/or looting activity is found, appropriate reconsideration of the access to the ring by the pubic should be undertaken.

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[1]cf. Fryman et al.1980, which includes a topographic map of the Joseph Reed shell ring produced around the same time.

[2]At one point, Edwards suggests that in his units the "interstices between the shells were filled . . . with large

concentrations of muddy, mucky soil with a high humus content, especially in the uppermost foot, and in varying degree at other levels" (Edwards 1965:12). The way the sentence is phrased, it is unclear if Edwards means that "high humus content" was found in the uppermost foot, or if "muddy, mucky soil with a high humus content" was found in the uppermost foot. Elsewhere he states that "a greater concentration of humus was evident in two beds extending at somewhat different angles of slope almost entirely across E-1" (Edwards 1965:14), and implies that these strata are in the uppermost layers (Edwards 1965:10). But here he does not clearly identify what kinds of soil the "greater concentration of humus" was intermixed with.

On page 50, Edwards (1965) suggests that F-1 had layers with a "high humus content," suggesting to him that these were deposited by forest (?) litter during periods of prehistoric abandonment. Elsewhere (1965:14) he notes "several darker, sloping layers" in F-1 lie in contrast to "shell zones of lighter color." It is not clear if these darker layers are the same as the humus layers he refers to. Their stratigraphic position is not clear, but humus, by definition, is a surface deposit, limited to upper levels of a solum. Exceptions include horizons buried by either natural catastrophes or human deposits. Although he did not use the terminology, he believed that the layers reperesented buried O ("humus") horizons (Edwards 1965:50). However, whether these relatively thin "darker layers" actually represent humus introduced during periods of abandonment, intrusive soils introduced by tides, differential human quarrying of dark matrix/oyster shell a la Cable 1997, or crushed shell and organics introduced by human living activities awaits resolution by a more thorough investigation of the strata.

[3] Ceramics from the date at the base of the unit (GX30186) were Thom's Creek Finger Pinched, while the ceramics from the upper level date (GX30187) were Awendaw Finger Impressed, a type, which Trinkley (1980b:22) considers a variant of Awendaw Finger Pinched. The Awendaw Finger Pinched series was later renamed Thom's Creek Finger Pinched (Trinkley 1983:44).

[4]Intriguingly, authors have mentioned a "small subsidiary midden or shell ridge about 30 feet to the east of the ring" (Trinkley 1985:105) or "southeast" of the ring a "second small shell midden" (Dorroh:1971:31), which would place it where our subsurface probes encountered the buried portions of the ring. We wonder if these references refer to that now-buried eastern portion of the ring, implying that it was not completely covered in marsh until recently; or in error, if they refer to the small midden southwest of the ring, which is still observable today (Figure 12, ca. 55N10E). However, one of these authors references both the southwest and the mystery southeast midden (Dorrah 1971:31). Apparently, something midden-like on the southeast side of the ring, which would place it in the marsh, has been observable in the past. Dorrah's description, however, is puzzling, since it states that a dense forest exists on the "backside" to that midden-like feature. We note, that only marsh and tidal creeks, no forests, exist on the southeastern side of the ring.

[5]In this area and on the extreme eastern edge of the map, the reader should note that shell distribution was mapped beyond the range of our data collection. Limits on time prevented us from continuing our probes north up the hill into the presumed adjoining "sand ridge" site, or east into the deeper waters of the marsh. Figure 12 shows the limits of our survey and informs the reader as to which of the contour lines were extrapolated by Surfer® and the cartographers beyond the extent of our survey.

[6]Cable's theory of pottery distribution at Spanish Mount is somewhat controversial. His presumption that "reverse stratigraphy" exists in the Spanish Mount ceramic assemblage is based on the a priori assumption that fiber tempered ceramics (Stallings, St. Simons) are older than sand-tempered series (Horse Island, Thom's Creek) and that Horse Island A series ceramics pre-date Horse Island B series. Other archeologists suggest these series and types may be contemporaneous (Saunders 2002b:46; Trinkley 1980b). An alternative explanation of pottery distribution at the sites is that it is in stratigraphic (vertical) order, and, consequently, so are the shell deposits that make up the mound.

[7]Did no one live on the ring? Cable (1997) hedges the issue (as do we) by stating "not necessarily," but gives no data to support the possibility, pointing out only that more recent prehistoric populations lived on shell mounds. The issue remains problematic because of limited excavations and poorly defined concepts such as "living." Does occupying the ring during a ceremony for a week constitute living? If only men occupied the ring, and not nuclear families, for an extended period of feasting, is that "living" or is that ceremony?

[8]In smaller excavation units where all four profiles have been drawn, Calmes (1967) identified piles of oyster shells placed next to and on top of each other over sufficient time to allow strata of humus or crushed refuse to accumulate. Cable (1995, 1997) suggests that Calmes was confused by the small sizes of the excavations, and instead of piles, he suggests that the dark, thin refuse separating piles is intentionally added construction layers placed on

the outside of the symmetrical ring. He sites Edwards' (1965) interpretation of the banding he observed at Sewee as support for the theory – unfortunately, those graphics have been lost. A close look at Calmes' profiles, however, indicate that Calmes' original interpretation of multiple piling is the more parsimonious view at Skull Creek. At the Sea Pines ring, the "banded" evidence for "outside layering" that Cable suggests, is actually located on both the outside (west) and inside (east) sides of the excavation unit. In orientation, therefore, it is not consistent with the theory of layering with concentric, horizontal cappings on the sides of an inner ring core since the banding was laid down perpendicular, not concentrically to the ring. In our view, Calmes' profiles are in agreement with his original hypothesis that many piles of shell were used to make the ring, rather than the alternative theory that concentric ring layers were built symmetrically and horizontally away from an initial ring towards the interior and exterior of the ring wall.

[9]Saunders (personal communication) suggest that based on unpublished plan maps of the trench excavations, the sloping deposits of shell separating the Group 1 and Group 2 piles of shell as seen in both the north and south wall profiles (Figure 19) may be intrusive, and that Group 1 and Group 2 features constitute a single group of sequential shell piles. Another intrusion is apparent in the Group 1 piles on the north wall only (Figure 19). If Saunders is correct, Rollins displays a piling sequence more similar, but not identical, to those found at Fig Island 3 and Horr's Island. Two, not three, as we have suggested, major group pilings would be apparent (Figure 21). In either reading, shell piling remains the main architectural construction technique.

[10]The rapid deposition of shell in piles that precludes intrusion of other refuse and soil, and limits activities resulting in crushing has been cited to support the idea that piles of "clean" or "whole" shell is primary refuse (Calmes 1967; Edwards 1965; Russo 1991; Russo and Heide 2002; Russo and Saunders 1999; Trinkley 1985; Waring and Larson 1968).

[11]What represents primary and what represents secondary refuse is a continuing problem in shell ring studies. If we are going to continue to center our discussions of shell ring construction on gradual vs ceremonial; primary vs. secondary; in situ vs. quarried deposits, we need to clearly define what these terms mean and how to distinguish among them. As for primary versus secondary deposits, these terms are often used synonymously with the ideas that in situ deposits dropped and crushed and mixed with other organics under foot represent primary, while deposits quarried from other sites and laid down or piled up at ring sites represent secondary deposits. But is a pile of oyster shell a primary or secondary deposit if it was eaten nearby at a hearth, and the shell transported ten feet away a few minutes later in a pile on top of the ring? If, as Trinkley suggests, the interior rings were used to prepare food, does removal of the shell from these preparation areas to the top of the ring a few feet away make them primary or secondary deposits? How does the archeologist distinguish between a pile of oyster shells that resulted from people eating individual oysters on top of the ring and throwing their shell into a pile (primary deposit) from a pile resulting from people preparing oysters on the interior of rings, and sometime later picking up the shell for deposit on the shell ring into a single pile?

Glossary

Metric attributes of shell rings have never been formally described. Authors may use variable terms for the same features, may variably use the same term for different features, and may use unclear or inappropriate terms for features. When measuring the size of a ring, for example, size may refer to volume, area, length, width, height, or other attributes. Frequently, linear measures of ring size, such as “58 meters,” may be given as the size of a ring without clarification as to what metric this figure refers to, the ring from outside to outside or from one high point to an opposite high point, the inside diameter of the plaza, the longer aspect of the ring if it is elliptical, or numerous other possibilities. To overcome some of these uncertainties in meaning we offer the following glossary for some terms we have used to measure Sewee.

Arc – a circumferential portion of a ring consisting of all the contiguous shell deposits between the interior and exterior. Note that cardinal assignations are often used to describe arcs, e.g., west arc, southeast arc. Synonymous with arm. Also refers to a shell ring whose curvature represents only by a small portion of a circle.

Arm – see “arc.”

Apex – the point of highest surface elevation or greatest shell thickness point along any axis of the ring. Also, cumulative series of apexes that form the midline of highest shell deposits between the exterior and interior of the ring, i.e., the crest or the ridge top of shell deposits.

Axis – an imaginary line that runs through the center of the ring and along which plaza, ring, and base lengths are measured. Note that all rings, no matter how circular appearing, are asymmetrical and determining the center of the ring upon which an axis lies is problematic, especially in C- and U-shaped rings.

Base – The width of a ring wall from the interior to the exterior of the ring along an axial line. Synonymous with, but perhaps less descriptive than “ring wall width.” Also, the cumulative total of all axial bases, as in “the base of the ring was placed on sand.”

Center – the point around which all ring and plaza area is equally distributed. Note that all rings, no matter how circular appearing, are asymmetrical and determining the center of the ring is problematic, especially in C- and U-shaped rings.

Closed end – the portion of a C or U shaped ring that lies opposite the opening in the ring.

Cross-cutting trench – a rectangular excavation unit placed across a ring wall from the exterior to the interior, usually in the shortest distance possible.

Diameter – the length of a straight line passing through the center of a shell ring and terminating at the periphery. Note that diameters of ring are not perfectly circular. Hence, measures of ring and plaza diameter may be given as least and/or greatest diameter.

Exterior – the periphery of the ring.

Greatest ring wall width – the longest distance in a ring from peripheral shell deposits along an axis to the shell that abuts the plaza.

Interior – the innermost line of ring abutting the plaza.

Least ring wall width – the shortest distance in a ring from the peripheral shell deposits along an axis to where the shell of the ring abuts the plaza.

Length – an axial or peripheral dimension of the ring or plaza. Usually used instead of “diameter” to refer to the length of the longest axis perpendicular to the axial width of a U-shaped a ring or plaza.

Midline – the line of, and proximate areas to, the highest shell deposits between the exterior and interior of the ring, i.e., the crest or the ridge of shell ring deposits.

Open end – the space between the two ends of a U- or C-shaped ring that contains no or little shell.

Plaza – the central, relatively flat, area surrounded by the ring which contains little or no shell. The term “plaza” assumes use of this architectural feature as an area of public interaction. Those archeologists who do not view this area as such, may choose not to use “plaza.” Alternative terms such as “flat area,” “center,” or “central area,”

Ring – the contiguous shell-bearing deposits surrounding the plaza.

Ring wall width – see “base.”

Ring height – the surface topographic elevation of the ring.

Shell ring –semi-circular to circular, contiguous deposit of shell and its plaza.

Shell thickness – the vertical depth of shell deposits in the ring. Shell thickness may be closely related to, but is not synonymous with “ring height”

Volume – the amount of shell in a ring usually expressed in cubic meters, or earlier, in cubic feet. Historically, shell volume estimates usually have not taken into account other materials that help constitute the ring, such as bone and soil, or plaza features.

Width – an axial or peripheral dimension of the ring or plaza. Usually used instead of “diameter” to refer to the length of the shortest axis perpendicular to the axial length of a U-shaped a ring or plaza.

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