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Coastal shell middens in Florida: A view from the Archaic period

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ABSTRACT

Current models generally place the appearance of shell middens along Florida's coasts after 5000 B.P. This paper argues that substantial shellfishing began at least two millennia earlier. It reviews information on the earliest shell middens known in coastal Florida and traces their evolution through the Archaic period (10,000–3000 B.P.) in three areas: 1) the panhandle; 2) the northeast, and 3) southwestern Florida. In the panhandle, estuarine exploitation was well established by 7200 B.P. The subsistence base included minor but consistent amounts of freshwater and terrestrial resources throughout the Archaic. On the northeast Florida coast, midden contents demonstrate that a range of terrestrial, estuarine, and littoral resources were being exploited by 6000 B.P. By 4500 B.P., however, this diverse subsistence base was abandoned and a more targeted estuarine focus was adopted. In southwest Florida, the earliest (ca. 7000 B.P.) coastal populations gathered shellfish, but the total subsistence regime is not clearly understood until 5000–4000 B.P., when intensive exploitation of marine shellfish and fish is recognized along the shore. By 4500 B.P. in all three regions of Florida, estuarine subsistence bases supported population nucleation and the creation of monumental architecture. By the end of the Archaic period (ca. 3500 B.P.) however, the brief venture into large-scale social works was abandoned in some, but not all of Florida, as climate and/or sea level regression brought significant environmental changes.

1. Introduction

Until recently, the conventional wisdom held that rapidly rising sea levels prevented or limited the establishment of coastal shellfish beds prior to the Late Archaic period (5000–3000 B.P.) (e.g., Goggin, 1952; Miller, 1988, pp. 71–72; Widmer, 1988; see Sassaman, 2004, p. 29; Widmer, 2005). In general, estimates by these and other archaeologists reflect the dates of the earliest known terrestrial coastal sites in their respective areas of study. With no direct evidence for earlier coastal sites, archaeologists assumed that estuarine ecosystems were unable to adapt to rapid sea level rise, precluding the possibility of earlier coastal settlement. Archaeological and geological evidence that productive estuaries were present earlier was seen as anomalous or was otherwise dismissed.

Conventional wisdom also placed little value on shellfish as a nutritional resource. Especially because of its low caloric content, archaeologists assumed that shellfish were used by fisher-gatherer-hunters only because: 1) the resource is easily acquired from nearby coastal marshes, 2) it can be gathered by women, children, and the aged or infirm, and 3) the resource is abundant and resistant to overexploitation (Yesner, 1980). However, this model results in an underestimation of the contribution of shellfishing to the diet of coastal peoples (Claassen, 1991); Thomas (2008) has shown that the post-encounter caloric return rate on oysters (*Crassostrea virginica*) is equivalent to slash and burn farming.

This paper comments on traditional models of shellfish exploitation and then describes the evolution of coastal shellfish use, primarily in Florida, throughout the Archaic where possible, information on settlement patterns, social systems, and trade is provided, as well as the limited available paleoenvironmental data. Previously considered impossible, data now suggest that by the Middle Archaic, many coastal peoples relied almost exclusively on shellfish and other estuarine resources, while others incorporated more freshwater and terrestrial fauna. By the Late Archaic, large shellfish middens are found at sedentary settlements (including riverine settlements) across the Southeast and the adaptation is successful enough to provide for population nucleation and the construction of monumental architecture in some locations. An article of this length cannot hope to be comprehensive. Thus, the focus is on a few areas with recent excavations or reexaminations that are forcing reevaluations of the conventional models of southeastern U.S. coastal adaptations.

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2. Shellfishing: antiquity and optimality

Archaeologists around the world have been slow to accept the antiquity and viability of a subsistence system based on shellfish. In a discussion of the irrefutable evidence of coastal shellfishing in the Paleolithic in Portugal, Bicho and Haws (2008) noted that the traditional Old World model of coastal adaptations explicitly rejects such early shellfishing. The arguments against such adaptations for the Old World Pleistocene/Holocene transition are remarkably similar to those cited above for the Southeast for the Archaic—and are similarly flawed: "Few coastal Pleistocene [Middle Archaic] sites exist; …sea level stabilized in the Holocene [Late Archaic]; many coastal sites appear in the Holocene [Late Archaic], therefore coastal adaptations began in the Holocene [Late Archaic]" (Bicho and Haws, 2008, p. 2167; the authors have added the Florida equivalent). As in the southeast U.S., the Old World model also assumes that shellfish are marginal resources: "if humans exploit them there must be population pressure on resources" (Bicho and Haws, 2008, p. 2167; for the Southeast, see e.g., Byrd, 1977; Wing and Brown, 1979). In contrast, Bicho and Haws (2008, p. 2173) demonstrated that shellfish were available "in large quantities" in the Late Middle Paleolithic and throughout the Upper Paleolithic. Further, they cited a number of studies (e.g., Hockett and Haws, 2003) indicating that shellfish should be ranked higher than they typically are on nutritional scales. Protein and fat content are similar to terrestrial resources "albeit in smaller packages" and some shellfish have carbohydrates that are lacking in terrestrial resources (Bicho and Haws, 2008, p. 2169; for calories, see Thomas, 2008).

The Portuguese coast was not uniquely favorable for estuarine development in the Pleistocene. Indeed, evidence for Terminal Pleistocene (13,000–11,000 cal B.P.) coastal shell exploitation is found around the globe (Erlandson, 2001; for Europe, see Bicho and Haws, 2008). Sites in Peru (Sandweiss et al., 1998) as well as elsewhere in South America (Scheinsohn, 2003) have yielded evidence of Pleistocene shellfishing. In North America, the California Channel Islands and adjacent coast provide a surprising amount of preserved evidence for Late Pleistocene/Early Holocene maritime adaptations. Radiocarbon dates from a shell midden at Daisy Cave (CA-SMI-261) on San Miguel Island extend shellfish gathering back to ca. 11,750 cal B.P, and isotope analysis of Arlington Woman from Santa Rosa Island may indicate maritime gathering as early as 13,000 cal B.P. By 9300 cal B.P., a "fully maritime" adaptation was in place at CA-SRI-6 (Erlandson et al., 1999; Jones et al., 2002). Farther north along the coast, shellfishing was well established in the Queen Charlotte Islands, British Columbia, by 10,000 cal B.P. (Southon et al., 1990).

Currently, the oldest mainland shell midden on the American west coast dates to between 10,350 and 9700 cal B.P., when sea level was 25–40 m below present (Jones et al., 2002). Along the shallow shores of the northern Gulf of Mexico, however, the earliest known terrestrial shell middens date to 8200–8050 1 cal B.P. (Weinstein, 2009). Indeed, there is a cluster of shell midden sites in Texas that date to the early 9th millennium B.P. (Ricklis and Weinstein, 2005), which corresponds to a sea level stillstand in the model followed by the investigators (Thomas and Anderson, 1994), but to a precipitous rise in many other models (e.g., Balsillie and Donoghue, 2004). Offshore, coring in the combined paleochannel of the Trinity and Sabine Rivers penetrated a rangia (*Rangia cuneata*) midden dated to 8500 cal B.P. (Pearson et al., 1986).

Though patchy, these data suggest early and (broadly) continuous coastal shellfish exploitation globally and in the U.S. from at least the Terminal Pleistocene to the Late Archaic. Thus, the authors reject settlement models based on a presupposition that shellfish could not adapt to the environmental conditions created by rapid sea level rise. Rather, oysters are able to tolerate marked changes in salinity, temperature, and turbidity, and not just in the short term (see papers in Kennedy et al., 1996). Indeed, oyster reproduction almost seems programmed to take advantage of rising waters. Oysters are broadcast spawners and larvae move about for two to three weeks prior to attachment to a hard substrate. During that time, oyster larvae are more abundant in the water column when the tide is coming in; that is, they resist seaward drift by rising and moving landward on flood tides—moving up the estuary—and settle to the bottom during outgoing tides (Shumway, 1996, p. 470; Kennedy, 1996). Biologists believe that the current adaptability of oysters (and other estuarine shellfish) is an evolutionary adaptation to dramatic changes in sea level and other environmental conditions; their plastic physiology is "acquired through geological ages of adaptation" (Shumway, 1996, p. 503). In addition, human societies were quite capable of developing settlement strategies to cope with dynamic hydrological environments. If not destroyed by sea level transgressions and regressions, many more early shell middens await discovery in the shallow waters of the Gulf of Mexico and the lower Atlantic coast.

Unfortunately, only limited underwater archaeological work has been done in Florida, mostly in the northern Gulf of Mexico. A radiocarbon date on a natural oyster bed at Ray Hole Spring, 30.6 km offshore of the panhandle, establishes brackish water conditions by at least 7800 cal B.P. (Tables 1 and 2) (Faught, 2004). A date of ca. 6800 cal B.P. was recovered from an oyster-shell midden at the J & J Hunt site, 6 km offshore in 3 m of water (Faught, 2004). These data indicate that early Holocene sites will be considerably further offshore. It appears that sea level rise in the Gulf occurred in pulses, and stillstands left a series of paleoshorelines as depicted in Fig. 1 (Faught and Donoghue, 1997; Faught, 2004). The 40 m isobath, 150 km (93 mi) offshore, is believed to mark the "Clovis shoreline," while a stillstand at ca. 8000-years ago may be responsible for the 20 m isobath (Faught and Donoghue, 1997, p. 447; Faught, 2004). These "stillstands" appear clear enough in the contours of the continental shelf, but they are present in only a minority of Gulf coast sea level curves (see, e.g., Tornqvist et al., 2004 for a discussion). Whether human exploitation of the coast was dependent on stillstands remains to be demonstrated (e.g., Russo, 2010). According to Faught and Donoghue (1997, p. 448), after the 8000 B.P. stillstand, between ca. 7000 and 6000 B.P. (uncalibrated), sea level in the Apalachicola Bay area rose ca. 4.3 m, which, given the shallow gradient in the area, translated to a shoreline retreat of 12 m a year. The adaptable oyster (which can achieve a consumable size in two years) clearly survived, and humans exploited them.

3. Case studies

3.1. Florida panhandle

The earliest terrestrial evidence for estuarine exploitation in the lower Southeast is in southwest Florida (see below) and above the Mitchell River floodplain on the Florida panhandle (Fig. 2; Table 1). The Mitchell River sites are part of a complex of 16 Archaic sites on a sandy Pleistocene terrace overlooking what is now a freshwater floodplain that drains into Choctawhatchee Bay (Mikell and Saunders, 2007). Twelve of these sites contain estuarine shell middens; two of these have features dated to 7200 cal B.P. (Prior to the dating of the Mitchell River sites, the earliest coastal sites in this area were thought to be no older than ca. 4600 B.P.) Terrestrial Middle and even Early Archaic coastal sites are likely in the area because the aforementioned 8000-year-old shoreline swings very close to the coast along much of the Florida panhandle. The Mitchell River occupations escaped the inundation of sites such as J&J Hunt because of their protected position on the terrace within an embayment.

Table 1
Selected radiocarbon dates from Archaic sites discussed in the text. All dates were calibrated with Calib 5.0; the delta *R* used was −5 ± 20. If $p > .9$, additional probabilities not included.

Lab #	Provenience	Material	Corrected, B.P.	$\delta^{13}C_{PDB}$	1 cal	2 cal
Ray Hole Spring						
NA	Oyster shell in voids in limestone bedrock	Oyster	7390 ± 60	NA	7930–7800 (1)	7980–7710 (1)
Mitchell River 1						
Beta-139264 AMS	TU3, Level 7, Feature T-7	Soot on steatite	6260 ± 40	−25.2	7250–7170 (1)	7270–7150 (.85) 7120–7030 (.14)
Beta-143030	TU3, Level 7, Stratum IV	Scattered charcoal	5950 ± 70	−26.1	6860–6720 (.85) 6700–6690 (.07) 6880–6870 (.04) 6690–6680 (.04)	6970–6640 (1)
WK-9652	EU6, Level 7, Stratum V	Oyster	5500 ± 50	2.1	5950–5810 (.98)	6010–5720 (1)
WK-9649	EU1, Level 9, Stratum IIIb	Oyster	5450 ± 50	−1.3	5900–5760 (1)	5950–5690 (1)
WK-9646	EU5, Level 7, Stratum IV	Oyster	5270 ± 50	−1.6	5690–5580 (1)	5790–5510 (1)
WK-9650	EU7, Level 9, Feature 13	Oyster	5030 ± 50	−1.8	5440–5320 (1)	5530–5280 (1)
WK-9645	EU1, Level 8, Stratum III	Charcoal	4180 ± 50	−25.5	4760–4690 (.50) 4680–4640 (.23) 4830–4800 (20) 4640–4630 (.05) 4790–4790 (.01)	4840–4570 (1)
WK-9644	EU5, Level 4, Stratum III	Oyster	4280 ± 50	−1.4	4490–4330 (1)	4550–4230 (1)
WK-9648	EU4, Level 7, Feature 7b	Charcoal	3880 ± 50	−25.3	4410–4280 (.83) 4280–4250 (.16)	4420–4150 (1)
WK-9647	EU4, Level 7, Feature 7	Oyster	4190 ± 50	−1.8	4390–4210 (1)	4430–4100 (1)
WK-9651	EU6, Level 2, Stratum III	Oyster	4140 ± 50	−.9	4310–4130 (1)	4390–4070 (1)
WK-9689	EU8, Level 6, Feature 19	Charcoal	3520 ± 50	−25.9	3800–3720 (.63) 3860–3810 (.37)	3930–3690 (.98)
Beta-139437	TU1, Level 3, Strat II	Charcoal	3390 ± 80	−25.0	3720–3560 (.84) 3520–3510 (.06) 3810–3800 (.05) 3500–3490 (.05)	3840–3450 (1)
Mitchell River 4						
GX299913	Eu2, Level 7, Area 1	Oyster	6540 ± 100	−2.7	7170–6930 (1)	7270–6790 (1)
J&J Hunt						
Beta-169504	Submerged shell midden	Charcoal	5970 ± 40	−26.7	6810–6740 (.59) 6860–6810 (.41)	6900–6710 (.96)
Spencers Midden						
Beta-119812	Lowest coquina deposit	Oyster	5670 ± 70	+.6	6170–5990 (1)	6245–5920 (1)
Beta-119813	Shovel Test 5 (dates Block deposits)	Oyster	5490 ± 70	−1.8	5960–5760 (1)	6060–5690 (1)
WK7434	Scattered oyster in Trench 1	Oyster	5720 ± 60	−2.4	6220–6050 (1)	6270–5980 (1)
Beta-50153	EU1, deep oyster-filled pit	Oyster	5570 ± 80	−3.2	6090–5880 (1)	6180–5760 (1)
McGundo Midden						
Beta-45924	TU4, 20 cm above base of midden	Oyster	4630 ± 70	NA	4970–4780 (1)	5060–4620 (1)
Oxeye Island						
Beta-119814	ST 1262, 2 mbs (base of shell)	Oyster	4580 ± 80	NA	4900–4670 (.98)	5020–4550 (1)
WK7437	EU5, 10–15 cmbs (top of shell)	Estuarine shell	4400 ± 60	NA	4650–4450 (1)	4780–4410 (1)
Beta-119815	EU5, 100 cmbs (base of shell)	Oyster	4570 ± 70	NA	4860–4670 (.98)	4970–4560 (1)
Tomoka Mounds						
Beta-54622	Pre-mound midden	Coquina	4460 ± 70	NA	4770–4560 (1)	4820–4450 (1)
Fig Island Ring Complex						
Selected dates showing contemporaneity of ring base and top						
WK10103	Fig Ring 1, Test 2 Ringlet top	Oyster	3820 ± 50	−.9	3830–3680 (1)	3920–3610 (1)
WK9746	Fig Ring 1, Test 2 Ringlet base	Oyster	3860 ± 50	−1.1	3890–3730 (1)	3960–3680 (1)
WK10102	Fig Ring 2, Shovel Test 4 Top of ring	Oyster	4010 ± 60	−.3	4100–3920 (1)	4190–3850 (1)
WK9762	Fig Ring 2, Shovel Test 4 Fea 4b- base of ring	Oyster	4110 ± 50	−.9	4240–4080 (1)	4340–4000 (1)
WK10104	Fig Ring 3 Top of ring, center	Oyster	4070 ± 50	−.4	4210–4040 (1)	4270–3950 (1)
WK9747	Fig Ring 3 Base of shell, middle of ring	Oyster	3990 ± 50	−.8	4080–3920 (1)	4150–3850 (1)
Rollins Shell Ring						
Selected dates showing contemporaneity of ring base						
Additional dates available in Saunders (2004)						
Beta-119816	Trench 1, TU 2, Feature 1, base of ring, western arm	Oyster	3670 ± 70	−2.5	3680–3480 (1)	3795–3400 (1)
WK-7438	Trench 1, TU 1, Feature 1,Top of ring, western arm	Oyster	3600 ± 60	−2.4	3580–3420 (1)	3660–3360 (1)
Beta-119817	TU 3197, base of ring	Oyster	3710 ± 70	−.3	3740–3540 (1)	3830–3450 (1)
GX-30737	TU 10 (ringlet F), base of shell	Oyster	3930 ± 80	−2.1	4050–3820 (1)	4150–3690 (1)
GX-30739	TU 11 (ringlet J), base of shell	Oyster	3630 ± 70	−3.6	3630–3440 (1)	3720–3360 (1)
GX-30740	TU 11, Fea 28 (below ringlet base)	Oyster	3820 ± 70	−2.0	3870–3680 (1)	3970–3580 (1)
Canons Point						
UM-520	Base of midden, marsh ring	Oyster	4190 ± 90	NA	4400–4150 (1)	4520–4000 (1)
Guana Shell Ring						
Beta-154817	Near base of ring; d. 1.2 m	Oyster	3600 ± 50	−1.2	3550–3440 (1)	3620–3440 (1)
Beta-165598	Base of ring	Oyster	3490 ± 70	−2.2	3440–3310 (1)	3530–3210 (1)
Beta-165599	Base of ring	Oyster	3590 ± 70	+.5	3560–3390 (1)	3640–3330 (1)

Table 1 (*continued*)

Lab #	Provenience	Material	Corrected, B.P.	$\delta^{13}C_{PDB}$	1 cal	2 cal
Horrs Island- earliest component and associated features						
27 additional dates available in Russo (1991)						
Beta-40276	Base of Mound B	Charcoal	6070 ± 90	NA	7020–6790 (.91)	7170–6720 (.99)
UM1920	Stratum C Mound B	Oyster	6330 ± 85	NA	6910–6690 (1)	7030–6580 (1)
	Base of overlying mound	Oyster	4645 ± 85	NA	5020–4790 (1)	5140–4630 (.98)
	Intrusive burial into Mound B	Bone	4030 ± 230	NA	4840–4230 (.98)	5070–3870 (.98)
Useppa Island						
Earliest component						
	Test 2, Busycon tool manufacturing camp	Shell	6025 ± 100	NA	6561–6330 (1)	6690–6250 (1)
U1836	Test 2, Busycon tool manufacturing camp	Shell	5335 ± 100	NA	5820–5600 (.97)	5920–5490 (1)

The date from Mitchell River 1 is an AMS date on soot removed from a large steatite sherd that was part of an in situ feature of shellfish—nerites (*Neritina reclivata*), rangia, and oyster—in an ashy sand matrix within a larger oyster/nerite midden stratum. Prior to this find, the earliest steatite in the area was thought to occur no earlier than ca. 4600 B.P.

These diverse shellfish species have different, but overlapping ranges of salinity tolerances (from 1 to>30%). Vertebrate fauna in the feature were very rare (all material in this testing phase excavation was screened through 6.4 mm [.25 inch] mesh), consisting of a mullet (*Mugil cephalus*) vertebra, a softshell turtle (*Apalone ferox*) carapace fragment, and two small unidentified bone fragments, probably fish. The oyster/nerite midden surrounding the feature also had little bone, and only two small mammal fragments were recovered. The 7200-year-old date from the Mitchell River 4 site was from a feature that had a much less diverse faunal assemblage. The date was from an oyster-shell lens at the base of a sand-filled pit. There was no other shell or bone in the feature. A piece of steatite was recovered from the same level/stratum as the feature.

Unfortunately, there is no other information on these early components. Their extent is unknown, and there are no seasonal indicators. The varied fauna suggests that a number of different estuarine and freshwater habitats were exploited: marsh grasses for nerites, open estuarine waters for rangia, oyster, and fish, upstream rivers for turtle (rangia and mullet may also be found considerably upstream), and terrestrial forests for the mammal. Paleoenvironmental reconstruction (Saunders et al., 2009) indicates that, at 7200 cal B.P., the floodplain below these sites was a broad, shallow, fresh to brackish water lake, with sedges as the main vegetation; the closest estuarine resources such as oyster may have been up to 6 km distant, at the mouth of Choctawhatchee Bay. Thus, the Mitchell River sites were positioned to take advantage of a number of different environments—the focus of the occupations was not just estuarine. While the degree of sedentism of the Middle Archaic occupations is unknown, according to Kent (1992), the presence of extralocal stone is one indication of longer-term occupations. All stone on Mitchell River sites is extralocal and there is a consistent association of these early deposits with steatite (probably from northwest Georgia) and other lithic debris.

The Mitchell River 1 (7200–3500 cal B.P.) site contains discrete deposits spanning almost 4000 years. The next component dates to 5900 cal B.P. At this time, the Mitchell River inhabitants adopted a subsistence strategy hitherto unidentified in the region—they relied almost exclusively on nerites. A 25-cm-thick stratum of midden containing mostly nerites was present throughout the southwestern portion of the site. A fine-screened sample from this stratum yielded 96.3% nerite, 3.6% bivalves (93% of which were oyster), .1% fishes (gar, *Lepisosteus* spp. and herrings/shad, Clupeidae), and .04% mammal (deer was the only identifiable species; large mammal may be underrepresented in the small fine screen samples) (Quitmyer, 2002).

This nerite subsistence focus was relatively short-lived. From 5600 to 3500 B.P., oyster was overwhelmingly the most abundant invertebrate (ca. 76% of fine-screened samples) and estuarine fish the most abundant vertebrate. However, terrestrial species, including deer and other large mammal, were exploited, as was alligator, which ranks slightly higher than white-tailed deer in terms of energetic return (Thomas, 2008; Figure 9.4). The presence of large species such as deer and alligator is consistent with the relatively large number of lithic tools and chipping debris recovered across the site.

To summarize, the folks along Mitchell River never committed to a low diversity strategy of exclusive reliance upon estuarine resources. Apparently from 7200 to 3500 B.P., shellfish were a major constituent of the diet, but terrestrial animals were also important. Exotic stone tools were either a necessary or a highly desirable part of the tool kit; long distance trade in stone occurred in all occupations. At Mitchell River 1, all proveniences with sufficient seasonal indicators indicate site use throughout the year (Quitmyer, 2002).

Long distance trade was the hallmark of the last Late Archaic presence along the panhandle, the Elliotts Point culture. Because Elliotts Point sites contain baked clay objects, microliths and other evidence of a lapidary industry, steatite bowls, and other exotic lithics, the phase is generally considered to be a part of the Poverty Point interaction sphere. (The Poverty Point site [major construction 3600–3300 cal. B.P.] is the premier Late Archaic mound site in the southeastern U.S. It contains the third largest mound built in any time period in the U.S., and a remarkable assemblage of exotic lithics from throughout the U.S.) However, the Elliotts Point phase (4600–3500 cal B.P.) actually began almost 1000 years earlier than

Table 2
Early environmental conditions and site components discussed in text. Named cultures are in italics.

	NW Florida		NE Florida		SW Florida	SE Florida
Early Archaic 10,000–8000 B.P.	Estuarine conditions by 7800 cal B.P. (8500 cal B.P. on Texas Gulf coast)					
Middle Archaic 8000–5000 B.P.	Mitchell River, J&J Hunt		Spencers Midden		Horrs Island Useppa Island	
Late Archaic 5000–3000 B.P.	Mitchell River, Apalachicola	*Elliotts Point*	McGundo Tomoka Shell Rings	*Thornhill Lake?Orange(FL)*	Horrs Island Bonita Bay Everglades Rings	Joe Reed

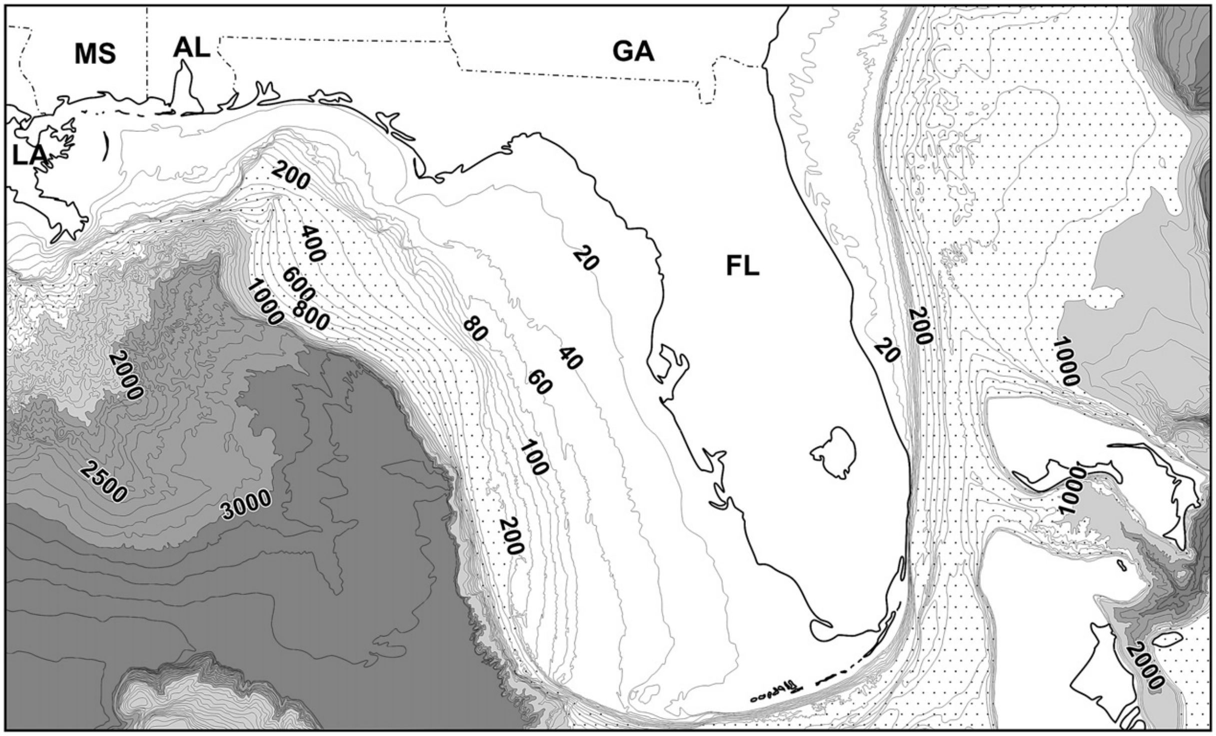

Fig. 1. Bathymetry along the Florida coast.

the beginning of Poverty Point, and declined during the building boom at the Poverty Point site.

Elliotts Point sites occur in clusters within 1.5 km of the coast. Occupations are considered sedentary, although individual sites may represent only seasonal or periodic occupations (Campbell et al., 2004). The Elliotts Point culture has some correlates with contemporaneous cultures on the lower Atlantic coast, particularly in the construction of large (ca. 100 m diameter) shell rings (crescents) that appear to be locations for periodic population aggregation, ritual, and feasting. Unlike the Atlantic rings, the Elliotts Point shell rings (three are known) contain relatively diverse shellfish assemblages, including oyster, rangia, and conch (e.g., *Strombus alatus*), hard clam (*Mercenaria mercenaria*), bay scallop (*Argopectin irradians*), and crab (*Callinecthes* spp.). Campbell et al. (2004) attribute the presence of the latter three species, which have high salinity tolerances, to an increase in salinity in Choctawhatchee Bay, and diatoms from a core taken below the Mitchell River 1 site do indicate that the bay was most saline at the beginning of the Elliotts Point phase.

Surprisingly, despite the coastal focus suggested by the settlement pattern, few Elliotts Point sites around Choctawhatchee Bay contain estuarine shell middens (the Mitchell River 1 site has one large oyster-shell feature dated to the phase). Indeed, it may be that, around Choctawhatchee Bay proper, shellfish consumption occurred primarily at ring sites. The heretical conclusion that shellfish were primarily feasting foods in the Elliotts Point phase warrants additional investigation.

In the Choctawhatchee Bay area, there was considerable sophistication in coastal adaptations as early as 7200 cal B.P. Settlement pattern is unclear for the earlier components, but full-time coastal residence was established at least by Elliott Point times. Even if residence at a single site was not year round, we believe that coastal residence was. Changes in hydrology may be responsible for a subsistence change around 5900 cal B.P. (to very low salinity nerites) and 4600 cal B.P. (to high salinity scallops and hard clams). The high salinity regime is correlated with the development, in a circumscribed area immediately surrounding Choctawhatchee Bay, of ceremonialism involving monumental architecture and, perhaps, special feasting foods, by around 4200 cal B.P. (Campbell et al., 2004; Table 6.1; recalibrated) at about the same time that shell rings appear along the lower Atlantic coast. Despite evidence for a lively trade in exotic lithics, there is no evidence of a status hierarchy.

In contrast to the apparent complexity of the settlement and social system in the Choctawhatchee Bay area are the more prosaic middens of the coastal Apalachicola River some 113 km (80 mi) to the east. The Apalachicola system has the greatest flow of any river in Florida, and its two tributaries, the Flint and the Chattahoochee Rivers, extend into the foothills and hills (respectively) of the Blue Ridge Mountains of northwest Georgia—where sources of steatite and other valuable lithics were mined and traded throughout prehistory. However, according to White (2003a,b, 2004), peoples living along the lower Apalachicola essentially ignored the extensive trade in exotics and the widespread ceremonialism occurring in the Elliotts Point occupations to the west. Baked clay objects are present, along with chert microliths, which, based on wear patterns, White interprets as woodworking tools (elsewhere in the Middle and Late Archaic Southeast, such tools are often considered part of a lapidary industry). Steatite is also present. However, though there are mounded shell middens on the coast, these appear to be accretional only. Shell species are predominantly oyster or rangia, depending on the degree of delta development and associated freshwater discharge (White and Donoghue, 1995). According to White, the dynamic hydrology of the area mitigated against sedentism, and the natural abundance and relative ease of collection of the primary food resources by men, women and children created either natural or cultural leveling. “Conservatism, resistance to change, is typical when resources are dependable and group life is successful” (White, 2003b, p. 25). It should be noted that other researchers (e.g., Hayden, 2001) view such natural abundance as a primary condition for the emergence of inequality. At present, it cannot be explained why mound building and other

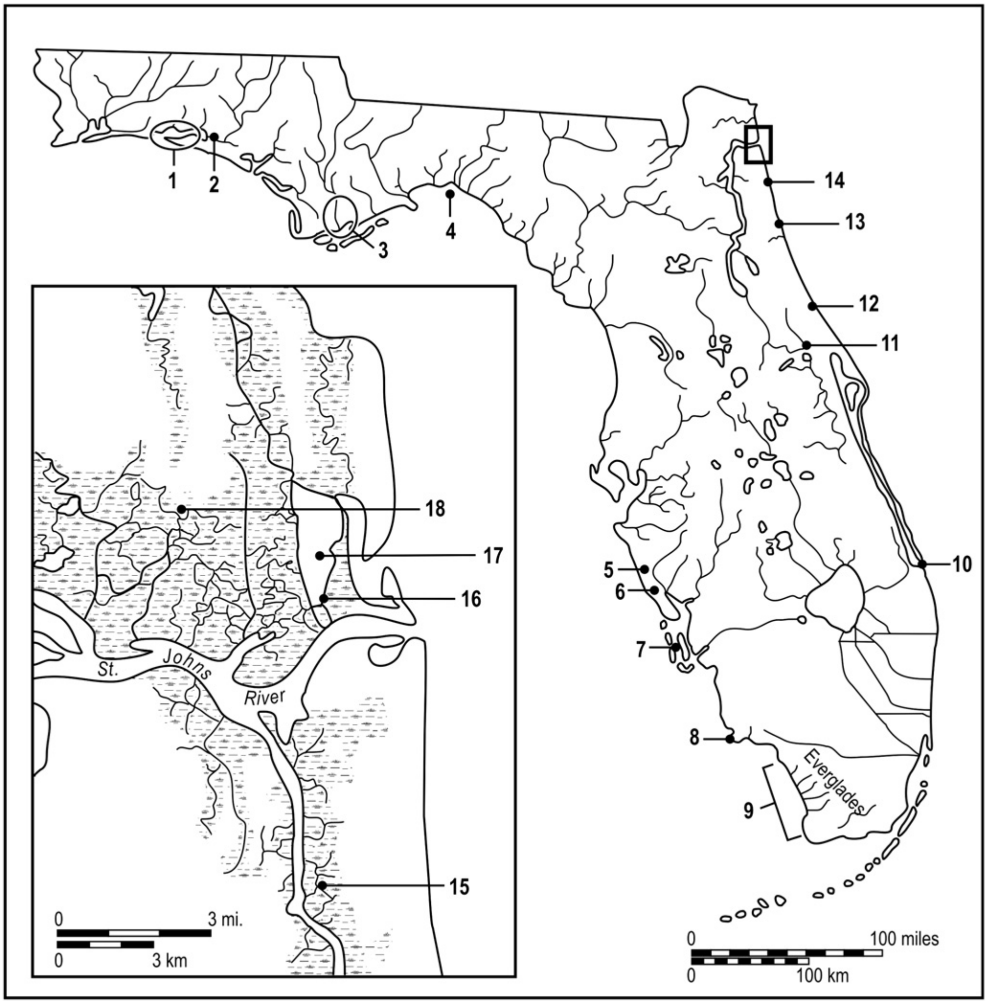

Fig. 2. Location of Florida sites mentioned in the text: 1. Elliotts Point sites around Choctawhatchee Bay; 2. Mitchell River sites; 3. Appalachicola River sites; 4. J&J Hunt site, Ray Hole Spring; 5. Hill Cottage site; 6. Venice Beach site; 7. Useppa Island; 8. Horrs Island/Bonita Shell Ring sites; 9. Ten Thousand Islands area/Everglades; 10. Joseph Reed Shell Ring site; 11. Tick Island site; 12. Tomoka Mounds site; 13. Summer Haven site; 14. Guana River Shell Ring site; 15. Spencers Midden site; 16. McGundo Midden site; 17. Rollins Shell Ring site; 18. Oxeye Island site.

ceremony arose in the Choctawhatchee River drainage and not the Apalachicola, or anywhere else on the Florida panhandle.

Mitchell River 1 was abandoned around 3500 cal B.P., and, though not so well dated, the other fifteen sites in the area were also abandoned around this time. This is the terminal date for the Elliotts Point phase and for large shell midden sites in the region for a thousand years. The 3500 cal B.P. date is also contemporaneous with an El Niño/Southern Oscillation (ENSO) climatic event that produced a cluster of severe (categories 4 and 5) hurricanes in the area (Liu and Fearn, 2000; Saunders et al., 2009; Saunders, 2010). The same event has been cited as responsible for the abandonment of the Lower Mississippi River valley after ca. 3000 B.P. (Kidder, 2006, 2010). In addition, some sea level curves (e.g., Tanner, 1993) model a pronounced sea level oscillation, beginning with a rapid regression at this time. Any or all of these environmental perturbations are considered critical factors in the end of the coastal Archaic and a subsequent Early Woodland period of reduced sociopolitical complexity (see papers in Thomas and Sanger, 2010).

3.2. Northeast Florida coast

By 6500 years ago, sea level had risen sufficiently to impede the northerly flow of the 320-km (200-mi) long St. Johns River that parallels the east coast of Florida. This resulted in the flooding of the broad and low gradient river valley, creating sluggish backwaters, marshes and large lakes in which the banded mystery snail (*Viviparus georgianus*), the apple snail (*Pomacea paludosa*), and a variety of freshwater mussels (*Elliptio* spp.) flourished. Within a few centuries, populations moved into every available river, lakeshore, and marsh island, collecting enormous quantities of shellfish. In the middle reaches of the river, the earliest (ca. 7000–6200 cal B.P.) evidence suggests that the mystery snail was the most frequently targeted shellfish (Endonino, 2008; Russo, 2010). The cumulative result of the subsistence and discard activities were enormous mounded shell middens, with the largest up to 10 m in height and over 100-m long.

Models of the interplay between Archaic riverine shellfish gatherers and coastal shellfish gatherers along the eastern Florida coast have changed over the years. Largely based on ethnohistoric accounts, earlier models depicted seasonal transhumance between the two areas, with the coast abandoned during the winter. Over the last twenty years, as the ethnohistoric record has been subjected to more critical reading and seasonal data have accrued, it appears that each area was occupied year round. Cultural developments were parallel; pottery (appearing around 4200 cal B.P.) was similar, and there is evidence of some trade in shell and other marine objects. However, the amount of interaction is still unclear.

The earliest evidence for estuarine resource exploitation in northeast Florida is found at the preceramic Spencers Midden site, which today is nestled on high ground adjacent to tidal marshes that border the eastern side of the St. Johns River near its mouth. Like the Mitchell River site, Spencers is comprised of a series of horizontally discrete shell deposits. The complete intrasite pattern remains unknown; however, discrete deposits of oyster, coquina (*Donax variabilis*), and minor amounts of other estuarine and marine shell, along with animal bone, were deposited in varying proportions and amounts in a vague semicircle about 40 m in diameter. The middens surround the north side of a depression that may be an extinct spring. Except in pit features, subsurface probing and some larger exposures indicate that middens are not extensive and they are generally shallow, ranging between 25 and 40 cm. To date, only shell features have been uncovered; no earth ovens, hearths, postmolds, or human remains have been found.

Radiocarbon dates from the Middle Archaic Spencers Midden cluster around ca. 6000 cal B.P. (Table 1); all overlap at 2 sigma. The "earliest" date (6220–6050 1 cal B.P.) came from the top of a 1 m deep oyster midden draped along the edge of the depression on the west side of the site, indicating that earlier dates from the site are possible. Directly north of this oyster midden were a series of coquina pot dumps dated to 6170–5990 1 cal B.P. These were buried under 40 cm of essentially sterile sand. East of this, there was a series of small inclusive shell features and shallow pits, also buried, uncovered in an 8 × 4 m excavation block. Though presumably exposed on the surface, there was no evidence of trampling or other disturbance of these shell concentrations. Either they were buried quickly, or this portion of the site saw little use after the food remains were discarded (or both).

The features contained oyster or coquina and oyster, dated to 5900–5740 1 cal B.P. Small fish bone was abundant in this block, even in non-shell areas. Deer bone was also abundant, especially in comparison with the amount of mammal present in Late Archaic sites in the area; there were 10 MNI of deer in a small area of discard. In addition to the features, several heavily reworked lithic knives and blades suggest the area exposed in the block was devoted to food processing and discard.

For most contexts at the site, faunal analysis revealed that small schooling fish such as herrings (Clupeidae) and menhaden (*Brevortia tyrannus*) were the principal estuarine vertebrate fauna; larger catfish (Ariidae) and drum (Scianidae) were also common. Drum was taken in the fall and menhaden in the winter (Russo, 1996a; Russo and Saunders, 1999). Isotopic analysis of coquina indicates that they were targeted in the fall (Jones et al., 2005; Quitmyer et al., 2005). Isotopic analysis also indicated that seawater temperature during the occupation of Spencers Midden was 5 °C higher than present and that seasonality was more pronounced (colder winters and warmer summers) in the Middle and Late Archaic than it is today (Jones et al., 2005).

The Spencers Midden site was located to take advantage of a number of ecotones including the ocean front (coquina), the estuaries (oyster and fish), and the forested hammocks (deer). The essentially contemporaneous radiocarbon dates and the lack of disturbance to (then) surficial piles of shell indicate that the site was used for only a brief period of time. Seasonal markers indicate site use throughout the year, although it is unknown whether or not Spencers folks were fully sedentary. As noted above, there are no other features except those indicating food processing and discard. Exotic stone (all stone is exotic to this area) was acquired; however, the stone tools recovered are of poor quality material and they are heavily reworked. This may indicate that, even at 6000 B.P., stone tools were becoming less important.

The McGundo Midden site (8DU7511) on Fort George Island, Florida, is the next oldest shell midden site in northeast Florida that has faunal data. The McGundo Midden was once part of a much larger mounded midden—possibly a monumental structure—that has been destroyed by shell mining. The small portion of the site that remains dates primarily to the preceramic Late Archaic period, 4970–4780 1 cal B.P. The McGundo Midden contents represent the quintessential northeast Florida, Late Archaic coastal diet. Though closer to the coast than Spencers, shellfish were overwhelmingly oyster; vertebrate fauna were overwhelmingly small, nettable fishes available in the estuary.

This was the subsistence base that fueled the rise of monumental architecture on the lower Atlantic coast—the shell ring. By ca. 4800 cal B.P., this purposefully constructed shell architectural feature made its first appearance in northeast Florida, at the Oxeye Island site, the earliest and the only preceramic ring along the lower Atlantic coast. Shell rings dominated the coastal landscape in northeast Florida and the Georgia and South Carolina coasts for the next millennium.

Shell rings were not, however, the only monumental architecture of the northeast Florida coastal Archaic. The apparently unique Tomoka Mound site consists of nine conical mounds built on top of a pre-existing coquina midden some 1500 m in length. A date on the midden provides a TPQ for mound construction of 4770–4560 1 cal B.P. The single mound that has been tested in modern times was also constructed of coquina midden. The mounds were built during the preceramic Archaic, although there were later ceramic Archaic intrusions into the mound that Piatek tested. Piatek (1994) recovered only bone and shell tools in the small tests he excavated in Mound 6 and in the village midden, although eight bannerstones were reported from this mound by an early investigator (Douglass, 1881–1885; Piatek, 1994). There is little additional information on this site. It is very different from shell rings: in the linearity of the site plan and in the clear presence of occupational midden underlying the mounds at the site. Indeed, all other coastal Archaic mounds occur at shell ring sites. It may be that Tomoka relates more to sites of the Thornhill Lake phase on the St. Johns River than to coastal sites.

For whatever reason, Tomoka was not replicated; shell rings were the order of the day. More than 40 shell ring sites (many with multiple rings) are known along the lower Atlantic coast between northern South Carolina and St. Augustine, Florida (Russo, 2006). Most are on high ground, either on Pleistocene barrier islands or the adjacent mainland. However, Oxeye Island and portions of the Canons Point Shell Ring complex, which contains the second oldest ring, are inundated. Thus, it is possible that earlier shell rings are buried beneath encroaching marsh or rising seas.

In most cases, shell ring fill is characterized by whole, clean oyster. This contrasts with the character of accretional middens, in which exposure to the elements and activities such as trampling create more broken and crushed shell, which is usually in a matrix of dark, humic sand. Small estuarine fish bone is abundant within most fill (which argues against the idea that the shell fill was borrowed and basket-loaded in from middens elsewhere). Fiber-tempered pottery is common in Georgia and Florida rings (farther north in South Carolina, a coeval, sand-tempered type is also found), as are bone and shell tools. Other artifacts, particularly lithics, are exceedingly rare. Shell and other food remains and artifacts can be present but are uncommon in the plaza areas that were maintained in the center of rings, and many ring sites have no occupational debris outside the ring. Most rings that have been radiocarbon dated indicate that ring walls were constructed very quickly. Top and bottom ring dates are often statistically contemporaneous at 1 sigma (Table 1).

The term "ring" is something of a misnomer. There are actually few truly circular "rings" (Fig. 3). Instead, rings come in a variety of shapes including closed circles, opened "C's" and "U's", overlapping

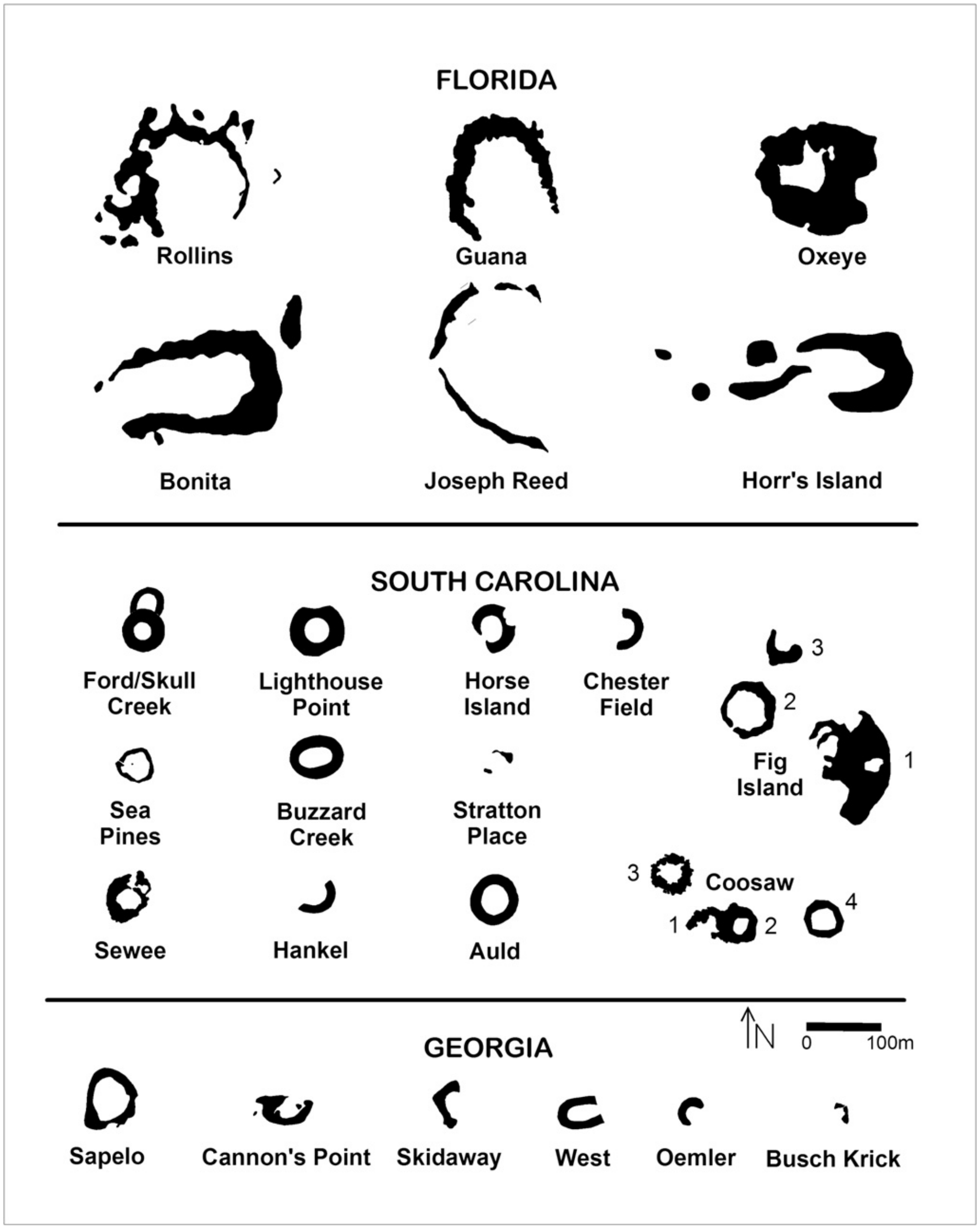

Fig. 3. Shell ring site footprints. All are to scale.

circles that form "8's", in one case a very clear hexagon, and other combinations not easily described. The tallest ring, Fig Island 1, is 6 m higher than the surrounding marsh and the broadest, Rollins Shell Ring, is 250 m in diameter. Rings in Georgia and South Carolina are generally smaller than those in Florida, rarely exceeding 70 m in diameter, but these more northern ring sites often contain multiple, contemporaneous rings. Three rings, one in South Carolina (Fig Island), and two in southwest Florida (Horrs Island and Bonita) contain conical mounds built of sand or sand and shell. Currently, there is no overarching hypothesis that accounts for the varied shape of rings. Some site-specific suggestions are discussed below.

One of the most complex ring sites is the Fig Island Shell Ring Complex (Fig. 4) in South Carolina, which contains three discrete shell "rings" (one nearly complete circle, one hexagon, and one crescentic-shaped structure) along with other architectural features made from oyster shell, including at least one causeway and what may be a large mound with a sand core capped with a volume of shell four times the volume of the sand (Saunders and Russo, 2002). With the possible exception of Oxeye (which is inundated and was mapped using subsurface probing), all Florida rings are U- or C-shaped, and all are larger than the largest shell rings in Georgia and South Carolina. One of the largest and most unusual is the Rollins Shell Ring complex, which is ca. 4 km southeast of Oxeye (and 1000 years younger). The Rollins ring complex consists of a large central ring with up to 14 smaller rings of various shapes attached to or surrounding it (Fig. 4); some appear to be unfinished. One working hypothesis developed to explain this configuration was that the main ring was built first and that, perhaps as some rituals at the ring became more exclusive, the smaller rings were built to restrict access to ceremonies specific to certain bands or moieties. However, one of the ringlets dated 400 years earlier than the main ring; the other was essentially contemporaneous with the main ring. It may be that Rollins was originally more like Georgia and South Carolina

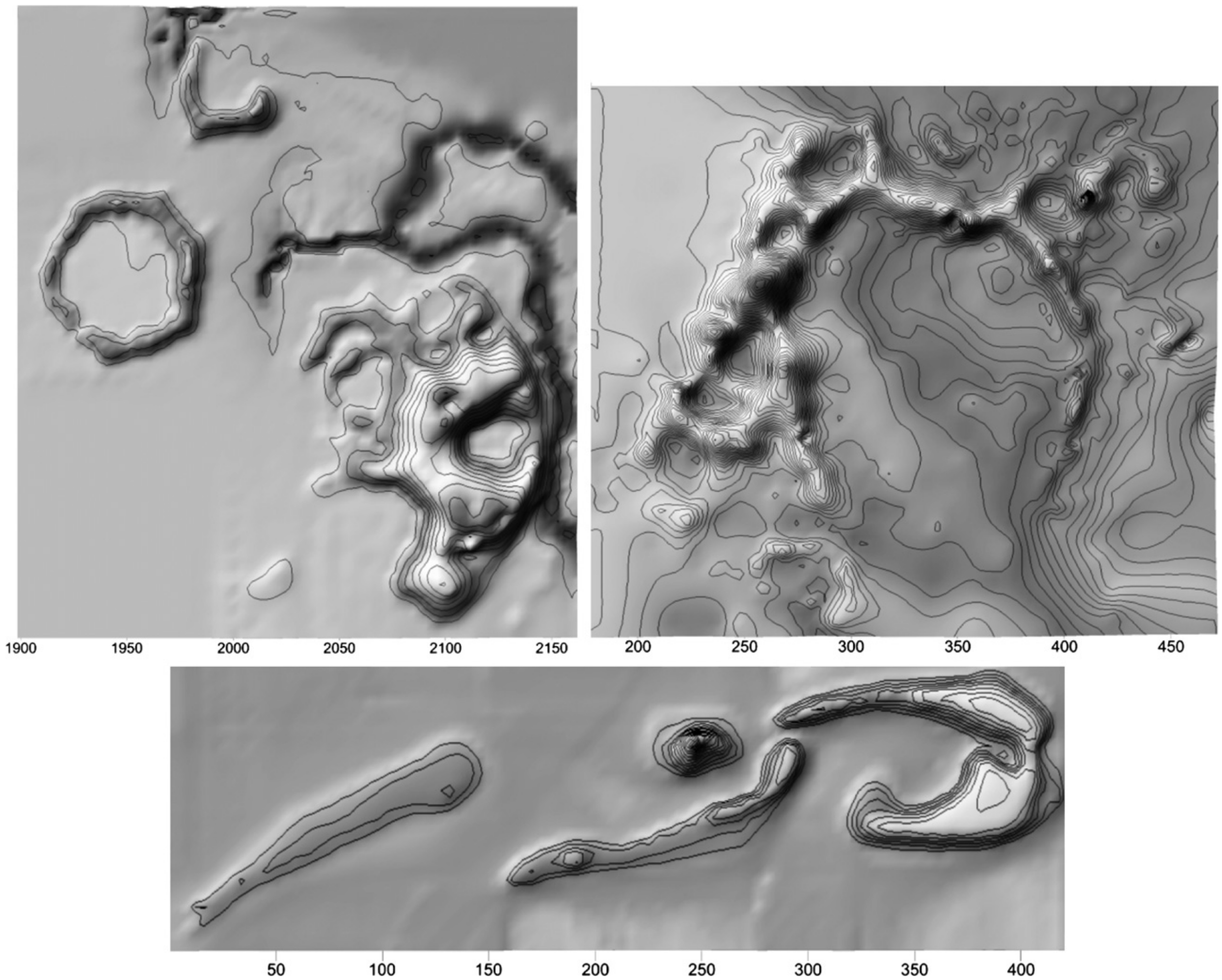

Fig. 4. Shaded relief topographic maps of the Fig Island Shell Ring site, Rollins Shell Ring site, and Horrs Island Ring complex. All are to scale.

rings, with multiple rings at a single site. Sometime around 3800 cal B.P., the decision was made to create the larger (more inclusive?) ring. Forty km south, the slightly younger Guana Shell Ring was clearly established as a large, U-shaped ring. The segmented ring configuration may indicate that Guana was expanded to the south through time, suggesting that U-shaped rings may have been constructed to allow for population growth.

Shell rings are one of three site types originally described for the Late Archaic along the lower Atlantic coast (DePratter, 1980). Accretional "sheet" shell middens and non-shell sites, which generally lack any soil color changes but contain lithics and pottery, are the other two types. Some sheet shell midden sites have non-shell areas, and it is possible that this combination is more common than it appears in the literature. To these can be added mounded accretional shell middens comprised of oyster or, in northeast Florida only, coquina. These are typically viewed as refuse piles. Coquina middens tend to be strongly seasonal; size class analysis indicates deposition in the summer and fall.

At present it is unclear how these different site types articulate. All occur within the same general coastal environment. Traditionally, archaeologists thought non-shell sites were hunting camps; sheet and mounded shell middens were seasonal habitation sites. By the 1990s, however, sufficient zooarchaeological analysis had been completed to demonstrate year-round occupation of the sheet midden sites. Shell ring function is more controversial. In an influential article, Trinkley (1985) argued that rings were habitation sites, with houses either on top or in the immediate interior of the ring. The present authors believe that the majority of rings were built of ceremonial feasting deposits. The ceremonial argument is based to a large extent on the character of the ring deposits, which, as noted above, often consist almost entirely of large, whole, clean oyster-shell valves in deep, loose strata that lack humic sands. Shell orientation runs the gamut from horizontal to vertical. Within the shell are the bones of literally millions of tiny fish, clearly taken using small-gauge nets, that represent an astounding quantity of food. The orientation of the shell, and the depth of the shell strata, suggest this refuse was dumped in large piles rather than accreting slowly as a result of individual meals.

One might argue that these attributes are also indicative of special processing sites or special processing areas at residential sites (Marquardt, 2008). This is a critical point: shell rings *are* special processing and discard areas. However, the purposeful planning involved in the layout of the sites, the conspicuous elevation, and the elaboration of some sites with multiple rings, ringlets, and mounds—belies the idea that rings were the result of daily refuse disposal. In addition to these characteristics, Saunders (2004) noted that most shell rings in northeast Florida (southwest Florida rings are clearly different) appear to be purposefully isolated from habitation and extraction sites. She theorized that isolation from villages provided neutral territory where bands could periodically gather to exchange information, to celebrate the group with song and dance, and to select mates. In this scenario, the ring is built of feasting deposits and stands as a monument to the group. Russo (2004) agreed that ceremony and the attendant feasting was one function of rings, but argued that some rings may have also served as long-term habitation sites, at least for some portion of the regional population, because seasonality studies show site use for all four seasons. On the basis of excavations at the Sapelo 3 ring, on Sapelo Island, Georgia, Thompson (2007: 271–272) suggested that rings began as habitation sites. Lower portions of the ring were built up as shell and other refuse accrued next to houses. At some point, however, the site was abandoned and became sacred, and the ring functioned as a ceremonial center. This is a viable hypothesis; however, the presence of feasting deposits at the base of many rings (e.g., Rollins; Saunders, 2004), along with ring isolation, indicates that some were initially established as ceremonial centers.

The few seasonality studies that have been completed indicate multi-season to year-round use of ring sites. However, because all of the scenarios described above could produce multi-seasonal to year-round seasonal signatures, seasonality studies alone are insufficient to resolve the site-function question. Ultimately, how shell rings functioned in the Archaic cultural landscape can only be answered empirically, on a case-by-case basis, and in the context of the greater settlement picture. It would be a mistake to impose too much regularity of function for ring sites that span preceramic to ceramic periods, two distinct ceramic traditions (Orange in Florida and Stallings/Thoms Creek in South Carolina), and 13 different archaeological cultures (Russo, 2006).

Regardless of site function, shell rings provide the first evidence along the lower Atlantic coast for population nucleation. Whether as habitation sites or ceremonial sites (or both), this nucleation raises the question of whether status differences emerged in ring-building cultures. Russo (2004) suggested that high status individuals or entrepreneurs competed for prestige through feasting. He cited non-random differences in shell height or volume around most rings, with the highest areas tending to be across from the ring entrance, as evidence for such status difference; this height/volume difference indicates greater access to food resources that reflects differential status distinctions among community members, at least in the context or ring feasting ceremonies (Russo and Heide, 2004; Russo, 2004, 2006). Burials, the *sina qua non* for status studies, are absent from rings. Curiously, many rings have yielded random skeletal elements, but no complete or even incomplete burials have been observed (Russo, 2006). As indicated above, exotic items that might be included with high status burials are very rare in the Late Archaic period in this area. Apparently, Middle Archaic folk had more access to (or desire for) exotic stone than their Late Archaic descendants. The Archaic burials that have been excavated in this area (i.e., at Tick Island (Aten, 1999), a riverine shell site with slight coastal connections, and Summer Haven (State of Florida, 1995), a coastal shell midden site) do not indicate status differences.

The shell ring phenomenon was relatively short-lived. Along the lower Atlantic coast, unequivocal radiocarbon dates indicate the most concentrated period of construction was from ca. 4000–3500 cal B.P. The cessation of construction is contemporaneous with the ENSO episode that produced the severe hurricanes in the Mitchell River area and flooding throughout the Lower Mississippi River Valley, as well as the aforementioned sea level regression. These climatic and sea level data are relatively new and are still being incorporated into models of the end of the Late Archaic (Thomas and Sanger, 2010). Most archaeologists envision abandonment of the coast. However, given the adaptability of estuarine resources and of human cultures, folks may have followed the sea eastward; post-3500 B.P. occupations could be inundated by subsequent transgressions. (Walker et al., 1995 present evidence for rapid occupation of land newly exposed by sea level regression between 1450 and 1350 B.P. in southwest Florida.) Researchers need to look for submerged coastal sites at the appropriate contour and in areas with a high probability of site preservation (i.e., low-wave energy embayments) to determine where the Late Archaic ring builders went.

3.3. Southwest Florida

One of the earliest shell middens located in south Florida was identified at the Horrs Island site, at the northern end of the Ten Thousand Island area of the Florida Everglades. At Horrs, a 10-m-long soil layer containing shell midden comprised of dark, humic sands and degraded oyster and clam shell (Russo, 1991, pp. 459, 468) dated to ca. 6900 cal B.P. Based on the degree of shell degradation, Russo (1991, p. 459) hypothesized that a considerable length of time passed between this initial occupation and the subsequent Late Archaic occupation that overlaid it. As at Mitchell River, not much else is known about this early component, but its presence demonstrates that subsequent developments at Horrs Island were not "sudden or anamalous" (Russo, 1991, p. 468) but derived from a long tradition of coastal exploitation. Indeed, slightly younger dates (Table 1) have come from what appears to be an early encampment on Useppa Island. This camp was clearly established to produce whelk (*Busycon contrarium*) columnellas (Milanich et al., 1984). A fine-screened vertebrate faunal sample from this component provided information on the relative contributions of fish (66%), sharks and rays (26%), and reptiles (6%). The archaeologists involved (Milanich et al., 1984:276), however, thought that deer was underrepresented because of the bias introduced by the small size of the fine-screened sample.

As indicated above, major development of the Horrs Island site began around 5000 cal B.P. The site configuration is significantly different from the lower Atlantic ring sites (Fig. 4). Situated on a long but narrow parabolic dune some 10 m above the surrounding Gulf and estuaries, the site consists of a central shell ring with two linear village middens to its west, each attended by small mounds, one sand/shell (Mound B) and one shell (Mound C). A much larger mound, Mound A (sand/shell), lies adjacent to the west end of the ring, while yet another, Mound D (sand/shell), lies 500 m to the east. As at the Fig Island sand and shell mound, the sand/shell mounds have sand cores that are capped by large quantities of oyster and other shell. At nearly a kilometer in length, the Horrs Island complex of mounds, rings, and village features was the largest ring complex in the southeastern U.S. as well as the largest permanent settlement in North America at ca. 5000–4000 B.P.; all without a single pot.

Horrs Island has yielded the most intensive faunal analysis of any Middle to Late Archaic site on the southwest Florida (Russo, 1991). The shell from most of the large Archaic shell midden sites has typically been reported in unquantified species lists. When quantified, most sites indicate a reliance on oyster among invertebrates and fish among vertebrates (e.g., Milanich et al., 1984; Torrence, 1996). When fine-grained analysis is undertaken, estuarine and other inshore, as opposed to offshore, shellfish and fish predominate, with relatively small contributions from terrestrial fauna.

The Horrs Island site contains an astonishing number of postholes. Many of these appear to belong to small, possibly domestic structures that are paired with stone-lined hearths. These structures were identified along the interior ring wall, between the ring and the open plaza. Similar features were associated with the contemporaneous linear village midden south of Mound A. Strikingly, people at Horrs Island may have lived in both circular and linear formations. There may have been a status difference between the areas, with some families assigned to linear settlements distant and separate from the public activities that occurred at the ring plaza.

This hierarchical living pattern, along with the complex stage-construction of the ritual mounds (see Russo, 1991, 1996b) suggests that Horrs Island society was organizationally quite complex. However, traditional status markers are rare. As with the lower Atlantic coast rings, burial was not a primary function of the Horrs Island constructions, so clues to status differentiation are not available through analysis of burial goods. Although Hrdlicka (1922) reported two bannerstones from the site, extensive excavations by McMichael (1982) and Russo (1991) produced very few stone tools or debitage in ring, mound, or village contexts. Faced with the lack of traditional material correlates of permanent ranked organizations, Russo (1991, p. 499) suggested that leadership took the form of sequential hierarchy, in which decision-making began at the lowest social unit and was passed up through increasingly larger units as consensus was reached. Temporary leadership emerged for task-specific undertakings including feasting and other ritual functions as well as mound construction.

For unknown reasons, mound and shell ring construction at Horrs Island ceased around 4400 cal B.P. Shell ring use, however, continued in the area. The Bonita Shell Ring some 20 mi north of Horrs Island dates to ca. 4380 cal B.P; thus, it was established just as Horrs Island was declining. Until recently, the Horrs and Bonita rings remained anomalies on the southwest Florida coast. (The Hill Cottage ring, with substantial but undated deposits predating 4700 cal B.P., is 161 km north of Horrs Island. On the basis of the Orange fiber-tempered pottery recovered from upper levels, Hill Cottage is usually associated with lower Atlantic rings). However, as many as 20 potential shell rings have been identified in the Ten Thousand Islands area around and to the south of Horrs Island (Schwadron, 2010). There is insufficient information available to consider whether these rings are simple occupations or monumental architecture (or both); no zooarchaeological information is available. Detailed mapping indicates that, of the 20 sites, 13 are isolated rings, while seven are incorporated within larger, later shell work complexes. Only a few of these rings have been investigated. To date, radiocarbon dates place construction between 3600 and 2200 cal B.P. Thus, unlike the shell constructions of the panhandle and the lower Atlantic coast, these southwest coast rings were not abandoned around 3500 cal B.P. Whatever perturbations induced site abandonment elsewhere in Florida around 3500 cal B.P., the peoples of extreme southwest Florida were either unaffected by or were able to adapt to the changing conditions.

Only a single shell ring is known from the southeast Florida coast, and it also dates to the very Late Archaic period. The Joseph Reed Shell Ring is a massive U-shaped ring; construction began around 3400 cal B.P. (Russo and Heide, 2004). The site contains some of the earliest St. Johns pottery (the type that would replace fiber-tempered Orange wares in northeast Florida around 2000 B.P.), as well as a new sand-tempered type, Glades, the pottery that would dominate south Florida types for the remainder of prehistory. The youngest date from the site, ca. 2800 cal B.P., suggests that the inhabitants of the Reed ring, too, weathered the posited sea level changes, hurricanes, and other climate changes that caused the more northerly Archaic coastal populations to abandon their mound and ring sites after 3500 B.P.

4. Discussion and conclusions

Radiocarbon dates from Mitchell River and Horrs Island, at opposite ends of Florida, provide irrefutable evidence for the proficient use of coastal resources by 7200 cal B.P., despite rapidly rising sea levels and/or dramatic sea level oscillations through time. Both of these sites were protected from sea level transgressions by their locations on very high ground, Mitchell River on a Pleistocene Terrace within an embayment and Horrs Island on an unusually high Pleistocene dune. It behooves us to scour the coastal landscape to find locations where early middens in the southeastern United States will be preserved (Blanton, 1996). In addition, it is clear from coring along the Texas coast and underwater studies in panhandle Florida that Early and Middle Archaic coastal midden sites can be located underwater, but may be a considerable distance offshore.

Terrestrial Middle Archaic shell middens indicate exploitation of a number of environments. On the panhandle of Florida, diverse estuarine resources were exploited at 7200 cal B.P. Though not as important as estuarine resources, terrestrial foods remained a consistent component of the diet throughout the Archaic. The continued reliance on deer and alligator may be one reason why lithic tools did not drop out of Late Archaic tool assemblages in this area to the extent that they did in northeast Florida. In northeast Florida, at 6000 cal. B.P., deer were heavily exploited, but beach and estuarine environments also contributed significantly to the diet. The use of estuarine resources increased dramatically a few hundred years later as use of terrestrial resources declined. This estuarine focus correlated with an apparent decrease in trade—at least a decrease in lithic exchange—perhaps because stone tools were no longer necessary to process foods. In addition, if exchange was also a strategy for risk reduction, it may be that the reliability and abundance of estuarine resources also diminished the necessity for trade. In Southwest Florida, a similar focus on estuarine resources is apparent by the Late Arcahic, if not even earlier at Horrs and Useppa Islands; exotic lithics are also rare.

In all the coastal areas examined for this paper, shell rings appeared in the Late Archaic, providing the first evidence for population nucleation and large-scale ceremonialism, and, we believe, feasting. The refuse from feasting provided construction material for some of the first large-scale monumental architecture in the coastal Southeast. Using Hayden's (2001) model of the evolution of feasting (and of the control of labor), and given the fact that feasting foods were essentially the same as everyday foods at ring sites, feasting was probably of the cooperative (as opposed to competitive) variety, meant to celebrate and invigorate the corporate group. The lack of competition is also consistent with the lack of evidence for obvious status markers, i.e., exotics, or even more prosaic, utilitarian trade goods.

A pronounced slowing of sea level rise was not necessary for robust estuarine adaptations to arise during the Middle and Late Archaic in Florida; both estuarine species and human beings can adapt to rapid changes in sea level. The large-scale shell constructions of the Late Archaic resulted from centuries of familiarity with estuaries and resulted in social traditions that, in part, celebrated the abundance of the aquatic resources that had been part of their coastal landscape for millennia. In contrast, the abandonment of shell mound and ring construction in most areas at the end of the Late Archaic has been attributed to changes in climate, including increased hurricane activity, and to lowered sea levels. South Florida societies either were unaffected or found solutions to weather these conditions. Whether northern Florida societies survived remains to be seen. In these areas, the end of the coastal Archaic, like the beginning, may await discovery beneath the sea.

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