Journal of Archaeological Science: Reports 5 (2016) 240–262

Contents lists available at ScienceDirect

Journal of Archaeological Science: Reports

journal homepage: www.elsevier.com/locate/jasrep

The archeology, sedimentology and paleontology of Gray's Reef National Marine Sanctuary and nearby hard bottom reefs along the mid continental shelf of the Georgia Bight

Ervan G. Garrison *, Jessica Cook Hale, Christopher Sean Cameron, Erin Smith

The University of Georgia, United States

ARTICLE INFO

Article history:
Received 7 June 2015
Received in revised form 28 October 2015
Accepted 4 November 2015
Available online 5 December 2015

Keywords:
Archeology
Sedimentology
Paleontology
Georgia Bight
SEM-EDS
XRD
Petrography

ABSTRACT

Geoarcheological surveys undertaken over the past two decades at Gray's Reef National Marine Sanctuary, 32 km offshore Georgia, and nearby JY Reef have recovered archeological and paleontological materials dating from the Late Pleistocene, primarily Marine Isotope Stage (MIS) 3, 59–24 KYBP as well as the early-to-mid Holocene, 6000 BP. The paleontological materials include both invertebrate and vertebrate taxa from both the Pleistocene and Holocene while the archeological materials are Holocene age. Sediment coring has developed a more comprehensive picture of the inner-to-mid continental shelf sediment prism of the Georgia Bight. Optical petrography, scanning electron microscopy, electron dispersive spectroscopy (SEM-EDS) and wavelength dispersive X-ray diffraction (XRD) have been used to characterize Gray's Reef lithic artifacts and nearby outcrops which are both primarily Pliocene age calcareous sandstones. JY Reef is, by contrast, a coquina rich in fossil and subfossil materials but depauperate in any archeologic finds. Petrologic and geochemical data have been developed for both the outcrops and artifacts that are in good agreement with previous studies using optical petrography.

1. Introduction

The search for submerged archeological sites on the sea floor has taken on renewed importance in the U.S. with the debate over the timing and means of the prehistoric human colonization of the Western Hemisphere (Dixon, 2001; Haynes, 2003; Rick and Erlandson, 2009; Erlandson et al., 2011; Faught and Gusick, 2011; Evans et al., 2014). The Atlantic coastline of the southeastern United States has been identified as an area with good potential for preservation of archeological sites from the periods prior to the establishment of the modern shoreline (cf. Harris et al., 2013). The drowned continental shelves along this coastline are wide and comparatively shallow, vastly increasing the area available to prehistoric groups prior to marine transgression, as well as improving probabilities for chances of site preservation during episodes of rapid lateral marine transgression of the coastline (Anuskiewicz and Dunbar, 1993; Faught, 2004a, 2004b). To these observations, we must add that the multiple paleoclimate studies showing that this region had much more favorable climate conditions than other regions of North America in the Late Pleistocene and into the Middle Holocene, during a period when the initial colonization of this hemisphere occurred (Russell et al., 2009).

We report here then, the results of our studies along the Georgia coast at Gray's Reef National Marine Sanctuary and nearby locations that have focused on exploring its potential for submerged prehistoric archeological and paleontological sites since 1996 (Fig. 1). The research has included sedimentological, geological/geophysical, chronological, archeological and paleontological investigations, all of which offer us both insight into the potential for deposition and preservation of both paleo-environmental proxy data as well as human activities along this now-drowned coastal plain. Initially the discovery of sites was the first priority of our research. Because the modern shoreline dates to only around 5000 BP, sites associated with any cultural period older than that are potentially present in the Georgia Bight and at Gray's Reef. In this report, first, we will outline the general geological, geomorphological, and sedimentological context of Gray's Reef. Next, we will briefly discuss the general outlines for each cultural period that could have deposited remains of their activities at Gray's Reef. Third, we will then discuss the sedimentology, paleontology and archeology as it is currently understood for these sites; Finally, we will synthesize these data into an analysis for overall significance.

2. The Georgia Bight and Gray's Reef

The Georgia Bight, also called the South Atlantic Bight, is a shallow embayment that stretches along the Atlantic coastline from South Carolina to the mouth of the St. John's River in northeastern Florida, along a tectonic low created by the Cape Fear and Ocala arches. It is a mixed energy coastline with a mesotidal range of around 2–3 m, and a minimal wave height of around 33 cm (Weaver, 2002: 16–17; Garrison et al.,

* Corresponding author.

http://dx.doi.org/10.1016/j.jasrep.2015.11.009
2352-409X/

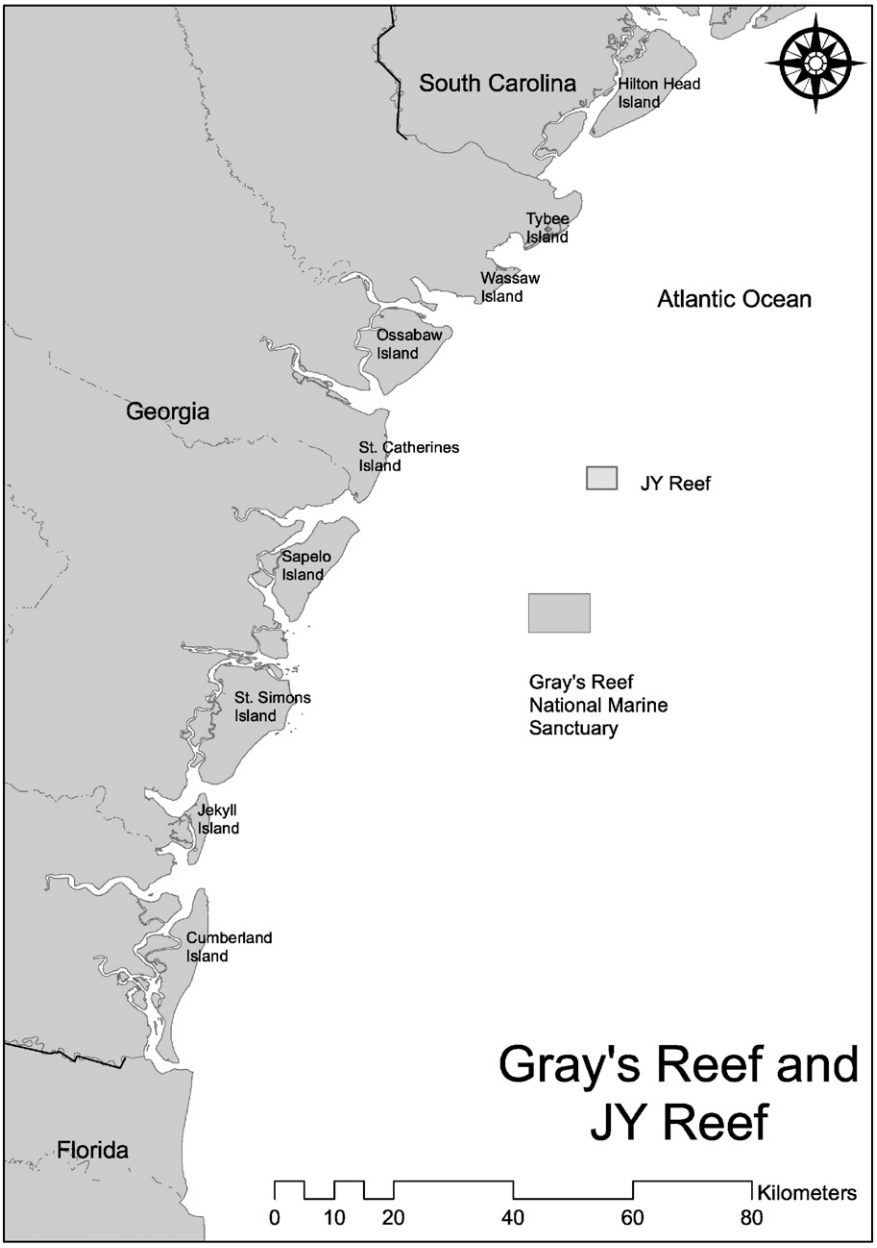

Fig. 1. Gray's Reef and JY Reef within the Georgia Bight.

2008). Two large watersheds empty into the Bight along the Georgia coastline: The Savannah River and the Altamaha. These are sourced in the southern Appalachians and deposit sediment from this area, as well as from the piedmont and coastal plain. Smaller watersheds such as the Satilla and the Ogeechee drain the coastal plain alone. Compared to other coastlines, the Bight is a sediment-starved continental shelf (Weaver, 2002:18; Harris et al., 2013:8), with little to no finer grained (<63 nm, silt sized or smaller) fluvial sediment deposited past 10 km from the coast. These sediments instead are deposited within the extensive saltwater marshes associated with the barrier islands fringing the coastline. Beyond the inner continental shelf, sediments are medium to coarser grained, with carbonate increasing towards the slope (Pilkey et al., 1981; Weaver, 2002:18; Garrison et al., 2008).

The continental shelf off Georgia is broad, stretching seaward another 60 or more kilometers where it meets the shelf break and continental slope. At the last glacial maximum, the entirety of this shelf was exposed, while by the Paleoindian period the relative sea level was somewhere in the region of the −40 to −73 m isobaths (Garrison, 1992; Dunbar et al., 1989; Anuskiewicz and Dunbar, 1993; Anderson and Faught, 2000:165, Fig. 1; Faught, 2004a, 2004b; Basillie and Donoghue, 2004; Garrison et al., 2008, 2012a, 2012b; Harris et al., 2013). Rock outcrops appear to be mostly Pliocene in age until the shelf break, although there may be Miocene outcrops along the modern coastline (Huddlestun, 1988). Non-Pliocene outcrops offshore are currently undocumented but certainly are possible (see Popenoe, 1991; Poppe et al., 1995 for discussion of offshore stratigraphy older than the Pliocene formations currently outcropping at Gray's Reef and elsewhere in the Georgia Bight).

The Holocene islands fronting the Atlantic are welded onto Pleistocene islands (Booth et al., 1999:83; Linsley et al., 2008: 38–39; Turck, 2010). All of them are subject to the vagaries of sediment supply and both eustatic and relative sea level changes (Nichols, 2009: 203–205). The terrestrial archeological sites along the modern coastline tend to be located in back barrier locations as early as the Late Archaic sites ca. 5000 BP; these are often located on the Pleistocene barrier components, near marshes that allowed access to multiple highly productive