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Savannah River Archaeology Program

Results from the 2009 Tar River Geoarchaeological Survey

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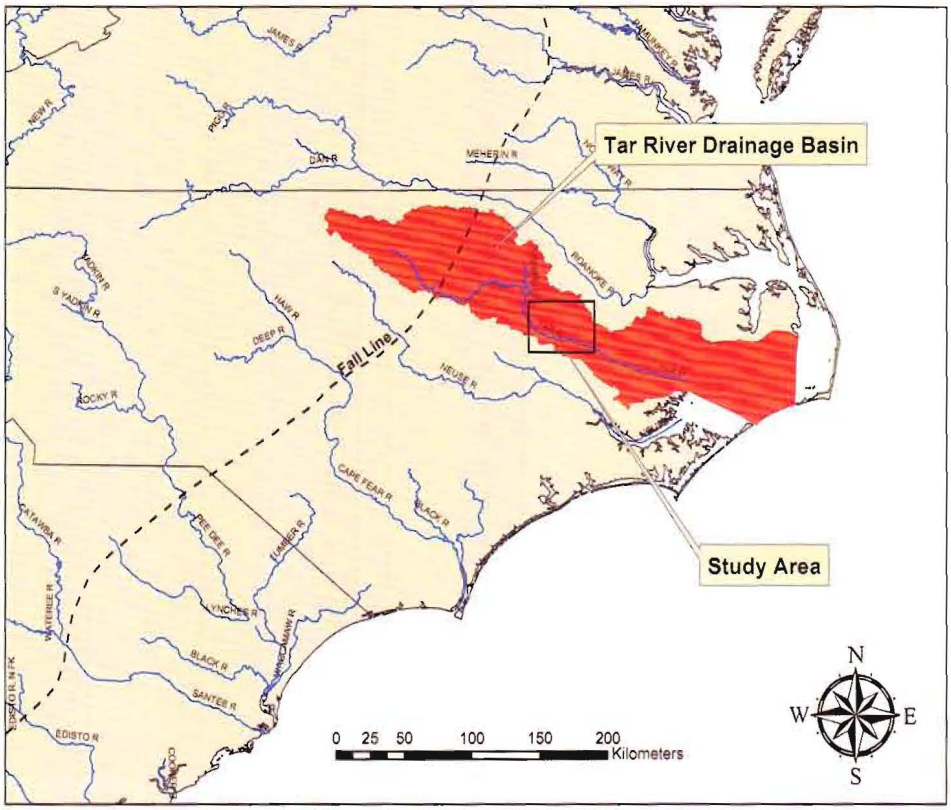

Fig. 1: Study area within the Tar River drainage basin, Pitt and Edgecombe Counties, North Carolina. (Figure produced in ArcGIS by Christopher Moore)

Fieldwork along the Tar River in North Carolina continued in the summer of 2009 with collaborative research on archaeologically stratified aeolian and fluvial landforms (Fig. 1). This work is a collaborative effort between the authors and involves ongoing archaeological and geoarchaeological investigations at Barber Creek (31PT259), Squires Ridge (31ED365), and Owens Ridge (31ED369). The later two sites were identified during the doctoral dissertation research of the senior author (Moore 2009b). The primary objectives of this research include: 1) the refinement of cultural chronologies and artifact typologies for the North Carolina Coastal Plain, 2) the development of a radiocarbon and luminescence (OSL) geochronology for stratified sites along the Tar River, and 3) examining linkages between paleo-environmental change (i.e., rapid climate change or RCC events), site formation processes, and human adaptation.

This research has direct implications for the Savannah River Archaeological Research Program's (SRARP) ongoing Carolina Bay Volunteer Research Program with similar site formation processes occurring on bay sand rims. The development of a regional database for site formation processes of relict source-bordering aeolian dunes and sand sheets along the Tar River in North Carolina and aeolian depositional processes in bay sand rims along the Savannah River may provide regional proxies for understanding paleoclimate variability, site burial processes, and human response to changing environments along the South Atlantic Slope.

In addition to the research component of this collaboration, SRARP public outreach objectives were also realized through this collaborative effort that included the North Carolina Summer Ventures Program in Science and Mathematics. In this program, selected high school students from around the state are allowed to participate in research-driven archaeological fieldwork and are taught proper excavation techniques, artifact analysis and, report writing (Fig. 2). At the end of a four-week program, students are required to present their findings orally to their peers and parents. Below is a summary of recent research

Fig. 2: Summer Ventures Program participants and volunteers. (Photo by I. Randolph Daniel, Jr.)

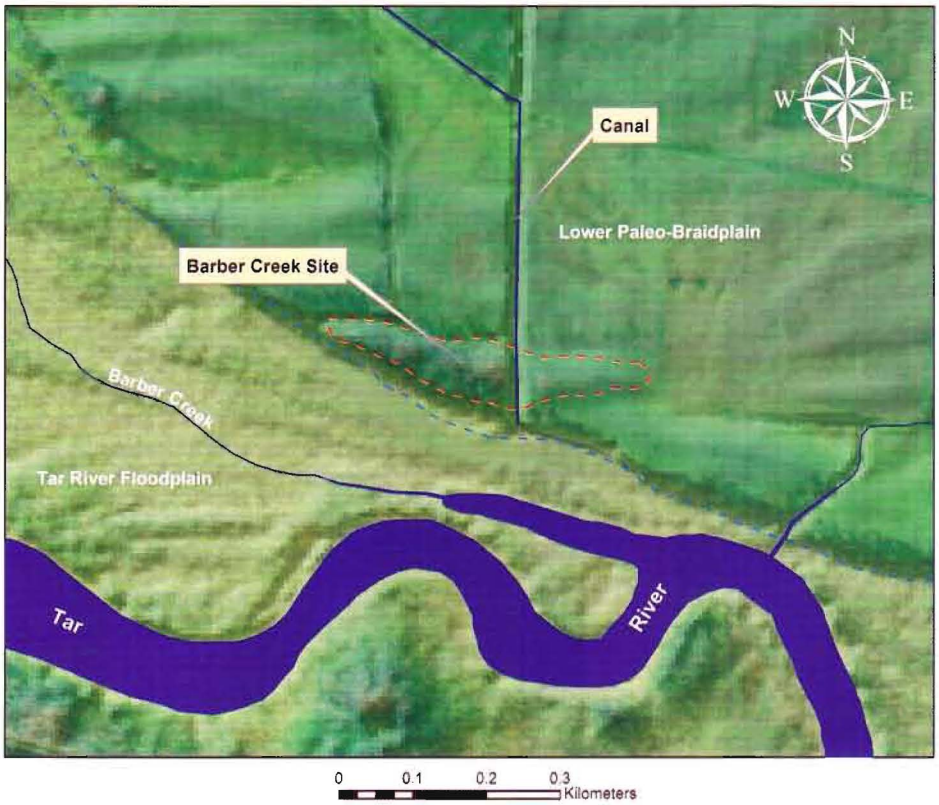

Fig. 3: Color Infrared DOQQ image of the Barber Creek Site (31PT259) overlaying a LiDAR shaded-relief map. (Image produced in ArcGIS by Christopher Moore)

on the Tar River, including the results of fieldwork conducted in the summer of 2009 at Squires Ridge and Owens Ridge with the help of the Summer Ventures Program.

Barber Creek (31PT259)

The Barber Creek site (31PT259) is a shallowly stratified multicomponent site on the Tar River near Greenville, North Carolina (Fig. 3). Excavations and geoarchaeological analyses have been conducted on the site over the last few years and have indicated that the site is a relict aeolian dune or sand sheet with stratified Early Archaic through Woodland occupations (Daniel et al. 2008; McFadden 2009; Moore 2009a, 2009b; Seramur and Cowan 2002; Seramur 2003).

Optically stimulated luminescence (OSL) samples (n = 3) collected in the summer of 2008 from the Barber Creek site (31PT259) were recently dated using the more accurate single-grain technique (Moore 2009b) (Fig. 4). Luminescence dating is a relatively new technique for determining the burial age of sediments (i.e., the last time the sediments were exposed to light) and is useful for indirectly dating archaeological deposits contained within those sediments and for building site formation chronologies. Barber Creek OSL age estimates were in broad agreement with ages determined by Moore (2009b) using the single-aliquot dating technique (an earlier form of OSL dating) and with radiocarbon dating already obtained from the Barber Creek site (Daniel et al. 2008). In short, single grain OSL age estimates from Barber Creek support earlier conclusions that indicate a major transition during the Younger Dryas stadial event (ca. 12,900-11,500 calendar years BP) from primarily fluvial to primarily aeolian depositional regimes. The Younger Dryas was a period of very rapid cooling and a return to near glacial temperatures following the arrival of Clovis during the warmer Bölling-Allerød climate interval (Alley 2000). These age estimates bolster claims for an entirely Holocene origin for the upper meter of sand at the Barber Creek

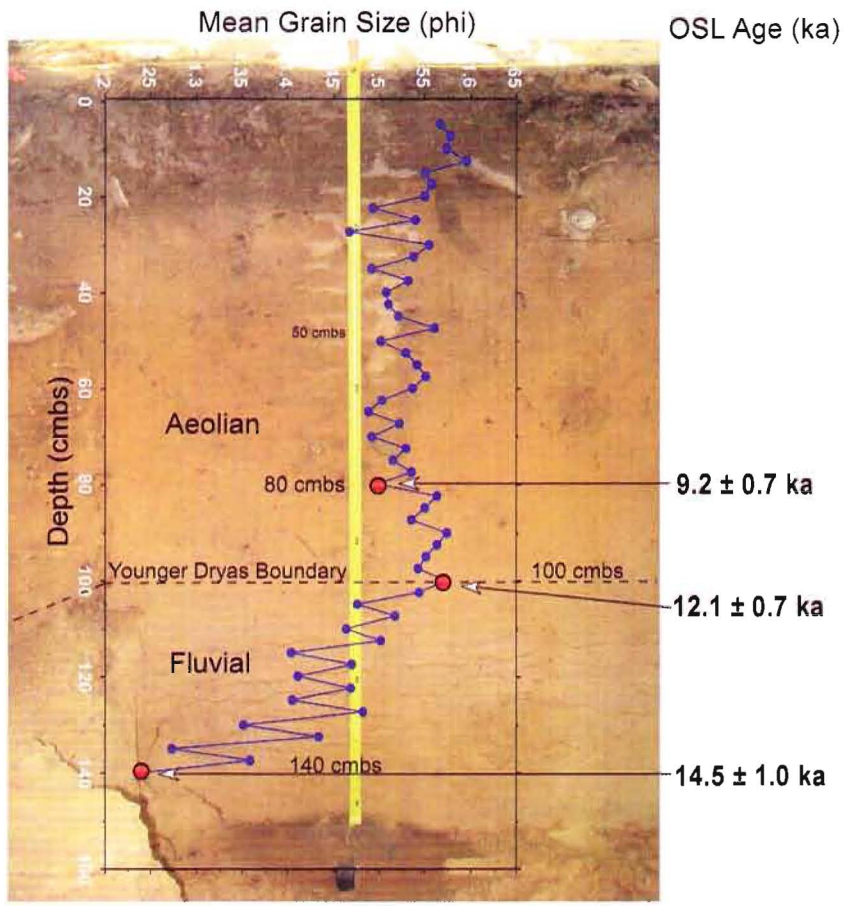

Fig. 4: Single-grain luminescence (OSL) dating for the Barber Creek site (31PT259) (Moore 2009b). Note: Close-interval grain-size data are from McFadden (2009). (Figure produced by Christopher Moore)

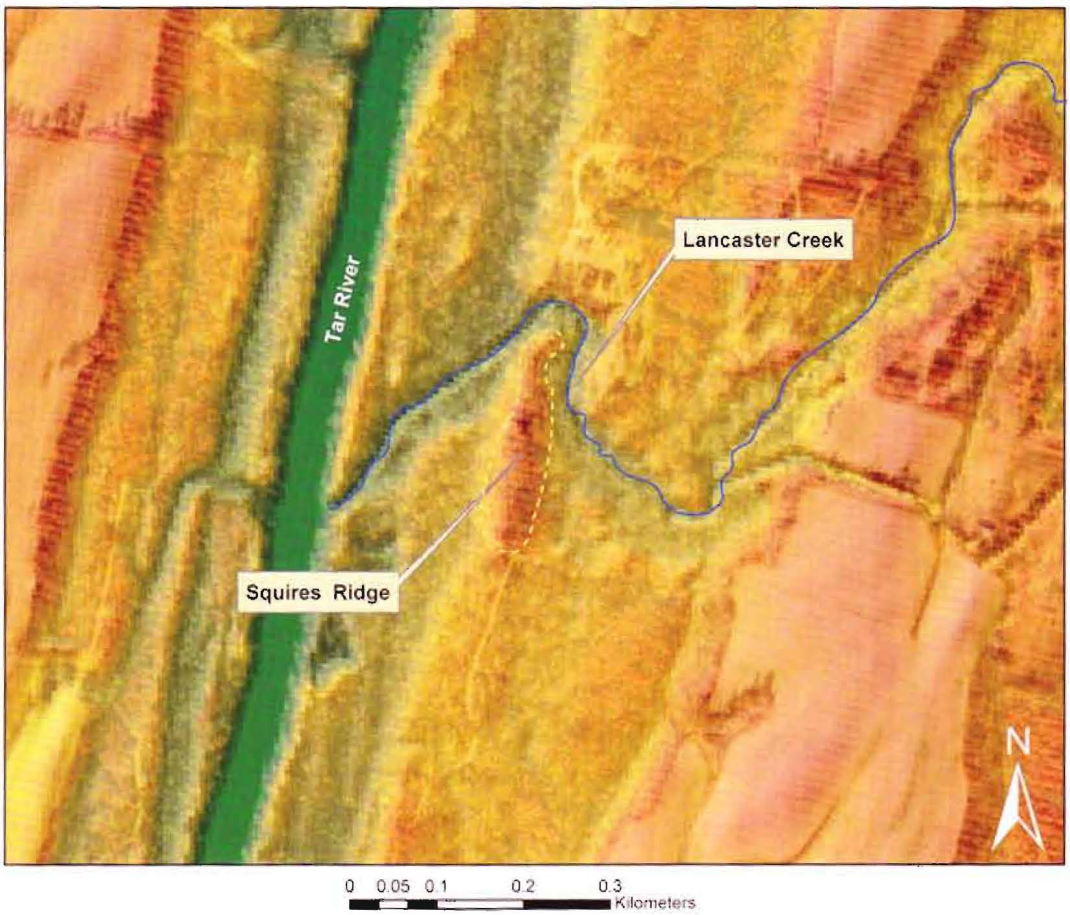

Fig. 5: Color Infrared DOQQ image of Squires Ridge (31ED365) overlaying a LiDAR shaded-relief map. (Figure produced in ArcGIS by Christopher Moore)

site. This indicates that bioturbation is not the primary site formation process with respect to artifact burial at the site and that artifacts and occupation surfaces have been sequentially and episodically buried over the course of the Holocene by both aeolian and fluvial processes. In this scenario, bioturbation is more accurately conceived as an overprint of the relatively intact archaeostratigraphy of the site. These data support interpretations by Moore (2009b) concerning site formation processes and artifact burial at other sites along the Tar River.

Squires Ridge (31ED365)

The Squires Ridge site (31ED365) is another large relict sand ridge overlooking the modern Tar River floodplain and is located along the middle Tar River valley within the upper Coastal Plain of North Carolina. The landform was first identified on the property of Mrs. Betsy Squires with the use of high resolution LiDAR (Light Detection and Ranging) elevation data acquired through the NC Department of Transportation Floodplain Mapping Program (Fig. 5). We wish to express great appreciation to Mrs. Squires and family for allowing continued excavations of her property by East Carolina University and Summer Ventures students and for her considerable enthusiasm for this work (Fig. 6).

Geoarchaeological investigations by Moore (2009b) identified the site as having great potential for buried/stratified Archaic through Woodland occupations. Limited shovel testing and test unit excavations revealed dense archaeological deposits with indications of relatively intact stratigraphy. Luminescence dating produced age estimates consistent with Guilford, Kirk Stemmed, and Palmer occupations (Moore 2009b).

During June and July of 2009, a shovel test survey was undertaken at Squires Ridge in order to delineate site boundaries and to produce a topographic map of the sand ridge. Summer Ventures participants assisted in laying out a shovel test grid, excavated shovel tests in 20-centimeter arbitrary levels, and later assisted in preliminary lab analysis of artifacts (Fig. 7). Shovel testing revealed dense archaeological deposits across the entire landform with some

Fig. 6: Mrs. Betsy Squires and grandchildren examining artifacts recovered from the Squires Ridge site (31ED365) during the 2009 Summer Ventures Program with Dr. Randy Daniel. (Photo by Christopher Moore)

indication of broad spatial patterning between Woodland and Archaic period occupations (Fig. 8, page 16). In addition to several Woodland and Middle Archaic points, a single metavolcanic side-notched point was excavated from a shovel test along with several well made unifacial tools and end scrapers (made from local quartzite and non-local high quality rhyolite) that indicate the presence of early Holocene occupations at Squires Ridge. Future work at Squires Ridge will build on previous work by Moore (2009b) and recent shovel testing with more extensive test unit and block excavations conducted in the summer of 2010. Additional geoarchaeological analyses are also planned.

Owens Ridge Site (31ED369)

In July of 2009, archaeological investigations at the Owens Ridge site (31ED369) in Edgecombe County, North Carolina, continued with the excavation of a single 2 X 2-meter test unit (i.e., Test Unit 3) (Fig. 9, page 17). Owens Ridge is a large linear and coalescing parabolic relict sand dune with stratified Archaic and possibly even Paleoindian occupations (Moore 2009a, 2009b). Volunteers for this excavation included former East Carolina University graduate student Paulette McFadden (now working with Dr. Ken Sassaman at the University of Florida on her Ph.D.) along with current and former graduate students Jonathan Smith, Mattie Raspberry, and Blake Wiggs. We also wish to express great appreciation to Mr. Willie Owens for graciously allowing continued excavations on his property.

The purpose of this excavation was to expand upon previous excavations conducted during the doctoral dissertation research by Moore (2009b). Previous work (Moore 2009a, 2009b) has established a baseline luminescence (OSL) and ^{14}C geochronology for the landform and interpreted the site formation history of the site based on close-interval (five-centimeter) grain size analysis and archaeostratigraphy. Archaeological and chronometric data have indicated the potential for buried late Pleistocene/early Holocene occupations in Level 8 (70-80 centimeters below datum) of Test Unit 2 and suggest a possible association with rapid climate change or Bond Events recorded for the Holocene (Moore 2009b). Bond Events are periods of rapid climate change during the Holocene and are associated with major ice-rafting events in the North Atlantic (e.g., Bond et al. 1997). In general, these events appear to represent the rapid onset of cooler and dryer conditions and occur on quasi-periodic (~1,500 year) cycles. Bond Events also appear correlated with regional records of rapid climate change in the mid-Atlantic (e.g., Willard et al. 2005) and globally by multiple proxy records of climate change (e.g., Mayewski et al. 2004).

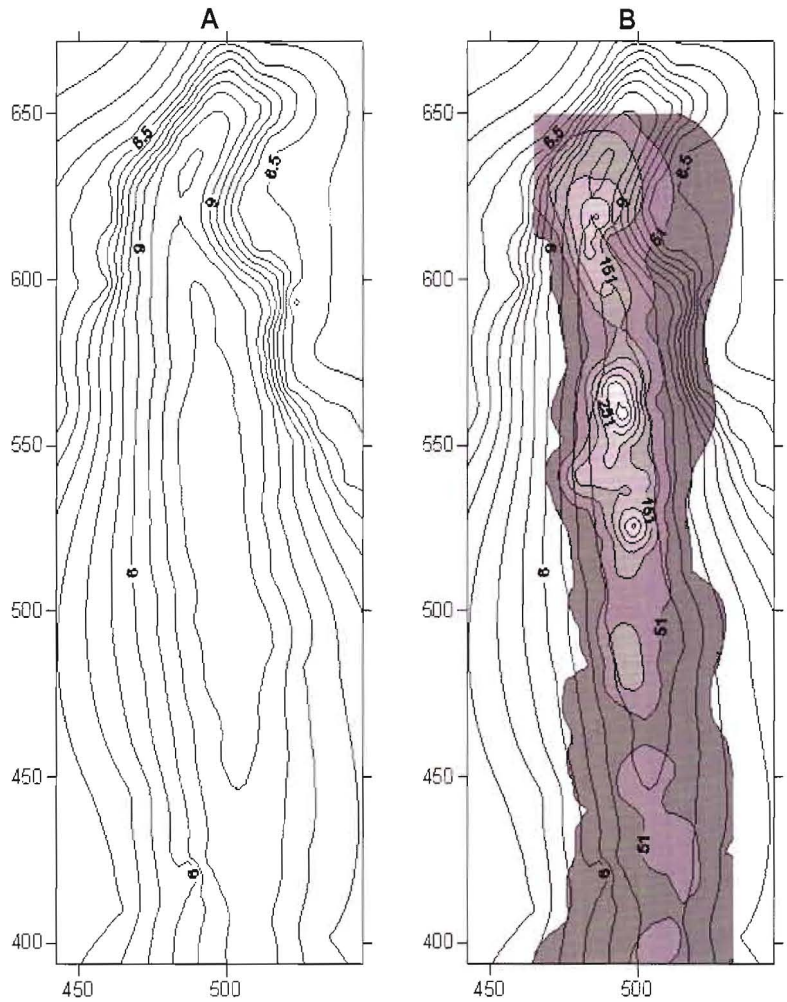

Fig. 7: Contour map of the Squires Ridge site (31ED365) generated during 2009 summer fieldwork along the Tar River in North Carolina. A) Contour map of the landform, B) Isodensity map of all artifacts recovered in shovel tests. Note: Grid north is up. (Figure produced by I. Randolph Daniel, Jr.)

If confirmed by additional OSL dating, these data suggest that regional paleoclimate has periodically plunged into a state of climatic disequilibrium with concomitant ecosystem stress and indicates potential short-term (centennial-scale) ecological changes possibly including increased storminess, fire, and drought (e.g., Marlon et al. 2009). In this case, burial events recorded in stratified sites along the Tar River serve as a proxy record of these short-term events. Presumably, these short-term events would have led to changing adaptive strategies for hunter-gatherers living along the Tar River.

In the summer of 2009, additional archaeological testing at Owens Ridge was conducted to look for evidence of early occupation in the form of diagnostic stone tool artifacts. Four samples were collected for single-grain luminescence (OSL) dating in order to refine age estimates provided by single-aliquot dating of the site by Moore (2009b). Additionally, a continuous sediment column was taken in two-and-a-half-centimeter intervals from Test Unit 3. Analysis of grain size data for this sediment column should help to refine our understanding of site formation processes and depositional environment at the site. While no diagnostic artifacts were found in the lower levels of Test Unit 3, a single distal point fragment (probably Middle

Archaic) was recovered in Level 5 (40-50 centimeters below datum) and unifacial tools and undiagnostic biface fragments and cobble biface preforms were recovered and piece-plotted in Levels 7 and 8.

Evidence for stratification of Archaic occupations was evident through a clear distinction in the dominant raw material types between upper and lower levels with primarily late stage metavolcanic flakes in upper levels and almost exclusively earlier stage local quartzite in lower levels. Previous excavations from Test Unit 2 had revealed a dense concentration of quartzite debitage and a formal end scraper in Level 8 (70-80 centimeters below datum) (Moore 2009a; 2009b). This pattern was even more evident in Test Unit 3 (located immediately adjacent to Test Unit 2) with artifact concentrations peaking in Level 8 and falling off quickly in Level 9. Processing of sediment column and archaeological data along with single-grain luminescence dating will provide additional clues as to the age of early occupations at Owens Ridge.

Future work at Owens Ridge will continue with additional excavations in hopes of refining the cultural chronology and typology of the site by recovering diagnostic artifacts—particularly from the lower levels. Single-grain OSL dates and close-interval sedimentology from Owens Ridge will help to refine the site formation history of the landform and suggest linkages between burial events, cultural occupations, and the paleoclimate record as indicated by oxygen isotopes and regional pollen data (e.g., Moore 2009b).

Fig. 8: Examples of projectile points recovered from shovel testing at the Squires Ridge site (31ED365). (Photos by Paulette McFadden)

For more information on the Tar River Geoarchaeological Survey, please contact Dr. Christopher R. Moore, cmoore@srarp.org, office: 803-725-5227 or Dr. I. Randolph Daniel, Jr., DANIELI@ecu.edu, office: 252-328-9455.

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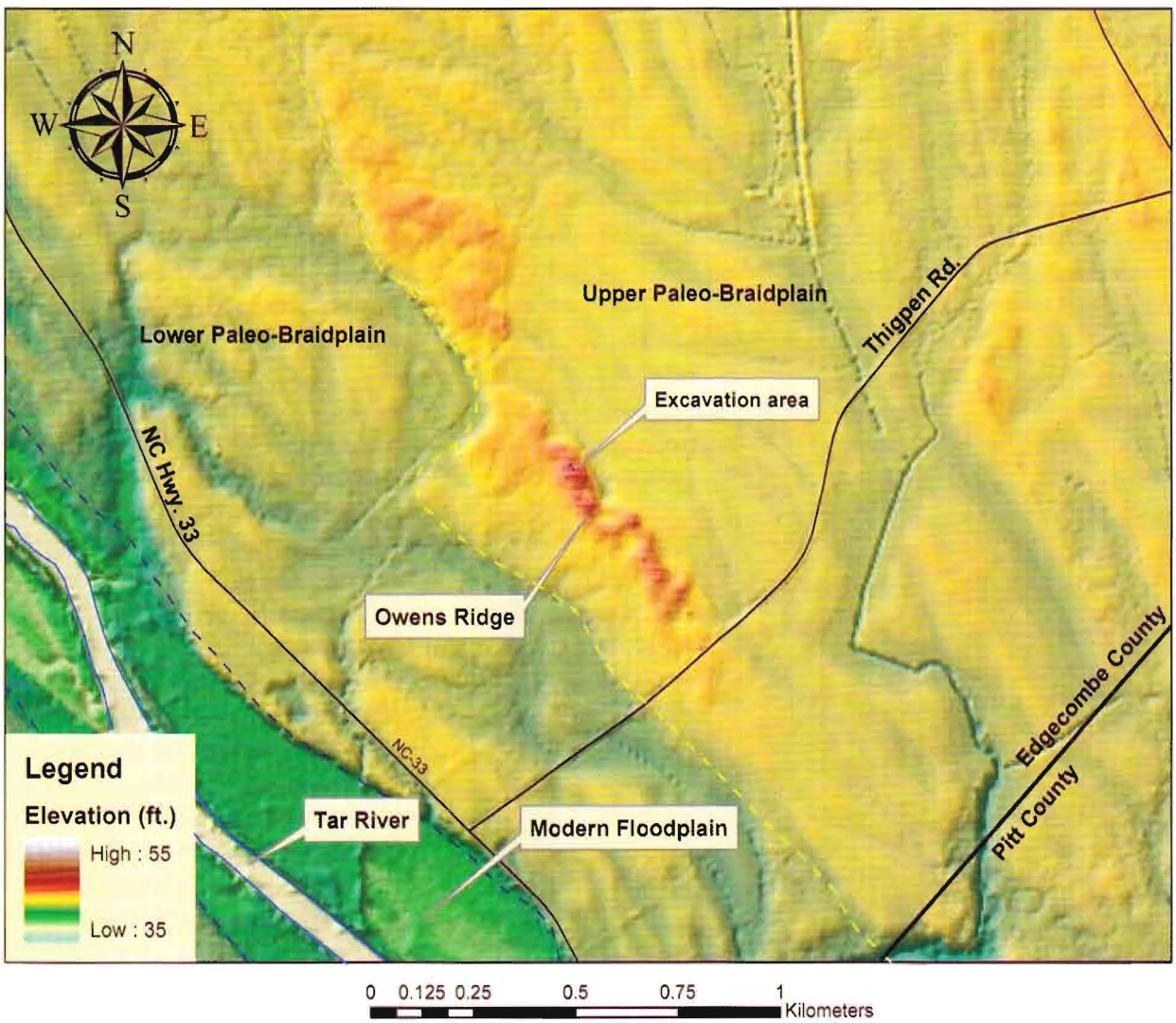

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