

**STUDY TITLE:** Archaeological Analysis of Submerged Sites on the Gulf of Mexico Outer Continental Shelf

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CONTRACT NUMBER: M09PC00048

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Central and Western

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PROJECT MANAGER: Matthew E. Keith

AFFILIATION: Tesla Offshore, LLC

ADDRESS: 36499 Perkins Road, Prairieville, Louisiana 70769

PRINCIPAL INVESTIGATOR: Amanda M. Evans

**KEY WORDS:** Gulf of Mexico, shipwreck, site formation processes, radioisotope analysis

**BACKGROUND:** The BOEM, U.S. Department of the Interior, is tasked with regulating activities associated with energy development and resource extraction on the Outer Continental Shelf (OCS) in the United States. In accordance with Section 106 of the National Historic Preservation Act, the BOEM Gulf of Mexico Region has issued multiple Notices to Lessees (NTL) and other supporting documentation that provide rules and guidelines for investigating and protecting submerged archaeological sites on the OCS. Presently, NTL 2005-G07 designates survey requirements in leases that are considered archaeologically significant. Identifications of potentially significant shipwreck sites have resulted from these required surveys and BOEM-funded studies provide follow up data with the goal of positively identifying the reported wrecks and if applicable nominating the vessels to the National Register of Historic Places. Long-term management in the Gulf consists of in situ preservation and the use of avoidance zones assigned during permitted, ground-disturbing activities. Site formation processes, or the inter-relationship between environmental and anthropogenic processes impacting the condition of the site, are directly relevant to the size and type of successful avoidance zones utilized.

**OBJECTIVES:** Tesla Offshore, LLC was contracted by the Minerals Management Service (MMS) (now the Bureau of Ocean Energy Management or BOEM) to

investigate six shipwreck sites on the outer continental shelf of the Gulf of Mexico. The sites were to be investigated through geophysical survey and a combination of diver observation and sediment core acquisition. The purpose of the study was to verify that the targets were shipwrecks, and, if possible, to provide identifications and an assessment of potential eligibility for listing on the National Register of Historic Places. A second aim of the study was to provide an assessment of site formation processes that impact the individual wreck sites, using, at a minimum, data obtained through sediment coring. The six sites ranged in water depth from 11 to 36.5 meters (36 to 120 feet) below sea-level (BSL) and were located across the north-central and northwestern Gulf of Mexico, from approximately Morgan City, Louisiana to Galveston, Texas.

**DESCRIPTION:** Between March, 2010 and June, 2011 the M/V *Nikola* conducted site-specific geophysical surveys at the six contracted shipwreck study sites; two additional sites were added to the scope of work through a contract amendment. Geophysical sensors used at all sites included a single beam echosounder, a magnetometer, a subbottom profiler, a multibeam echosounder, and sidescan sonar. At selected sites, 3-D sonar was also used. In August of 2010 dive investigations were conducted at eleven total possible wreck sites by archaeologists from Tesla Offshore, LLC and the University of West Florida Archaeology Institute. BOEM marine archaeologists Dr. Christopher Horrell and Melanie Damour accompanied the diving operations as representatives of the funding agency. During dive operations, sediment cores were acquired on site, logged onshore, and samples were prepared for evaluation of sediment characteristics and chemical analysis. Also during dive operations, water samples for each site were acquired and tested onshore for pH, salinity, and dissolved oxygen content. Oceanographic analyses were conducted for three datums throughout the Gulf of Mexico; the resulting models were used to extrapolate conditions to each site.

**SIGNIFICANT CONCLUSIONS:** Of the 11 sites investigated, five are considered eligible for listing on the National Register of Historic Places: Sites 433, 386, 373, 389, and 236. Each of these sites is eligible under multiple criteria; the USS *Hatteras* (Site 236) is already listed on the National Register and was added to the scope of work for monitoring purposes. Nomination forms have been prepared for Sites 433 (*R.W. Gallagher*), 386 (*Heredia*), 373 (*Cities Service Toledo*), and 389 (*J.A. Bisso*) and submitted under this contract's scope of work. The four remaining shipwrecks verified as part of this study represent relatively modern vessels and did not display any unique qualities or apparent historical significance (Sites 15488, 15366, 15326, and 322). No shipwreck was identified at the reported location of Site 380. The feature investigated in the West Cameron area (no site number available), was determined to represent modern industry-related debris rather than a shipwreck site, and was not interpreted as eligible for listing on the National Register.

**STUDY RESULTS:** Oceanographic modeling of datum sites comparable to the wreck sites, together with the results of radioisotope analysis, indicates minimal scour related to recent storm events; however, at each of the sites varying degrees of cumulative scour were recorded on geophysical data. Across the study sites, sediment shear strengths range from very soft to very stiff (<0.2 to >2.0 ksf); surficial grain sizes range from 343  $\mu\text{m}$  (medium sand) to 9.76  $\mu\text{m}$  (medium/fine silt), although divers and

geophysical data recorded significant variation of surficial grain sizes within some of the individual sites. Linear accumulation rates obtained from radioisotope analysis indicate that sediment accretion at the sampled shipwreck sites averages 0.12 cm/yr. Absent of shipwreck subsidence, and compared with the other data sets, these low rates of sediment accretion indicate that the exposed hulls observed by divers during the 2010 field work will remain exposed for the foreseeable future. Due to the lack of significant sediment accretion, the hulls examined in this study will remain subjected to water column variables, and will likely suffer continued corrosion. Anthropogenic impacts were observed on the seafloor at several of the wreck sites, including drag and or trawl scars; however, no apparent damage that can be attributed to oil and gas development was observed to the physical remains of the wrecks.

**STUDY PRODUCTS:** Evans, A.M., M.E. Keith, E.E. Voisin, P. Hesp, G. Cook, M. Allison, G. da Silva, and E. Swanson. 2012. Archaeological analysis of submerged sites on the Gulf of Mexico Outer Continental Shelf. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2013-011110. 431pp.

Website in development: Shipwrecks of the Gulf. Final study report.