

**Reconnaissance Search for Paleoliquefaction Structures
in Northeastern Louisiana**

Annual Project Summary

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Investigations Undertaken

We began the reconnaissance search for the presence of paleoliquefaction structures with a field excursion to examine cutbanks of streams accessible by road in the area of the Bastrop 1:100,000-scale quadrangle in northeastern Louisiana (shown on the attached figure) during the week of April 22-26, 1996. The availability of good surface exposures promptly emerged as the crucial element of the field work. We examined cutbanks of streams at road crossings in the Bastrop quadrangle, from the Boeuf River, the principal tributary of the Ouachita River in the western part of the study area, to Bayou Macon, principal tributary of the Tensas River in the eastern part of the study area. Between these two main stream systems, we examined cutbanks of smaller tributaries and the walls of artificial drainage canals. Owing to a scarcity of suitable surface exposures revealed in this first excursion, we shifted the focus of our activities to documentary research and postponed the next field excursion until November.

Results

Field Excursions

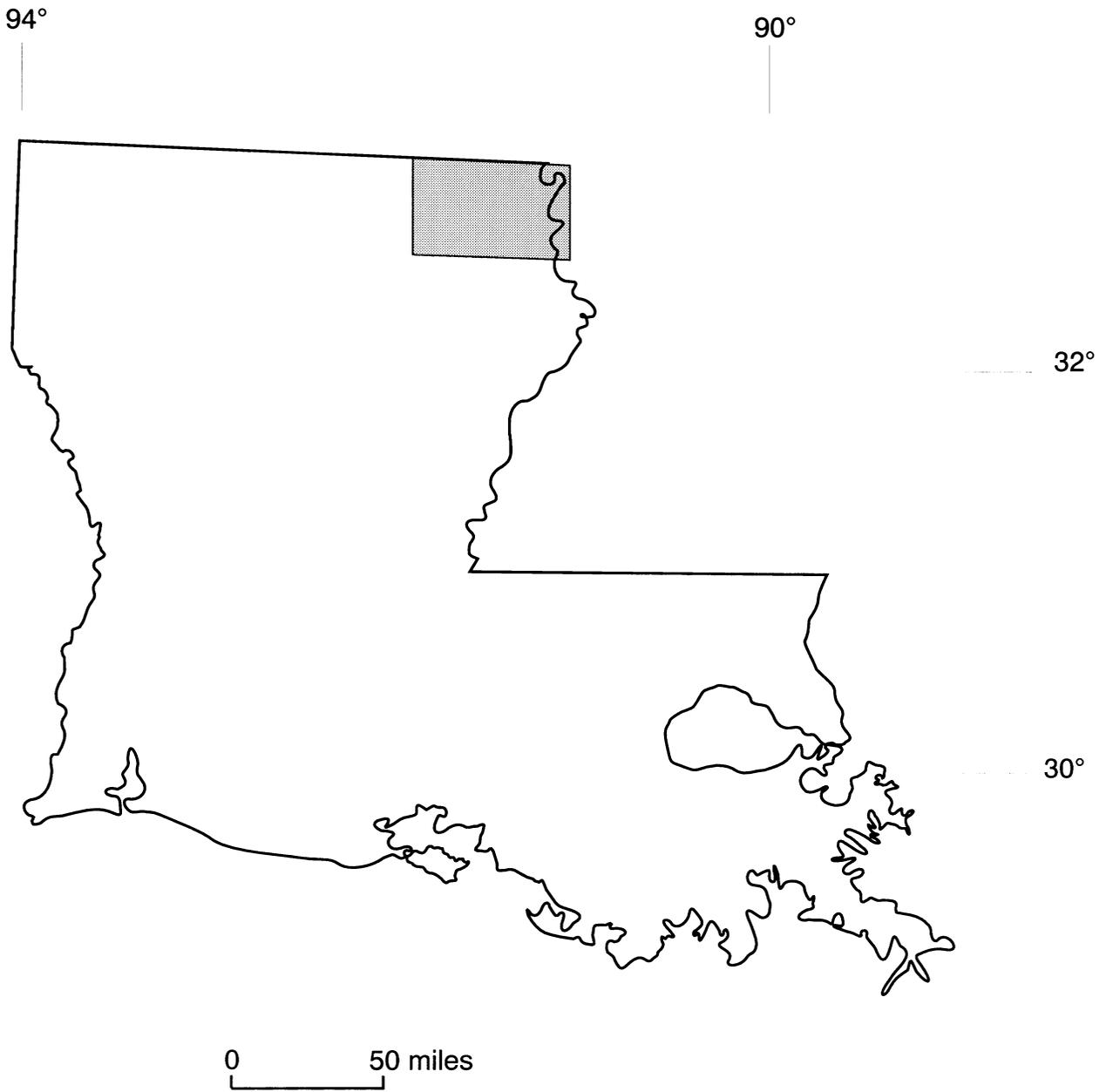
In general, we found a striking paucity of exposed material at the surface. The western valley escarpment of Bayou Macon is vegetated in all the places in the Bastrop quadrangle where we could access it, and sediment sequences in the cutbanks of the Boeuf River are also obscured beneath vegetative cover where transected. The artificial drainage system in the area consists of segments that are generally shallow, on the order of 1 m, and vary in the time elapsed since last scraping. We found no suggestive indicators of paleoliquefaction in examining the above cutbank reaches and ditch walls, but had few good exposures to examine. We consulted with soil scientist Thurman Allen of the district office of the Natural Resources Conservation Service (NRCS; formerly Soil Conservation Service or SCS) in the area, and inquired about the availability of surface exposures. He was unaware of suitable locations to recommend for examining exposed surface materials, and exclusively utilizes NRCS soil borings and artificial pits excavated to produce standard soil profiles. We planned another field excursion for the week of November 18-22, and in the meantime are continuing our inquiries in the archaeological community and examination of archaeological and historical records.

Search of Archaeological Data

A significant source of data concerning the types and chronology of liquefaction structures within the New Madrid, Missouri earthquake region has been archaeological studies, e.g., Saucier (1977, 1989). In this region, excavations at various archaeological sites have serendipitously encountered sand dikes, sand sills, and sand blows from the 1811-1812 and older prehistoric earthquakes intersecting middens and other cultural

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Bastrop 1: 100,000 Quadrangle



deposits. Thus, as a part of this research, we examined both published and unpublished archaeological data for any evidence of liquefaction structures.

Initially, we examined the archaeological testing and survey reports and other papers on file with the Division of Archaeology in the Louisiana Office of Cultural Development for studies conducted in East Carroll, Morehouse, and West Carroll parishes. We later also examined the same material for westernmost Ouachita and northern Richland parishes. It was found that only very few sites in the study region had been tested with either test pits or backhoe trenches. An examination of descriptions and figures of the profiles that had been described revealed nothing that could be interpreted as evidence of liquefaction structures.

As a second step, we posted requests for information about liquefaction and unusual sedimentary structures observed in regional archaeological excavations to newsgroups and listservers. Specifically, we posted these requests to the "sci.archaeology" newsgroup and the "ARCH-L" listserv. These posts produced some interesting comments on the use of archaeology along the Wabash River to date seismic events and the effects of coal-mine subsidence on archaeological sites, but failed to produce any information about liquefaction structures in the project area.

Finally, we have been contacting the archaeologists who have conducted either cultural resource management (CRM) or academic archaeological research in the project region directly. These contacts included consultations with technical professionals at Coastal Environments, Inc. (Baton Rouge, LA) and with other companies, and with the regional archaeologist for the project area, Dr. Joe Saunders, but failed to produce any evidence of liquefaction structures therein. We encountered an alleged report of observations of sand volcanoes by farmers in the Red River flood plain in the 1800s, but in returning to the alleged source of this story have been unable to substantiate the report. At this time, we are preparing a letter that will be sent to the 23 archaeological consulting firms that regularly conduct CRM work within Louisiana, requesting the reporting of liquefaction and unusual sedimentary structures to us.

We had sought with the archaeological portion of this work to compensate for the initial difficulties encountered in locating suitable surface exposures for examination. Unfortunately, in this component as with the field component of the project, the absence of evidence constitutes no proof of the absence of liquefaction structures. First, the number of sites that have either sufficient subsurface excavation or testing to reveal liquefaction structures are relatively few. Second, the description of the subsurface stratigraphy at some of these sites is insufficient to recognize such structures had they been present. Finally, the geology and geomorphology chapters of these reports are often only a perfunctory recasting of data and ideas contained in existing source materials. Thus, our to-date unsuccessful attempt to find evidence for liquefaction structures in the available archaeological database could reflect nothing more than the general lack of subsurface archaeological excavations and testing in the project area.

Reports Published

The current project is of one-year rather than multi-year duration; it has not yet produced publishable results.

Availability of Seismic, Geodetic, and Processed Data

Acquisition and generation of these data were not proposed for the current project, and have not been undertaken.

References

- Saucier, R. T., 1977, Effects of the New Madrid earthquake series in the Mississippi alluvial valley. U.S. Army Engineer Waterways Experimental Station Miscellaneous Paper S-77-5, 10 pp.
- Saucier, R. T., 1989, Evidence for episodic sand-blow activity during the 1811-1812 New Madrid (Missouri) earthquake series. *Geology*, v. 17, pp. 103-106.

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Non-Technical Project Summary

Reconnaissance of streams in northeastern Louisiana thus far reveals no sediment features indicative of effects from earthquakes in the New Madrid area. Archaeological sources reveal few sites tested with either pits or backhoe trenches, and available accounts of excavations that also give no indications of such features. Our to-date unsuccessful attempt to uncover evidence of such features may largely reflect a scarcity of available surface exposures owing to widespread vegetative cover, and a general lack of archaeological excavations and testing in the project area. Discovery of such features would require a reevaluation of Louisiana's earthquake risk and hazard preparations.