Advances in Archaeological Practice (2024), 1–17
doi:10.1017/aap.2024.9

SAA
SOCIETY FOR AMERICAN ARCHAEOLOGY

HOW-TO SERIES

Landscape Histories and the Search for Early Settlements along Louisiana's Bayous

Steven J. Filoromo[1], Emily K. Dale[2], and Paul D. Jackson[3]

[1]TRC Companies, New Orleans, Louisiana, USA; [2]TerraXplorations, Durham, North Carolina, USA; and [3]TerraXplorations Inc., Plaquemine, Louisiana, USA
Corresponding author: Steven J. Filoromo; Email: sjfiloromo@gmail.com

Abstract

Historical changes from shifting land use, the natural meandering of waterways, and the aftereffects of erosion complicate modern environments and obfuscate precontact landscapes. Although archaeologists can create stratified sampling models or employ systematic surveys, traditional field methodologies are often not suitable for site discovery, thereby limiting knowledge of ancient cultural landscapes. Many water systems in southern Louisiana, and in many parts of the world, have been covered or concealed in backswamps by natural geomorphological processes, development, or environmental degradation. Investigation standards that do not account for these changes will not be effective at identifying archaeological sites in such transformed landscapes. Discoveries made during ongoing archaeological research in Iberville Parish, Louisiana, provide examples of what can be missed and offer solutions through changes in archaeological field methods. This article advocates for a mixed-methodology approach, drawing from historical research and shallow geophysics to look at landforms and landscape changes. Strictly following state survey guidelines can muddle the archaeological record, particularly in places subject to significant landscape change from historical land-use alteration. By applying these approaches, we offer a way to reconstruct ancient landscapes and landforms that are culturally significant but often missed given the nature of modern environmental conditions.

Resumen

Los cambios históricos derivados del cambio de uso de la tierra, los meandros naturales de los cursos de agua y las secuelas de la erosión complican los entornos modernos y confunden los paisajes culturales prehistóricos. Aunque los arqueólogos pueden crear modelos de muestreo estratificados o emplear estudios sistemáticos, las metodologías de campo tradicionales a menudo no son adecuadas para el descubrimiento de sitios, lo que limita el conocimiento de los paisajes culturales antiguos. Muchos sistemas de agua en el sur de Luisiana, y en muchas partes del mundo, han quedado cubiertos o ocultos en pantanos debido a procesos geomorfológicos naturales, desarrollo, o degradación ambiental. Los estándares de investigación que no toman en cuenta estos cambios no serán eficaces para identificar sitios arqueológicos en paisajes tan transformados. Hallazgos realizados durante investigaciónes arqueológicas en Iberville Parish, Luisiana, proporcionan ejemplos de lo que sepuede omitiry ofrecen soluciones mediante cambios en los métodos de campo arqueológicos. Este estudio aboga por un enfoque de metodología mixta, basándose en la investigación histórica y la geofísica superficial para observar las formas del relieve y los cambios del paisaje. Siguiendo estrictamente las pautas de los estudios estatales puede confundir el registro arqueológico, particularmente en lugares sujetos a cambios significativos en el paisaje debido a la alteración histórica del uso de la tierra. Al aplicar estos enfoques, ofrecemos una manera de reconstruir paisajes y relieves antiguos que son culturalmente significativos pero que a menudo se pasan por alto dada las condiciones ambientales modernas.

Keywords: Louisiana; wetland archaeology; erosion; shallow geophysics; site survey methods

Palabras clave: Luisiana; arqueología humedal; erosión; geofisica superficial; métodos de inspección de sitios

Over time, historical changes in land use and water management have affected our ability to identify ancient sites and landscapes, requiring new approaches to archaeological survey. Archaeologists in southern Louisiana often conduct large-scale surveys within the Mississippi River floodplain, collecting significant quantities of data across sugarcane fields and swamps crosscut with drainage ditches. The primary farmlands are often adjacent to backswamps covered in riparian hardwood forests. The reason these backswamps have not been farmed is that they are typically connected to active bayous, which flood seasonally. This makes growing traditional crops impossible. For this article, a backswamp is defined as a low-lying, wet, poorly drained landform associated with a waterway(s), whereas a bayou is a slow-moving or still creek, derived from the Secretary of the Interior's definition from the 1850 Swamp Lands Act (Jackson et al. 2021; Phillips and Soederberg 2023). Because of their frequently inundated condition, backswamps are often treated as having a low probability of precontact occupations and are either subject to a simple pedestrian survey or are shovel tested at a wider interval, reducing our ability to detect conditions different from those we might have expected.

This article demonstrates ways archaeologists can integrate mixed methodologies to assess and mitigate the loss of significant archaeological sites that would otherwise be undetected. First, we outline issues with current practices in the recognition and archaeological documentation of environmental impacts. We share a series of iterative field methods that are designed to better detect and interpret cultural sites and landscapes in these contexts. Our investigations at a group of interrelated and highly significant, yet previously unsuspected, archaeological sites in Iberville Parish, Louisiana, demonstrate the effectiveness of our approach. These sites were located along a former waterway whose course was modified through channelization and other forms of landscape modification in the twentieth century. Although the case study is from southern Louisiana, the lessons learned have much broader applicability. The modification and erasure or covering of past landscapes from historic activities, including from ongoing climate change impacts, are matters practitioners in coastal and riverine settings everywhere need to address.

Climate, Environment, and Site Discovery

Long-term studies by the United States Geological Survey (USGS) have documented that the equivalent of an American football field in land area (ca. 5,400 m^2, or 1.32 acres) is lost every 34 to 100 minutes on Louisiana's coastline (United States Geological Survey 2017). Although many of the changes to local waterways within the Mississippi River Delta and associated subdeltas are part of natural processes, the rate of changes and erosion are exacerbated by human action or inaction (Brasseaux and Davis 2017). In areas such as swamps and wetlands, the detection of cultural resources in these difficult to access and often low-lying areas is often hampered by existing practices guiding site discovery investigations. These areas are often classified as having a low probability for cultural resources, yet they are often the most vulnerable to loss, particularly in the face of the ongoing climate crisis (Parker et al. 2023; Peixotto 2017; Skipton 2021). These problems include the following:

(1) Short-term historic landscape modifications have obfuscated signs of precontact land use. As the Mississippi River changed courses over time, Native American communities utilized natural levees and forests in site selection. Yet today's swamps may have once been the location of ancient forests and natural levees where significant villages were located (e.g., Mehta and Chamberlain 2019). Within the coastal and riverine wetlands, Native American communities in some areas created canals for fish capture and water management (Jackson et al. 2023; Rodning 2002; Thompson et al. 2014; Waselkov 2022). More recently, land tenure legislation set forth by the early American government provided the grounds for former Spanish and French colonizers to reaffirm late eighteenth-century land claims and to reclaim backswamps through the Swamp Lands Act of 1850 (Phillips and Soederberg 2023; Reuss 2004). Agricultural enterprises, such as sugar production and cypress logging, led to dramatic changes in the landscape—including its waterways—through the construction of artificial levees and cypress logging that forced a static boundary on the Mississippi River and drained swamps and bayous (Hall 1992; Reuss 2004; Silkenat 2022). These changes entrenched a formerly

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

dynamic landscape into a series of agricultural fields interwoven with canals and drainage ditches that in some cases flowed in markedly different channels than those once present (A Louisianian of Natchez 1830; Morris 2021; Turner 2021).

(2) Traditional archaeological survey approaches are often insufficient to address major landscape modifications. Knowledge of the state of constant fluctuation of the Mississippi River Delta, subdeltas, bayous, and backswamps, and of the extensive histories of land use and settlement decisions by past and present peoples, only generally inform state regulations for cultural resources investigations in such settings. The 2021 Louisiana Fieldwork Guidelines for Cultural Resource Investigations specifically define that areas with a high-probability of subsurface resources should be shovel tested at 30 m intervals, but they leave the definition of how to examine low-probability areas to the consultant. Lower-probability areas are usually sampled at no greater than 50 m intervals, although they also recommend consultation with their office (Louisiana Division of Archaeology 2021:10–11). Per state guidelines, shovel testing should reach at least 50 cm below ground surface, with excavated soils being screened in 0.635 cm (0.25 in.) mesh. This may lead to the elimination of some areas from consideration that, appropriately examined, may yield highly significant cultural resources. The guidelines do not provide guidance on the use of geophysical methodologies, for example, which, as we demonstrate in the case study that follows, can be useful tools for site discovery and evaluation. Outside of the southern parishes, various Tribal Historic Preservation Offices (THPOs), such as the Osage Nation Historic Preservation Office (ONHPO), have more stringent survey standards within parishes under their jurisdiction when included in Housing and Urban Development (HUD) review. For example, when working in Caddo Parish, ONHPO regulations would require pedestrian or shovel testing along transects at 15 m intervals.

Although the approaches within this article are not individually new, their combined and routine use as part of survey and compliance activity are more novel in most work conducted to date in the challenging environments of southern Louisiana. The impetus for discussing historical land use in Louisiana stems from two sources. First, as 2023 continued a trend of new record storms, droughts, and changes in environmental legislation (e.g., Section 404 permitting), such issues are increasingly relevant in the dynamic environment of industrial development and adverse impacts to sensitive waterways, prairies, and floodplains. Second, although archaeologists in southern Louisiana and the Texas Gulf Coast are increasingly utilizing geophysics or geomorphological assessment methods to locate sites or landforms capable of yielding sites, these methods are not commonly used to understand landscapes and land alterations.

Problems in Survey Environments and Regulations

Louisiana has environments that can make archaeological work difficult. The alluvial geomorphology of the Mississippi River and ongoing alterations from past and present communities result in a continuously changing environment (e.g., Fisk 1944; Mehta and Chamberlain 2019; Saucier 1994). With these constant fluctuations, the depositional environment of many archaeological sites is complicated—some are deeply buried, whereas others may be ephemeral. In the context of precontact Native American communities (though this is not mutually exclusive), many sites can be small or ephemeral and located along these waterways (e.g., Bernard 2016; Reuss 2004; Rodning 2002). Unfortunately, high-probability methods have rarely been used in the backswamps of Point Pleasant and similar environments, so sites large and small have almost certainly been missed.

To add to the problems of locating archaeological sites, the silty clay soils are often wet, making screening and feature recognition difficult. Surveyors are forced to chop through the soils rather than push them through the screens, making small artifact recovery unlikely. Once the topsoil was removed at Point Pleasant, an immense number of artifacts and features were recovered and recorded at depths greater than that of a typical shovel test per state regulations (approximately <50 cmbs). Significant and well-preserved cultural resources were found deep below the plowzone and alluvium produced by several hundred years of flooding and agricultural manipulation.

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

Per the state's archaeological standards, high-probability areas relevant to the current discussion are defined as lands within 100 or 200 m of a small to moderate stream or bayou (depending on the size of the watercourse), locations within 200 m of elevated landforms *without* associated waterways that are adjacent to and overlooking a lower area, all major rivers and natural levees, crevasse splays, and areas within 100 m of a previously recorded site (Louisiana Division of Archaeology 2021:10). The backswamp regions are often identified by heavy foliage, thick underbrush, and standing water. When defined as having low site potential, backswamps are typically shovel tested at 50 m intervals or, if flooded, often just visually inspected with no subsurface testing. Therefore, applications of these standards can inadvertently create a false equivalency where low accessibility creates low probability. If a stratified sampling strategy is favored over systematic survey, then the criteria need reconsideration. Historic land use of these areas has obscured potential precontact deposits.

Wetland Archaeology

What makes bayous and backswamps particularly sensitive to deleterious landscape alterations is that the both creation of levees and diversions of waterways alter the course of channels and cut off a source of water. The extensive modifications made since the nineteenth century make a landscape that would be largely unrecognizable to peoples of the past. Paired with human-induced long-term climatic changes, greater interannual variability is exacerbated by rising temperatures, sea levels, eroding wetlands, and generally more unpredictable weather events. Whereas the summer of 2023 saw one of the state's worst droughts in decades, the summer of 2022 was particularly wet, making it impossible to survey portions of the Point Pleasant backswamps (Filoromo et al. 2022). Taking a long view from agricultural records (namely, the historic *Statement of Sugar Crops Made in Louisiana*, from between 1840 and 1910), the yearly average temperature in Louisiana in 1895 was 64.8°F but is currently 71°F, a six-degree increase (Bouchereau 1895). This change may seem subtle, but even without considering the highest temperatures, this increase demonstrates the steadily rising global temperature on a small scale. Even the slightest temperature increase affects sea-level rise, which in turn impacts coastal populations and archaeological sites (Anderson et al. 2017).

Project Overview: Point Pleasant

The Iberville Parish has been the subject of many significant compliance projects, with 193 reports listed in the Louisiana Cultural Resource Management Bibliography (Louisiana Division of Archaeology 2024). Here, we focus on four projects: two surveys, a site evaluation, and a recent mitigation that were completed for compliance with Section 106, and that were conducted in a section of the parish known as Point Pleasant. Together, they provided insights into issues of field methodology and site detection.

Archaeological Surveys

Recently, we completed two cultural resources surveys that bisect the Point Pleasant landform. Approximately 162 ha (400 acres) of land were investigated as part of two projects (Filoromo et al. 2022; Ixta and Perrault 2023). A high-probability 30 m interval testing strategy was employed on both projects, given that—as Native American site distribution, coupled with historical map and soil research (historic and modern soil surveys and geomorphology) suggested—there was a high probability for encountering significant cultural features and artifacts. For these surveys, each shovel test was approximately 50 cm in depth, and screened through a 0.635 cm (0.25 in.) mesh.

During the first survey on the southern end of Point Pleasant, we recorded two archaeological sites that yielded Indigenous assemblages and substantial research potential. Site 16IV243 is a multicomponent site located within an agricultural field with Late Archaic, Early Woodland, and historic components. The Early Woodland component consists of a Pontchartrain projectile point, lithic debitage, and a single piece of daub, the latter of which is suggestive of structural remains. Site 16IV244 is a lithic reduction site, where we recovered a proximal biface fragment and a sparse collection of lithic debitage. Both sites are along the same upward-sloping elevation that straddles the bayou, where other Indigenous sites have also been identified.

We continued to employ the high-probability survey strategy in a second survey, which extended from the backswamp containing Bayou Goula to the Mississippi River levee. On this project, we identified loci with Indigenous cultural materials (Ixta and Perrault 2023). Site 16IV247 was adjacent to the bayou and contained a possible post mold, several large daub fragments strongly suggestive of a potential structure, and a Baytown Plain sherd. Additional field methods were necessary to document and evaluate these sites, as discussed below.

Site Evaluation: Looking for a “Sugarhouse and Burial”

In a third project, Filoromo and Jackson (2023) recently tested a historic sugar mill (16IV209) in 2022. Before our work, Ryan and colleagues (2014) identified the site, recovering 17 historic artifacts from surface deposits. Given the site’s proximity to a known Civil War–era skirmish, the site was also the potential location for the burial of a Union soldier. During the investigation, they noted that brick flecks were present across the site and in two shovel tests (Ryan et al. 2014:197). Therefore, the expectation was that we would identify features and materials associated with the sugarhouse. Because of this, the state archaeologist requested the use of canine-guided historic human remains detection and shallow geophysics to map potential deposits prior to ground disturbance (Filoromo and Jackson 2023). Our investigation failed to find evidence of the historic sugarhouse or burial. However, we uncovered a portion of a buried bayou and found a small Plaquemine period (ca. AD 1300–1700) component in deeper deposits (approximately 70 cm below ground surface; Filoromo and Jackson 2023). This locus was considerably smaller than the site boundary, only consisting of a handful of pottery sherds and a disjointed collection of structural posts.

Archaeological Mitigation at Point Pleasant (16IV199)

The effects of historic, natural, and modern human–induced climate change on landscapes are matters of increasing concern to cultural resource managers. The recent mitigation of the Point Pleasant site (16IV199)—an extensive 5.06 ha (12.5 acres) nonmound, Coles Creek period (AD 1000–1200) occupation in southern Louisiana, located in a low probability zone—exemplifies these challenges. Previous investigations at the site indicated that deeply buried archaeological deposits were likely present, requiring further evaluation (e.g., Ryan et al. 2014; Wells et al. 2018). A site-wide magnetometry survey was conducted as part of the follow-up examination, locating extensive subsurface features.

Nonmound academic archaeological research in the Lower Mississippi River Valley south of the terraces near Baton Rouge has been limited, other than a few examples, in the Natchez bluffs and Tensas Basin (Brain 1978; Kidder 1993; LaDu 2021; Mehta and Chamberlain 2019). Although CRM archaeology in the region has led to the recovery of significant data on settlement patterns and site location (Jeter et al. 1989; Mann 2013; Woodiel 1993), refining scholarly understanding of daily life is not often the goal. Although there is a disproportionate focus on mound centers, it is more likely that villages and single-family settlements are presumably where most Coles Creek populations lived (Brain 1978; Kassabaum 2019, 2021; Roe and Schilling 2010). Archaeological definitions of villages and single-family settlements lack clarity and rely on contrasts in site size and demographics (LaDu 2021; West et al. 2018). LaDu (2021) argues that the typical Coles Creek village was a year-round settlement that lacked monumental architecture and where multifamily coresidential groups lived, whereas a single-family settlement was an isolated, year-round occupation. Archaeologists often describe villages lacking monumental architecture as relatively simple, yet these assertions rely on limited excavation data (see LaDu 2021; Thompson and Birch 2018). Our recent work at Point Pleasant has shown that the daily lives of village inhabitants during the Coles Creek period were more complicated than previously assumed (e.g., Blitz 1999; see also Pauketat 2007).

As a result of the geophysical data, we delineated an ancient bayou that had been covered and channelized by the landowners to capitalize on one such backswamp in the 1850s, in 1901, and again in the 1980s (Jackson et al. 2023; see also Wells et al. 2018:59). The water course was first clearly delimited through remote sensing and refined during mechanical stripping. We were able to identify, through soil color and content, not only the bayou but surrounding lowland backswamp regions and historically higher, drier occupied landforms. Historical maps depicting the Point Pleasant landform inconsistently

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

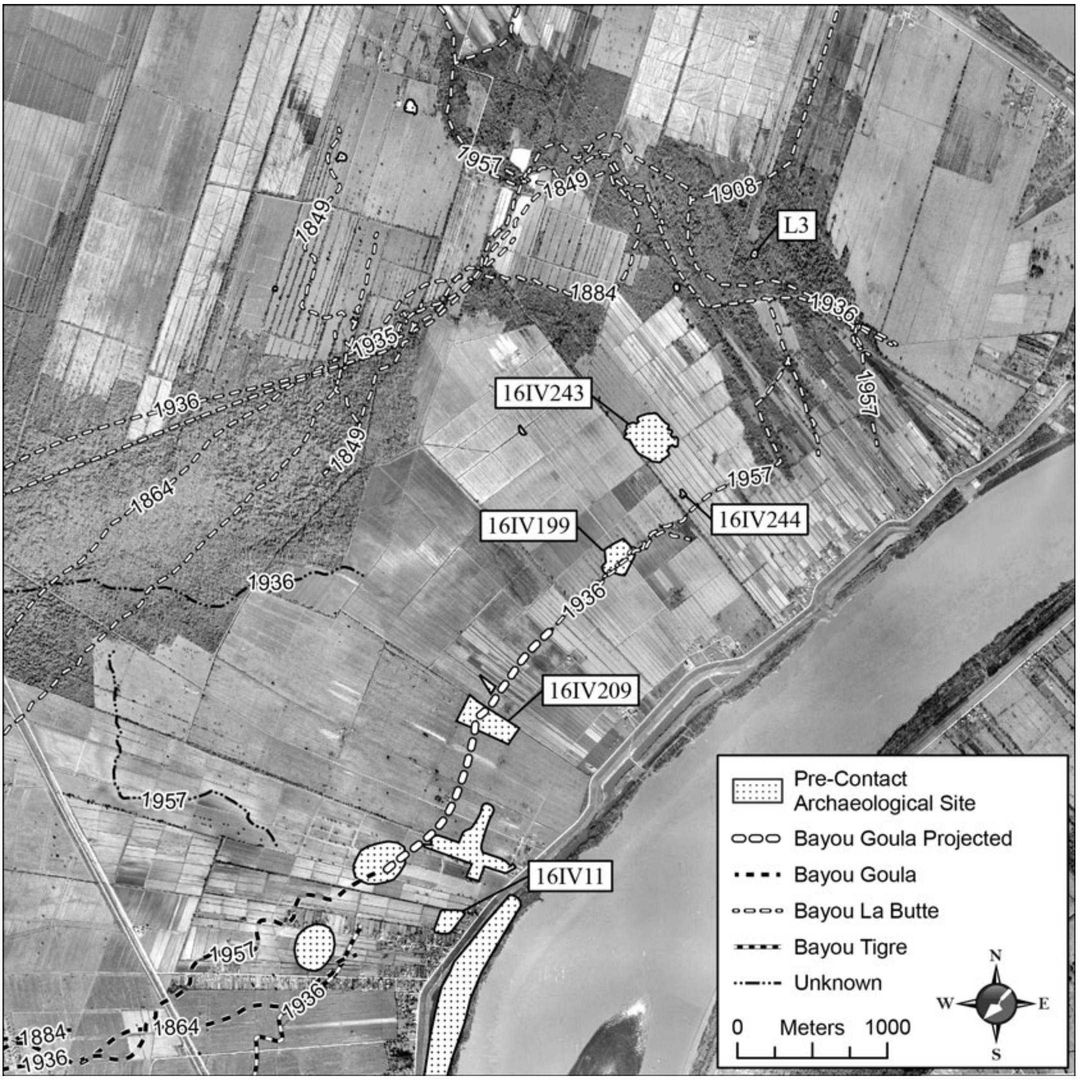

Figure 1. Aerial imagery from 1957 showing the location of archaeological sites mentioned in text and along various historic tracts of Bayou Goula.

identify the bayou as Bayou la Butte, Bayou Tigre, and Bayou Gula (Figure 1). For this article, we have simplified the name to Bayou Goula—not to be confused with the archaeological site bearing the same name (Quimby 1957) but revised to follow recent local spellings of the waterway. The farmer's land alteration, infilling the bayou, was an effective strategy because it increased arable land, opened separate fields for mechanized planting and harvesting, and redirected the flow of water. In doing this, they also covered and, in effect, encapsulated and protected a massive precontact late Coles Creek site located along the banks of the infilled bayou. During the mitigation, geophysical data and the full excavation of 5.06 ha (12.5 acres) led to the identification of more than 219 cooking pits and more than 18,000 potential post features, which date between cal AD 1180 and 1280 (Figure 2; see Jackson et al. 2023:339–342). Although some of these features appear to come from individual residences, a large portion of the site was also apparently dedicated to community gatherings, as indicated by the presence of massive communal pit and fish capture features. The significant size of the site and extensive deposits along the relict channel were surprising, providing valuable information on the daily gathering spaces of the inhabitants.

Since the 2014 discovery of the Point Pleasant (16IV199) site, and subsequent investigations by Wells and colleagues (2018) and our recent mitigation (Jackson et al. 2023), the nature of these

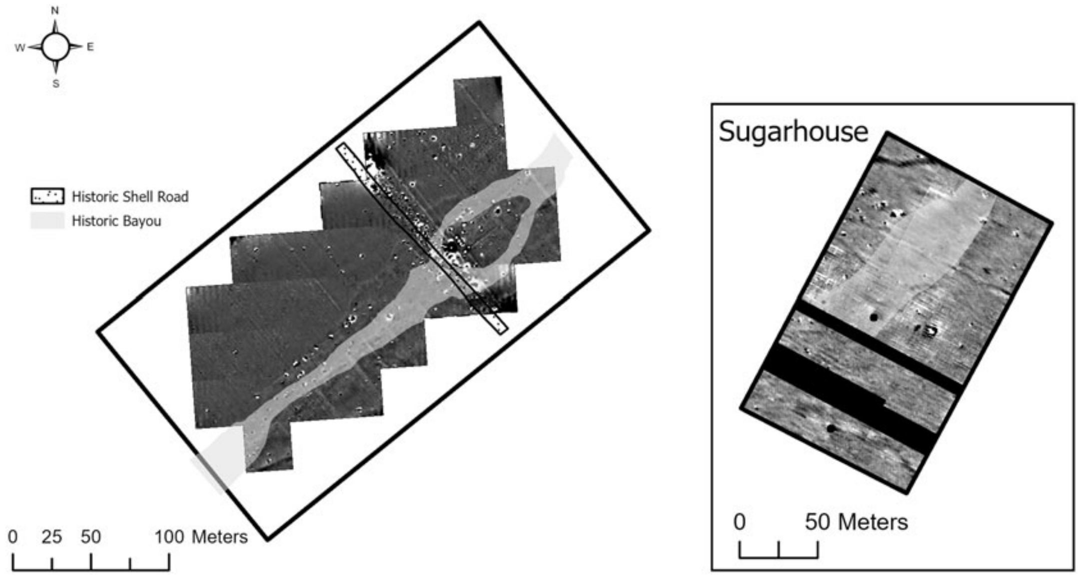

Figure 2. Features identified at Point Pleasant.

deposits encouraged us to consider where more occupations might be located along active bayous that have not been infilled for agricultural use. Bayou Goula is visible on modern and historical topographic maps and aerials stretching across the Point Pleasant landscape and extending past the Bayou Goula Site (16IV11), a Plaquemine period mound and village, before ending at the Mississippi River (Brown 1976; Jeter et al. 1989; Quimby 1957). Much of the bayou is covered by agricultural fields, but as we tracked it upstream, we determined that it is still active in some of the backswamps (Figure 1). Knowing this, we believe that backswamps may previously have been more habitable land than generally assumed, and that these features should be surveyed both at high-probability intervals and with an array of field procedures.

Changes in Methodologies

Taking all the above issues into consideration, what is the best approach to investigating sites and landscapes with similar alluvial and agricultural histories? We believe a combination of techniques should be considered, including detailed historic research, geospatial analysis, intensive shovel testing (including 15 to 30 m intervals and to a depth of >50 cm), selected mechanical trenching, remote sensing, and shallow geophysics.

Adopting Multiple Geospatial Analysis Approaches

Although many of these approaches provide excellent tools, most archaeologists manage budgetary and time constraints (particularly in CRM) that might make such approaches less feasible. However, we advocate for an approach grounded in map regression to better understand the changing features across a landscape (e.g., Cochran and Honerkamp 2017; Hunter and Ryan 2021; Roberts Thompson 2020; Skipton 2021; Wells et al. 2016). Major land modifications began in in the 1720s, when the French government began granting land concessions, and levee construction began by the mid-1700s. Geospatial analysis should include comprehensive aerial, map, lidar, and deed research encompassing and going beyond the project boundaries before beginning fieldwork. If a bayou is indicated, we believe the margins should be considered to have high probability for precontact archaeological sites. Although elevation is important, land alteration for farmland optimization often results in the leveling of formerly prime habitation areas. Notwithstanding, these landforms still have a high likelihood of containing remnants of precontact occupations underneath the plowzone (see below).

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

Within the surrounding vicinity of the Point Pleasant site, we drew from an extensive collection of historical USGS topographic maps, United States Department of Agriculture (USDA) aerial imagery, National Oceanic and Atmospheric Administration (NOAA) coastal survey charts, Mississippi River Commission (MRC) Survey maps, 2017 USGS lidar-derived digital elevation models (DEMs), Government Land Office historic plat surveys, and an undated map from the Civil War to trace the many changing paths of Bayous La Butte, Tigre, and Goula (Figure 1). Using ESRI ArcGIS Pro software, we georeferenced each map using the most stable reference points (which are often roads and almost never a waterway in southern Louisiana). Tracing the changing paths of the bayous helps us understand the meanders and channelization that have occurred over the recent history of Bayou Goula. We used a range of map and imagery types both to track the changes through time and to help account for the differing intentions of the cartographers. For example, the MRC was so much more concerned with navigation and human-created features adjacent to the Mississippi River—such as roads and canals—that in 1935, it labeled Bayou Tigre as a ditch, even though it has meanders and curves in the 1936 USGS topographic map and on the 1957 aerial (see Figure 1). The 1849 GLO plat map showed surprising detail with the bayous but with few labels and no roads.

When comparing these data to archaeological sites within the surrounding landscape, precontact sites generally appeared on the interior of the bayous, away from the river. One notable community at the site 16IV11 (Bayou Goula Mounds) provides a unique case study in site selection for the former contact-period Bayagoula (Quimby 1957). The Bayou Goula mounds are the location of a seventeenth-century Bayagoula village, with two mounds. The archaeological evidence at the site beyond the mounds might be associated with early French settlers on the Duvernay Concession, and the actual village may be 500 m from the mounds at site 16IV134 (Brown 1976; Mann 2013). Although the original identification of structural remains on the site were thought to be associated with the local Native community, Brown's (1976) reevaluation suggests these were associated with the early French Duvernay Concession (ca. 1740s). Additionally, during more recent field surveys, Fredlund (1982) and Mann (2013) demonstrate that the actual Bayagoula village is to the north at 16IV134, which intersects with the historically known and projected relict tracts of Bayou Goula.

Although common in modern archaeological practice, geospatial analysis using site probability modeling, settlement predictions, and vulnerability modeling can provide powerful insight for visualizing change and sensitivity. One of the strengths of modern geographic information systems is the ability to condense, integrate, and interpret diverse and often disparate data. Within the context of climate change and site vulnerability, there are many issues where a lack of uniformity in metadata collection, let alone a critical use of language, impacts direct assessments for site risk (Cochran et al. 2023; Erlandson 2012; Rockman and Hritz 2020). The use of legacy data alongside modern site information can be fraught with difficulty, but its use can enable better understandings of the long-term changes at archaeological sites and associated landscapes since their discovery (see Clarke 2015; Jones et al. 2023; St. Amand et al. 2020; Ullah 2015). With these challenges in mind, there are excellent opportunities to revise approaches to geospatial analysis. In Louisiana, these methods are essential in identifying land-use impacts on unmarked cemeteries (e.g., Filoromo 2023; Hunter and Ryan 2021) and in identifying lost landforms in sediment dispersion areas (e.g., Wells et al. 2016). Elsewhere in the US Southeast, Cochran and colleagues (2021) used logistic regression—including generalized linear models, fuzzy logic, and weighted overlay analysis—to develop a site suitability index for the Georgia coast, where similar threats of heritage loss face the future of cultural resource management in the marshes, islands, and wetlands (see also Cochran et al. 2024). With similar concerns in mind, but primarily focusing on locating potential sites of maroonage, Skipton (2021) developed a least-cost-path model that she is currently testing in her work. Moreover, ongoing efforts in Louisiana, particularly through the Mississippi River Delta Archaeological Mitigation (MRDAM) project, aid in researching and evaluating risk from unsustainable agricultural practices and sea-level rise as it relates to site loss and heritage management (Watt et al. 2019, 2020).

Procedures to Incorporate into Archaeological Survey and Mitigation Fieldwork

At the Point Pleasant site, most of the cultural material and all the features were found more than 50 cm below ground surface, a depth that is beyond state requirements. Elsewhere in the US

Southeast, states such as Georgia and Florida require more intensive field methodologies. For example, state requirements in Florida, in their simplest form, stipulate that shovel testing should reach a depth of 1 m, and in Georgia, 80 cmbs (Florida Division of Historic Resources 2022; Georgia Council of Professional Archaeologists 2019). In the coastal zones of Georgia and Florida, significant and deep sandy deposits are more manageable than the clay and compacted silt alluvium that is all too common in sensitive environments in Louisiana. Consequently, we suggest that deeper shovel testing may be necessary in locations adjacent to active and ancient bayous, as informed by geospatial and historical research. Even within the structure of soil deposition within the region, it is important to remember that the Mississippi River transports a significant amount (approximately 100 million tons) of suspended sediment toward the Gulf of Mexico per year. Before the creation of artificial boundaries on the river, sediment would regularly accumulate over agricultural fields, thereby continuously burying archaeological deposits. Eighteenth- and nineteenth-century levee systems were subject to constant issues, although as people took more modern approaches, they forced a static boundary on the river, leaving suspended sediment to accumulate at the bottom of the river and along the levees, which created the "batture," a term describing the lands between levees and bluffs. As sediment accumulated at the bottom of the river, water levels could rise and create devastating floods (Silkenat 2022). Although the US Army Corps of Engineers often completes dredging projects within the river to avoid these effects today, batture lands remain a constant yet marginal space in the southern coastal landscape.

Batture landforms constitute a more recent phenomenon in environmental processes. Batture refers to the lands between the low-tide water level and the natural or engineered levees. These landforms can exist for several years to several decades; their position within a river course makes them subject to constant change from the erosion and accumulation of silt and sediment in the suspended loads of the Mississippi River. The geomorphological context of these lands predisposes them to constant change in the sedimentation rates that are fully dependent on Mississippi River–wide low- and high-magnitude flooding. The significant clay and silt flux is the product of various development projects that are creating a negative impact on the discharge of suspended sediments within the system. Although sedimentation processes are neither uniform nor fully understood in batture lands, Remo and colleagues (2018) argue that changes in these processes are the product of above-average low-magnitude floods and levee construction, the latter of which limits the available floodplain areas for sediment. Despite their constant state of uncertainty, these locations can still contain significant cultural resources. The significance of the batture—and flooding—to cultural resources is in the fact that the continued accumulation of sediment is burying archaeological deposits deeper than one may readily expect. In some cases, the batture might be the product of a levee setback and, consequently, still contain resources. However, even if one surveys batture lands at high probability, damage from previous major hurricanes might lead to the discovery of once-missing boats, cars, and other movable objects. Within our own work in 2023, the low stages of the Mississippi River permitted the completion of a high-probability (30 m interval) survey of batture lands in St. Charles and Ascension Parishes, leading to the identification of a historic farm road, a few small late nineteenth-century historic sites, several modern destroyed boats and cars, and, of course, many baby alligators.

Despite the continued burial of archaeological sites from sediment accumulation, deep chisel plowing for sugarcane agriculture is assumed to have destroyed most archaeological deposits in areas where historic era cultivation has occurred. However, our work at 16IV209 and the Point Pleasant site has demonstrated that intact features are not only present but prevalent beneath the plow zone. Consequently, we recommend a tailored approach depending on field conditions, which could include a shovel-test grid tighter than 30 m and >50 cm in depth, selective mechanical trenching, and/or geophysical investigations. Some cultural resources work in Louisiana is done as part of HUD compliance, although requests for surveys have come from Tribal Historic Preservation Office interest. THPO standards and protocols are specific to each nation. For example, given that ONHPO often requires survey work in Caddo Parish, its survey methodology specifically calls for the use of a 15 m grid, and in urban areas, even mechanically excavated trenches due to the high possibility of deeply buried A horizons. A sample of the shovel tests should also be taken below the plowzone, even if it exceeds 50 cmbs. Moreover, mechanical stripping methods often target the wholly undisturbed soils beneath the plow-

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

disturbed soils; however, if we remove the soil to the depth of the plow scars rather than the less-disturbed ridges, we may inadvertently remove cultural features. Even though historic and modern agricultural practices create adverse effects on the integrity of archaeological features, the general surface and disturbed materials can be significant indicators of notable sites beneath the tillage (e.g., Baker 1978; Dunnell and Simek 1995). Plowed agricultural fields do not greatly impact soil chemistry—meaning that methods such as magnetic susceptibility and phosphates may be useful and complementary during fieldwork (e.g., Roos and Nolan 2012). In Virginia, some opt for a percent-sampling method utilizing 1 × 1 m test units to locate discrete activity areas (e.g., Muraca et al. 2009), which is more intensive than the budgetary and time constraints permitted in traditional survey work, although it demonstrates that greater care in assessing site integrity is necessary. Our understanding of plowzones needs to be redefined, because the nature of row crop agriculture and technology is complicated, and archaeologists can be poorly versed in historic modern agricultural practices. Depending on the crop, available plows, method of plowing (using animals versus tractors), and structure of labor, plow scars can vary greatly (e.g., Jackson and Filoromo 2021).

Use of Multiple Shallow Geophysics Techniques

Shallow geophysical techniques provide a powerful suite of tools that enable investigations into archaeological features and underlying geomorphology as they relate to coastal-zone resource management. Common techniques often include ground-penetrating radar (GPR), magnetometry, and electrical resistivity tomography (ERT). These methods are commonly used in site classification or evaluation rather than identification. Generally, in coastal environments, techniques such as GPR allow for an exploration of stratigraphy in coastal depositional environments (e.g., Leandro et al. 2019). In other techniques—such as magnetometry, electrical resistance, and electromagnetic induction—it is possible to identify relict channels and bayous, which assist in evaluating the temporal change to the landscape. Moreover, magnetometry enables the ability to evaluate larger areas, and the material culture and their associated geophysical signature help assess the landscape of lived spaces between many areas.

An important component of some of these techniques, such as ground-penetrating radar (GPR) and electrical resistivity tomography (ERT), is the ability to investigate stratigraphic deposition. In archaeological geophysics in the US Southeast, many aim to investigate construction sequences within earthen monuments (Bigman and Seinfeld 2017; Kassabaum et al. 2014; Plattner et al. 2022; Seinfeld et al. 2015). When integrated with regional knowledge, it is possible to distinguish between different temporal associations within geophysical data (e.g., Filoromo 2022; King et al. 2011, 2021; Lydick et al. 2013; Thompson et al. 2014; Walker 2009). Although geophysics and remote sensing techniques are commonly used in coastal sites in the US Southeast (e.g., Blair 2013, 2015; Pluckhahn et al. 2018; Thompson et al. 2011), these methodologies can not only assist in site evaluation but also contribute to identification in sensitive environments at risk.

When possible, remote sensing and shallow geophysical techniques enable the identification of both natural and cultural features. Geophysical surveys often result in a complicated mosaic of archaeological and geological features (Horsley et al. 2014; Kvamme 2017). Depending on the depth of resolution and processing ability, the resulting data condenses several meters of stratigraphy, which could reveal features such as relict streams, land leveling, forest fires, villages, camps, and more (e.g., Evans and Heller 2003; Musset and Kahn 2000; Stele et al. 2020). Typically, archaeologists prioritize *cultural* evidence, such as hearths or architectural components, over geological features, such as relict bayous and channels. These features are often disregarded and treated as insignificant to the cultural landscape and complex geomorphological processes (Filoromo 2022; Henry and Johnson 2012; Kassabaum et al. 2014, Stele et al. 2020). The specific explanations for the appearance of features depend on a range of site-specific conditions, historic land use, and mineralogy. For example, with magnetometry, a fluxgate gradiometer collects data that condenses sediment layers with variable levels of magnetization, leaving features such as relict channels evident in contrast to surrounding environmental and cultural features (e.g., Evans and Heller 2003; Stele et al. 2020).

The historic and modern environment along the banks of the Mississippi River presents many obstacles for utilizing GPR. Different methods require a range of considerations—for example, water-

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

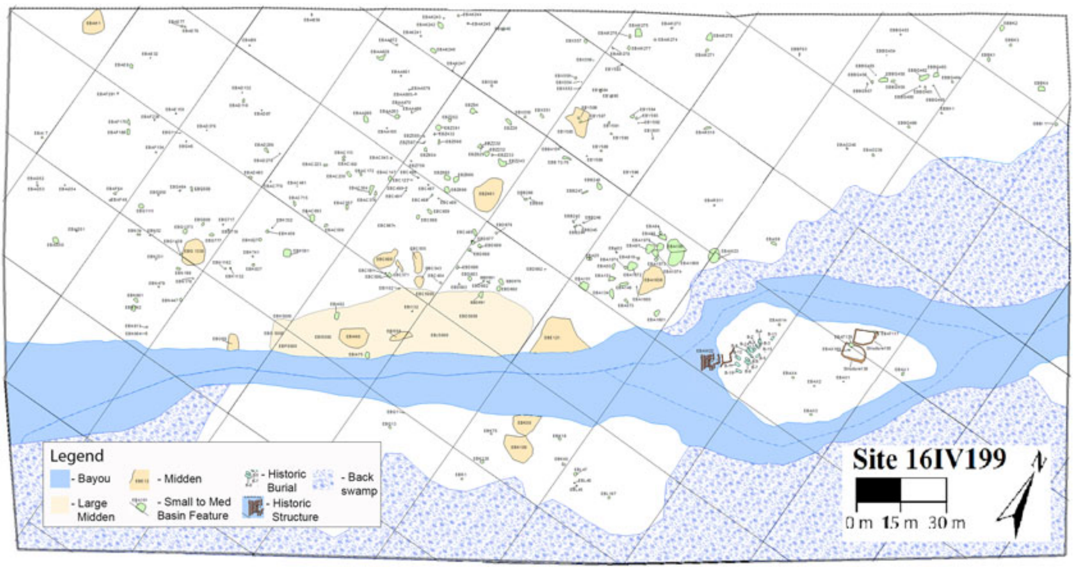

Figure 3. Magnetometry data from the Point Pleasant Village and 16IV209, showing the relict tract of Bayou Goula, as determined through block excavation.

based ground-penetrating radar is fraught with difficulty due to high conductivity of saltwater, although in some cases, it is possible to evaluate saltwater and freshwater transitions zones (e.g., Kruse et al. 2000). However, for archaeological applications, these same properties (high conductivity) problematize the use of GPR. High soil conductivity obscures significant features, particularly given that those associated with precontact deposits have low contrast. The accumulation of silt and clay and a very shallow water table lead to signal attenuation for the average (400 MHz) GPR antenna. In Louisiana, many of the coastal and riverine environments are not well suited to certain techniques, particularly GPR, given that the environments are covered in dense vegetation, are regularly inundated, or are in swamps. Therefore, when conducting archaeological work with geophysical equipment in sugarcane fields, we often rely on other methods, such as magnetometry.

During the Phase II testing at 16IV209 and the Phase III mitigation at the Point Pleasant site, we utilized a Bartington 601-2 Fluxgate Gradiometer prior to any new ground disturbance (see Filoromo and Jackson 2023; Jackson et al. 2023). At 16IV209, the magnetometry survey covered a total area of 13,500 m^2 over the potential location of the sugarhouse, which was indicated by a slight rise on topographic maps. At the Point Pleasant site, the magnetometry survey covered 29,703 m^2 (Figures 3 and 4). At 16IV209, we initially expected to encounter significant, high-contrast anomalies associated with the potential sugarhouse, not the precontact component or relict bayou (see Filoromo and Jackson 2023; Ryan et al. 2014). However, after a pedestrian survey (at 5 m intervals across the site), there were few artifacts on the surface, and magnetometry data within the area most likely associated with the sugarhouse revealed only a few distinct features. At the Point Pleasant site, numerous anomalies related to precontact structures, a historic road, and several ditches were identified. Precontact anomalies were subtle at Point Pleasant (which is generally common for precontact sites), and there were several historic landscape modifications that had significant contrast in field data. In both datasets, we observed slight contrasts in low-magnitude (between 2 and −2 nT, or nanoTeslas) magnetic variations. The general finding at both locations was that subtle magnetic background difference defined the boundary between the fields and bayous. The difference between the two sites was that the interior of the former bayou at the village contained more evident subtle anomalies with positive magnetic gradient because it had been infilled with dense deposits of ceramic fragments and other soils and cultural materials with greater magnetic susceptibility from the surrounding higher areas.

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

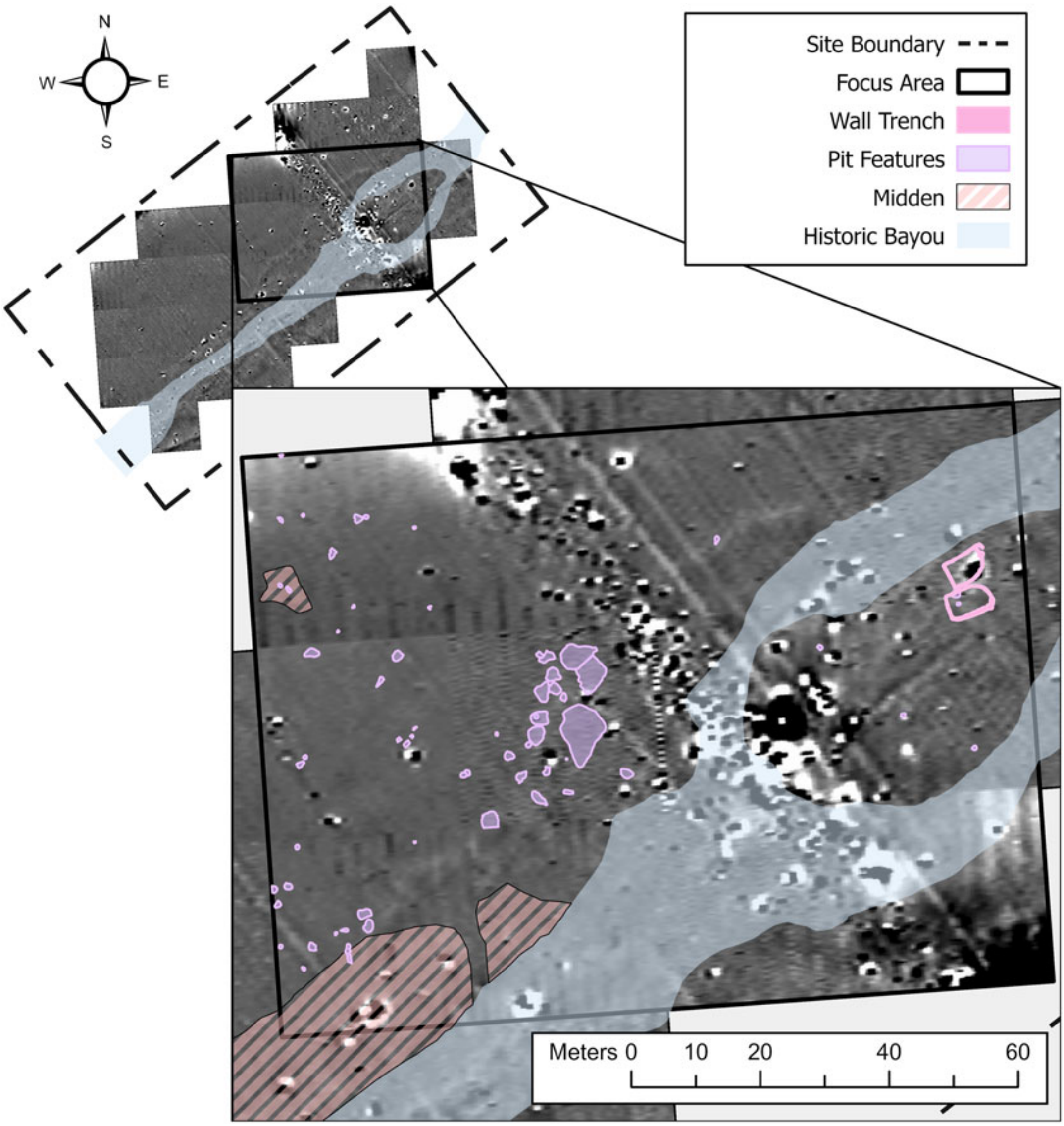

Figure 4. Close-up of magnetometry results overlaid with feature excavation data at the Point Pleasant site (16IV199).

Final Thoughts

As archaeologists, our tendency to focus narrowly on discrete cultural sites within discrete project areas rather than taking a more holistic landscape approach, our lack of knowledge regarding current agricultural practices, and the complications added by climate change have left many buried sites undiscovered and vulnerable to destruction. Recent findings suggest that the current probability models, such as in Louisiana's Standards and Guidelines, need modification to better support the identification of precontact settlements in such situations and settings. We must critically evaluate the approaches we use to identify and assess cultural resources in sensitive environments. Although the purpose of this article is to demonstrate a suite of methodologies that might provide a more appropriate or effective means to identifying precontact sites, the implications of our approach can also contribute to historic period research. Given the nature of the modern environment and the challenges of climate extremes, a long-term view for understanding settlement prior to European colonization should

https://doi.org/10.1017/aap.2024.9 Published online by Cambridge University Press

incorporate a greater knowledge of land-use histories and agricultural practices. For example, a combination of varying spatial data built from many sources from landscape-scale sets (e.g., lidar, plat surveys, USGS) and legacy site data can provide a more holistic view of site selection and change. Consequently, this knowledge aids in developing a better understanding for determining potential cultural sensitivity, particularly in the face of greater rates of wetland erosion, draining bayous, and other adverse effects on waterways.

By advocating for the use of multiple methods—such as cartographic regression and environmental and shallow geophysical data—we hope to encourage thoughtful planning of project methods that consider historic land-use practices and the modifications that impact modern landscapes and site detection. Although the issue of equifinality is not lost on archaeologists around the world, the use of the suite of techniques and approaches described here can lead to a greater appreciation and understanding of how dynamic land use is while also helping to interpret complicated features at a greater scale. Rather than strictly following state-survey guidelines, we encourage greater coordination and consultation across state and federal agencies to integrate preexisting technologies like these to reconstruct ancient landscapes and landforms obscured by historic and modern landscape alterations.

Acknowledgments. Portions of this work initially appeared within a presentation at the 2023 Southeastern Archaeological Conference. The authors would like to thank Sarah Miller, Jeneva Wright, and David Anderson for their invitation to contribute to this special issue. Moreover, we would like to acknowledge the excellent advice that both David Anderson and the anonymous reviewers provided to help refine our work. We greatly appreciate the field archaeologists who assisted in various aspects of the investigations presented here, including Shaun West, Kevin Rolph, Christopher Rivers, Emma Breaux, Austin Tranberg, and Natalia Moonier. No permits were required for this work. A copy of the Memorandum of Agreement for the 16IV199 mitigation is available upon request.

Funding Statement. Funding for the individual investigations mentioned within this text are from cultural resource projects undertaken for compliance with Section 106.

Data Availability Statement. Although most of the reports and investigations referenced in the text are indexed and available through the Louisiana Division of Archaeology, all data are curated at TerraXploration's laboratory in Tuscaloosa, Alabama.

Competing Interests. The authors declare no immediate competing interests.

References Cited

Anderson, David G., Thaddeus G. Bissett, Stephen J. Yerka, Joshua J. Wells, Eric C. Kansa, Sarah W. Kansa, Kelsey Noack Myers, R. Carl DeMuth, and Devin A. White. 2017. Sea-Level Rise and Archaeological Site Destruction: An Example from the Southeastern United States Using DINAA (Digital Index of North American Archaeology). *PLoS ONE* 12(11):e0188142. https://doi.org/10.1371/journal.pone.0188142.

Baker, Charles M. 1978. The Size Effect: An Explanation of Variability in Surface Artifact Assemblage Content. *American Antiquity* 43(2):288–293.

Bernard, Shane. 2016. *Teche: A History of Louisiana's Most Famous Bayou*. University Press of Mississippi, Jackson.

Bigman, Daniel, and Daniel Seinfeld. 2017. The Anthropological Potential of Ground-Penetrating Radar for Southeastern Earthen Mound Investigations: A Case Study from Letchworth Mounds, Tallahassee, Florida. In *Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications*, edited by Duncan McKinnon and Bryan Haley, pp. 185–197. University of Alabama Press, Tuscaloosa.

Blair, Elliot H. 2013. The Guale Landscape of Mission Santa Catalina de Guale: 30 Years of Geophysics at a Spanish Colonial Mission. In *Life among the Tides: Recent Archaeology on the Georgia Bight*, edited by Victor D. Thompson and David Hurst Thomas, pp. 375–394. American Museum of Natural History, New York.

Blair, Elliot H. 2015. Making Mission Communities: Population Aggregation, Social Networks, and Communities of Practice at 17th Century Mission Santa Catalina de Guale. PhD dissertation, Department of Anthropology, University of California, Berkeley.

Blitz, John. 1999. Mississippian Chiefdoms and the Fission-Fusion Process. *American Antiquity* 64(4):577–592.

Bouchereau, Alcée. 1895. *Statement of the Sugar and Rice Crops Made in Louisiana in 1894–1895*. A. Bouchereau, New Orleans, Louisiana.

Brain, Jeffrey. 1978. Late Prehistoric Settlement Patterning in the Yazoo Basin and Natchez Bluffs Regions of the Lower Mississippi Valley. In *Mississippian Settlement Patterns*, edited by Bruce Smith, pp. 331–368. Academic Press, New York.

Brasseaux, Carl A., and Donald Davis. 2017. *Ain't There No More: Louisiana's Disappearing Coastal Plain*. University Press of Mississippi, Jackson.

Brown, Ian W. 1976. A Reexamination of the Houses at the Bayou Goula Site, Iberville Parish, Louisiana. *Louisiana Archaeology* 3:193–205.

Clarke, Mary. 2015. The Digital Dilemma: Preservation and the Digital Archaeological Record. *Advances in Archaeological Practice* 3(4):313–330.
Cochran, Lindsey, and Nick Honerkamp. 2017. Reconciling Historic Maps with the Archaeological Record on Coastal Plantation: A Cautionary Tale. *Early Georgia* 45(1&2):93–110.
Cochran, Lindsey, Victor Thompson, and Bryan Tucker. 2021. Creating Living Predictive Models of Coastal Paleoenvironmental Landscapes: Georgia, USA. In *Palaeolandscapes in Archaeology: Lessons for the Past and Future*, edited by Mike Carson, pp. 130–155. Routledge, Abingdon, United Kingdom.
Cochran, Lindsey, Victor D. Thompson, David G. Anderson, Christine M. Hladik, and Ellen Herbert. 2024. The Timing of Sea Level Rise Impacts to Cultural Heritage Sites along the Georgia Coast, USA through Fine Grain Modeling. *Advances in Archaeological Practice* 12(3), in press.
Cochran, Lindsey E., Sarah Miller, Heather Wholey, Ramie Gougeon, Meg Gaillard, Emily Jane Murray, Katherine Parker, et al. 2023. Building a Foundation to Unify the Language of Climate Change in Historical Archaeology. *Historical Archaeology* 57(2):473–488.
Dunnell, Robert, and Jan Simek. 1995. Artifact Size and Plowzone Processes. *Journal of Field Archaeology* 22(3):305–319.
Erlandson, Jon M. 2012. As the Word Warms: Rising Seas, Coastal Archaeology, and the Erosion of Maritime History. *Journal of Coastal Conservation* 16:137–142.
Evans, Michael, and Friedrich Heller. 2003. *Environmental Magnetism: Principles and Applications of Enviromagnetics*. Academic Press, Amsterdam.
Filoromo, Steven. 2022. Snow's Bend (1TU2/3) and the Landscapes of the Moundville Chiefdom: A Multi-Method Geophysical Survey. Master's thesis, Department of Anthropology, University of Alabama, Tuscaloosa. Electronic document, https://ir.ua.edu/items/f5044549-c573-43aa-8cbd-b66d5c64a60f, accessed January 10, 2024.
Filoromo, Steven. 2023. *Bagatelle Site (16SJ130) Geophysical and Remote Sensing Survey, St. James Parish, Louisiana*. Report submitted to Equilon Enterprises, LLC dba Shell Oil Products US, Convent Refinery, Convent, Louisiana. Report on file at TerraXplorations Inc., Plaquemine, Louisiana.
Filoromo, Steven, and Paul D. Jackson. 2023. *Phase II Archaeological Testing of Site 16IV209, Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Filoromo, Steven, Briane Shane, and Samuel Johnson. 2022. *Phase I Cultural Resources Survey within the Shintech Railcar Storage Yard Extension, Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Fisk, Harold N. 1944. *Geological Investigations of the Alluvial Valley of the Lower Mississippi River*. Mississippi River Commission, Vicksburg.
Florida Division of Historical Resources. 2022. *Module Three: Guidelines for Use by Historic Preservation Professionals*. Florida Department of State, Tallahassee.
Fredlund, Glen G. 1982. Where Did the Bayogoula Dance; Why Do They Sing No More: A Reexamination of the Bayou Goula Area, Iberville Parish, Louisiana. Master's thesis, Department of Anthropology, Louisiana State University, Baton Rouge.
Georgia Council of Professional Archaeologists. 2019. *Georgia Standards and Guidelines for Archaeological Investigations*. Georgia Council of Professional Archaeologists, Atlanta.
Hall, Gwendolyn Mildo.1992. *Africans in Colonial Louisiana: The Development of Afro-Creole Culture in the Eighteenth Century*. Louisiana State University Press, Baton Rouge.
Henry, Edward, and Jay Johnson. 2012. *Geophysical Investigations at Feltus Mounds (22Je568), Jefferson County, MS*. Report submitted to University of Mississippi. Copies available from the Center for Archaeological Research, University of Mississippi, Oxford.
Horsley, Timothy, Alice Wright, and Casey Barrier. 2014. Prospecting for New Questions: Integrating Geophysics to Define Anthropological Research Objectives and Inform Excavation Strategies at Monumental Sites. *Archaeological Prospection* 21:75–86.
Hunter, Donald, and Joanne Ryan. 2021. *Golden Grove and Sport Place Plantations: Two Unmarked Plantation Cemeteries in St. James Parish, Louisiana: Land-Use History and Cartography*. Report prepared by Coastal Environments Inc., Baton Rouge, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Ixta, Itzamara, and Stephanie Perrault. 2023. *Phase I Cultural Resources Survey of 110 Acres in Iberville Parish, Louisiana*. Report submitted to SNF Flopam, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Jackson, Paul D., and Steven Filoromo. 2021. Phase III Archaeological Mitigation of the Dunboyne Plantation Sugarhouse (16IV204). *Newsletter of the Louisiana Archaeological Society* 49(1):12–17.
Jackson, Paul D., Steven Filoromo, Brad Lanning, Katherine Seeber, Jessi Jenkins, and Emma Pepperman. 2021. *Phase III Archaeological Mitigation of the Dunboyne Sugar Mill, 16IV204, Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Jackson, Paul D., Steven Filoromo, Sharlene O'Donnell, Mike Eichstaedt, Joanna Klein, Natalia Moonier, Shaun West, and Kevin Rolph. 2023. *Phase III Archaeological Mitigation of the Point Pleasant Site (16IV199) in Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.
Jeter, Marvin D., Jerome C. Rose, G. Ishmael Williams, Jr., and Anna M. Harmon. 1989. *Archaeology and Bioarchaeology of the Lower Mississippi Valley and Trans-Mississippi South in Arkansas and Louisiana*. Report submitted to the US Army Corps of Engineers, Southwestern Division. Copies available from the Arkansas Archaeological Survey, Fayetteville.

Jones, Jennifer, Edward Pollar, Kieran Craven, James Barry, Antony Corms, Sandra Henry, Robert Shaw, Linda Shine, and Louise Baker. 2023. Understanding Pressures to Archaeological Heritage in the Face of Climate Change: An Integrated Approach to Coastal-Zone Assessments in Irelands. *Historical Archaeology* 57(2):566–588.

Kassabaum, Megan. 2019. Early Platforms, Early Plazas: Exploring the Precursors to Mississippian Mound-and-Plaza Centers. *Journal of Archaeological Research* 27:187–247.

Kassabaum, Megan. 2021. *A History of Platform Mound Ceremonialism: Finding Meaning in Elevated Ground*. University Press of Florida, Gainesville.

Kassabaum, Megan, Edward Henry, Vincas Steponaitis, and John O'Hear. 2014. Between Surface and Summit: The Process of Mound Construction at Feltus. *Archaeological Prospection* 21:27–37.

Kidder, Tristram. 1993. *1992 Archaeological Test Excavations in Tensas Parish, Louisiana*. Center for Archaeology, Tulane University, New Orleans, Louisiana.

King, Adam, Chester P. Walker, Robert V. Sharp, F. Kent Reilly, and Duncan McKinnon. 2011. Remote Sensing Data from Etowah's Mound A: Architecture and the Re-Creation of Mississippian Tradition. *American Antiquity* 76(2):355–371.

King, Adam, Chester P. Walker, and F. Kent Reilly. 2021. The Etowah Archaeo-Geophysical Survey: Creating Place and Identity through the Built Environment. *Journal of Archaeological Science: Reports* 36:1–9.

Kruse, Sarah, James C. Schneider, James A. Inman, and James A. Allen. 2000. Ground Penetrating Radar Imaging of the Freshwater/Saltwater Interface on a Carbonate Island, Key Largo, Florida. In *Proceedings Volume 4084: Eighth International Conference on Ground Penetrating Radar*, edited by David A. Noon, Glen F. Stickley, and Dennis Longstaff. SPIE, Bellingham, Washington. https://doi.org/10.1117/12.383588.

Kvamme, Kenneth L. 2017. A Decade of Geophysics and Remote Sensing in North American Archaeology: Practices, Advances, and Trends. In *Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications*, edited by Duncan McKinnon and Bryan Haley, pp. 215–230. University of Alabama Press, Tuscaloosa.

LaDu, Daniel A. 2021. Reconstructing the Coles Creek Settlement System: The Hinterlands. *Midcontinental Journal of Archaeology* 46(2):125–156.

Leandro, Carolina G., Eduardo G. Barboza, Felipe Caron, Felipe A. N. de Jesus. 2019. GPR Trace Analysis for Coastal Depositional Environments of Southern Brazil. *Journal of Applied Geophysics* 162(1–2):1–12.

Louisiana Division of Archaeology. 2021. *Fieldwork Guidelines for Cultural Resource Investigations*. Louisiana Division of Archaeology, Baton Rouge.

Louisiana Division of Archaeology. 2024. Louisiana Cultural Resource Management Bibliography. Electronic document, https://www.crt.state.la.us/cultural-development/archaeology/CRM/databases/louisiana-cultural-resources-management-bibliography/index, accessed February 4, 2024.

Louisianian of Natchez. 1830. On the Cultivation of Sugar Cane. *Southern Agriculturalist* 3(3):134–140.

Lydick, Christopher, David G. Anderson, and John E. Cornelison Jr. 2013. Integrated Remote Sensing Surveys. In *Archeological Investigations at Shiloh Indian Mounds National Historic Landmark,40HR7, 1999–2004*, edited by David G. Anderson, John E. Cornelison Jr., and Sarah C. Sherwood, pp. 196–288. Southeast Archeological Center, National Park Service, Tallahassee, Florida.

Mann, Robb. 2013. *2013 Annual Report for Management Units IV and V, Regional Archaeology Program, Department of Geography and Anthropology, Louisiana State University*. Report prepared by Southeastern Louisiana Regional Archaeology Program, Louisiana State University, Baton Rouge. Copies available from the Louisiana Division of Archaeology, Baton Rouge.

Mehta, Jayur Madhusudan, and Elizabeth L. Chamberlain. 2019. Mound Construction and Site Selection in the Lafourche Subdelta of the Mississippi River Delta, Louisiana, USA. *Journal of Island and Coastal Archaeology* 14(4):453–478.

Morris, Christopher. 2021. The Rise and Fall of Uncle Sam Plantation. In *Charting the Plantation Landscape from Natchez to New Orleans*, edited by Laura Kilcer VanHuss, pp. 191–222. Louisiana State University Press, Baton Rouge.

Muraca, David, Philip Levy, and Leslie McFaden. 2009. *The Archaeology of Rich Neck Plantation (44WB52): Description of the Features*. Colonial Williamsburg Foundation Library Research Report. Colonial Williamsburg Foundation, Williamsburg, Virginia.

Mussett, Alan E., and M. Aftab Khan. 2000. *Looking into the Earth: An Introduction to Geological Geophysics*. Cambridge University Press, Cambridge.

Parker, Katherine G., Jordan L. Schaefer, Brigid M. Ogden, and Rebecca J. Webster. 2023. Climate Change and the Consequences of Underrepresentation in the Archaeological Record. *Historical Archaeology* 57(2):550–565.

Pauketat, Timothy. 2007. *Chiefdoms and Other Archaeological Delusions*. Issues in Eastern Woodlands Archaeology. AltaMira Press, Lanham, Maryland.

Peixotto, Becca. 2017. Wetlands in Defiance: Exploring African-American Resistance in the Great Dismal Swamp. *Journal of Wetland Archaeology* 17(1):18–35.

Phillips, Rachel, and Susanne Soederberg. 2023. Making and Mastering Violent Environments: Following Infrastructures of Accumulation in Coastal Louisiana. *Antipode* 55(1):222–242.

Plater, David D. 2015. *The Butlers of Iberville Parish, Louisiana: Dunboyne Plantation in the 1800s*. Louisiana State University Press, Baton Rouge.

Plattner, Alain, Steven Filoromo, and Elliot H. Blair. 2022. Multi-Method Geophysical Investigation at Snow's Bend, a Mississippian Platform Mound. *Archaeological Prospection* 29(3):343–351.

Pluckhahn, Thomas J., Martin Menz, Shaun E. West, and Neill J. Wallis. 2018. A New History of Community Formation and Change at Kolomoki (9ER1). *American Antiquity* 83(2):320–344.

Quimby, George I. 1957. *The Bayou Goula Site, Iberville Parish, Louisiana*. Chicago Natural History Museum, Chicago, Illinois.

Remo, Jonathan, Julia Ryherd, Charles Ruffner, and Matthew Therrell. 2018. Temporal and Spatial Patterns of Sedimentation within the Batture Lands of the Middle Mississippi River, USA. *Geomorphology* 308(5):129–141.

Reuss, Martin. 2004. *Designing the Bayous: The Control of Water in the Atchafalaya Basin 1800–1995*. Texas A&M University Press, College Station.

Roberts Thompson, Amanda. 2020. People, Place, and Taskscapes of Enslavement: African American Life on the South End Plantation, Ossabaw Island, Georgia, 1849–1861. PhD dissertation, Department of Archaeology, University of York, York, United Kingdom.

Rockman, Marcy, and Carrie Hritz. 2020. Expanding Use of Archaeology in Climate change Response by Changing Its Social Environment. *PNAS* 117(15):8295–8302.

Rodning, Christopher. 2002. Water Travel and Mississippian Settlement at Bottle Creek. In *Bottle Creek: A Pensacola Culture Site in South Alabama*, edited by Ian W. Brown, pp. 194–204. University of Alabama Press, Tuscaloosa.

Roe, Lori M., and Timothy M. Schilling. 2010. Coles Creek. In *Archaeology of Louisiana*, edited by Mark A. Rees, pp. 157–171. Louisiana State University Press, Baton Rouge.

Roos, Christopher, and Kevin Nolan. 2012. Phosphates, Plowzones, and Plazas: A Minimally Invasive Approach to Settlement Structure of Plowed Village Sites. *Journal of Archaeological Science* 39(1):23–32.

Ryan, Joanne, Thurston H. G. Hahn III, Michael Carpenter, Maegan A. Smith, and Sid Gray. 2014. *Phase I Cultural Resource Investigations for the Proposed Shintech Louisiana, LLC, Chemical Plant Expansion Project, Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.

Saucier, Roger. 1994. *Geomorphology and Quaternary Geological History of the Lower Mississippi Valley*. US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Seinfeld, Daniel, Daniel Bigman, John Grant Stauffer, and Jesse Nowak. 2015. Mound Building at Lake Jackson (8LE1) Tallahassee, Florida: New Insights from Ground Penetrating Radar. *Southeastern Archaeology* 34(3):220–236.

Silkenat, David. 2022. *Scars on the Land: An Environmental History of Slavery in the American South*. Oxford University Press, Oxford.

Skipton, Tara. 2021. Elusive Forever? Assessing the Value of Least-Cost Networks in Locating Eighteenth-Century Maroon Archaeological Sites in St. Bernard Parish, Louisiana. Master's thesis, Department of Anthropology, Florida State University, Tallahassee.

St. Amand, Franki, Terry Childs, Elizabeth Reitz, Sky Heller, Bonnie Newsom, Torben Rick, Daniel Sandweiss, and Ryan Wheeler. 2020. Leveraging Legacy Archaeological Collections as Proxies for Climate and Environmental Research. *PNAS* 117(15):8287–8294.

Stele, Andreas, Jorg Fassbinder, Joachim Hartling, Jens Bussmann, Johannes Schmidy, and Christoph Zielhofer. 2020. Genesis of Magnetic Anomalies and Magnetic Properties of Archaeological Sediments in Floodplain Wetlands of the Fossa Carolina. *Archaeological Prospection* 27:169–180.

Thompson, Victor D., and Jennifer Birch. 2018. The Power of Villages. In *The Archaeology of Villages in Eastern North America*, edited by Jennifer Birch and Victor D. Thompson, pp. 1–19. University Press of Florida, Gainesville.

Thompson, Victor D., Philip J. Arnold, Thomas J. Pluckhahn, and Amber M. Vanderwarker. 2011. Situating Remote Sensing in Anthropological Archaeology. *Archaeological Prospection* 18(3):195–213.

Thompson, Victor D., William Marquardt, and Karen Walker. 2014. A Remote Sensing Perspective on Shoreline Modification, Canal Construction and Household Trajectories at Pineland along Florida's Southwestern Gulf Coast. *Archaeological Prospection* 21:59–73.

Turner, Suzanne. 2021. The Plantation Landscape: Spectres of Unseen Imprint. In *Charting the Plantation Landscape from Natchez to New Orleans*, edited by Laura Kilcer VanHuss, pp. 49–78. Louisiana State University Press, Baton Rouge.

Ullah, Isaac. 2015. Integrating Older Survey Data into Modern Research Paradigms: Identifying and Correcting Spatial Error in "Legacy" Datasets. *Advances in Archaeological Practice* 3(4):331–350.

United States Geological Survey. 2017. Louisiana Changing Coastal Wetlands. Electronic document, https://www.usgs.gov/news/national-news-release/usgs-louisianas-rate-coastal-wetland-losscontinues-slow#:~:text=The%20researchers%20found%20that%20over,10.8%20square%20miles)%20per%20year, accessed January 11, 2024.

Walker, Chester P. 2009. Landscape Archaeogeophysics: A Study of Magnetometer Surveys from Etowah (9BW1), the George C. Davis Site (41CE19), and the Hill Farm Site (9BW169). PhD dissertation, Department of Anthropology, University of Texas, Austin.

Waselkov, Gregory. 2022. History and Hydrology: Engineering Canoe Canals in the Estuaries of the Gulf of Mexico. *Journal of Field Archaeology* 47(2):486–500.

Watt, David J., Tad Britt, Mark A. Rees, and Marian Feinburg. 2019. *The Mississippi River Delta Archaeological Mitigation Project*. Report submitted to the National Center for Preservation Technology and Training and the National Parks Service, Natchitoches, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.

Watt, David J., Mark A. Rees, Tad Britt, Kory Konsoer, and Samuel M. Huey. 2020. Mitigating Engineered Disaster on Louisiana's Gulf Coast. *SAA Archaeological Record* 20(5):15–21, 40.

Wells, Douglas, Bryan Haley, and Charles Pearson. 2016. *Phase I Cultural Resources Investigations and Remote Sensing Survey of the Bay Area and Bar Channel Disposal Areas, Houmas Navigation Canal, Terrebonne Parish, Louisiana*. Report submitted to the US Army Corps of Engineers, New Orleans District, New Orleans, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.

Wells, Douglas C., Joanne Ryan, Thurston H.G. Hahn III, Michael Carpenter, and Donald G. Hunter. 2018. *Phase II Cultural Resources Testing of Sites 16IV198, 16IV199, 16IV204, 16IV206 for the Proposed Shintech Louisiana, LLC, Chemical Plant Expansion, Iberville Parish, Louisiana*. Report submitted to Shintech Louisiana, LLC, Plaquemine, Louisiana, and Providence Engineering and Environmental Group LLC., Baton Rouge, Louisiana. Report on file at the Louisiana Division of Archaeology, Baton Rouge.

West, Shaun, Thomas J. Pluckhahn, and Martin Menz. 2018. Size Matters: Kolomoki (9ER1) and the Power of the Hypertrophic Village. In *The Archaeology of Villages in Eastern North America*, edited by Jennifer Birch and Victor D. Thompson. University Press of Florida, Gainesville.

Woodiel, Deborah. 1993. The St. Gabriel Site. *Louisiana Archaeology* 20:1–136.

Cite this article: Filoromo, Steven J., Emily K. Dale, and Paul D. Jackson. 2024. Landscape Histories and the Search for Early Settlements along Louisiana's Bayous. *Advances in Archaeological Practice*. https://doi.org/10.1017/aap.2024.9.