The Urban Archaeological Supersite Paradigm: Integrating Archaeology and HGIS into Heritage Management

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THE URBAN ARCHAEOLOGICAL SUPERSITE PARADIGM:
INTEGRATING ARCHAEOLOGY AND
HGIS INTO HERITAGE MANAGEMENT

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
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in

The Department of Geography and Anthropology

by

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December 2018
For my parents who first brought me to Louisiana

and David Livingstone who helped preserve Louisiana’s heritage.
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Abstract

The archaeological heritages of many of the world’s historic cities are at risk. If these urban archaeological resources are destroyed before excavation and documentation using sound archaeological techniques, the material histories of these cities are erased. The Urban Archaeological Supersite Paradigm is presented as means to address some of the threats facing urban archaeological sites.

The urban archaeological supersite paradigm is both an applied and a scholarly research framework useful for examining and interpreting the urban past and for helping to address urban archaeological heritage at risk. It conceptualizes the historic city as a supersite made up of numerous archaeological deposits and past activity areas that can reveal the palimpsest of the city. The supersite paradigm is also a mechanism to identify, analyze, and interpret the archaeological heritage of the city via historical GIS (HGIS). Using New Orleans as an example, the research presented involved collecting, creating, and analyzing geospatial data and combining this data in new, meaningful ways within a GIS platform. To showcase the usefulness of implementing the supersite paradigm using HGIS research, three different research questions, at three different scales, are addressed to investigate past histories of New Orleans.

The goal is to improve the likelihood that archaeology is incorporated into larger urban planning, management, and implementation processes thereby reducing the threats to the historic urban landscape. Moreover, creating a research paradigm in combination with HGIS creates opportunities for scholars to examine the historic city from a variety of perspectives and helps to link research themes spatially by adding a geographical component.
Chapter 1. Introduction

The archaeological heritages of many of the world’s historic cities are at risk. Buried beneath the urban footprint of historic cities are the remnants of the former cityscapes—the fragile remains of archaeological sites that provide direct, tangible evidence of a city’s past not found in historical records. However, increased urbanization and human modification of the environment have already impacted and continue to endanger archaeological sites. Already, many of the world’s historic cities are exposed to high levels of urban risk such as the effects of climate change and pollution (Bigio 2015). Due to their aquatic geography, many cities are located in coastal areas or along waterways, making archaeological heritage more vulnerable to sea level rise, frequent flooding, and shoreline erosion. Moreover, many cities lack strong archaeological preservation protections. If these urban archaeological resources are lost or destroyed before being documented, either via recordation or excavation using sound archaeological techniques, the materials histories of these cities are erased.

Some threats to urban archaeology stem from the global migration of people to urban settings and the attractiveness of historic cities as places to settle and conduct business. In the twenty-first century, cities have become the “most significant environment for the human species” (Bandarin and Oers 2012:viii). Never before in human history have so many people lived in concentrated settlements, many of which possess a rich past and contain historic areas. Today, over half of the world’s inhabitants are residing in cities and that number is expected to rise (Bigio 2015; Smith 2014). The United Nations predicts that by 2030, two-thirds of the global population will be dwelling in urbanized areas (Hutchison 2010). Population relocation will inevitably include (re)settlement in the world’s historic cities as they have many attractive qualities and amenities.
As a result of increased numbers of inhabitants and visitors, historic cities are facing many modern challenges. Swelling populations and increased industry raises real estate values, causing changes in land use patterns as planners and developers are pressed to (re)develop areas, increase urban density, and move increasing quantities of people and goods in, out, and around cities. This can be especially challenging in historic cities whose narrow streets were mapped out prior to modern modes of transportation. Urban expansion strains existing—often dated—infrastructure. Rapid and unrestricted development can make urban environments more susceptible to natural and human-induced hazards such fires and flooding. The rise of heritage tourism, which can be a boon economically, also increases pressures on historical portions of the city.

Amplified urbanization and population pressures makes the historic city—specifically the preservation of the city’s historical and cultural resources—particularly vulnerable. In many places there is disconnect between conservation of the historic areas and the daily management of living in a growing city. All too often, historic preservation¹ and archaeological research is portrayed as being at odds with modernization. Even when preservation plans exist to address urban challenges, archaeology is often discussed less extensively in comparison to the built environment.²

I attribute part of this lack of archaeological consideration and public support to people’s misunderstandings about what is important about archaeological resources. It is not uncommon for urban planners, developers, and the public to equate archaeology with artifacts, rather than

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¹ Historic preservation is also called heritage conservation internationally. I mainly stick to using historic preservation, but occasionally use heritage or historic conservation when referencing other authors’ works.

² For example, the State of Louisiana’s Hazard Mitigation Plan (2014) profiled only four archaeological sites out of 41 of the state’s important historical resources.
understanding the goal of archaeological practice is to reconstruct past lifeways. This knowledge is gained from examining the context and relationship between features and soil stratigraphy, as well as the artifacts contained within them. There can be several reasons for the neglect of, and misconceptions about, archaeology. These include the challenges associated with archaeology, and—urban archaeology in particular. Challenges include obtaining access to resources buried beneath the more recent cityscape and the difficulty of working in urban contexts. Then there is the lack of archaeological survey and site inventory in many historic cities, which in turn makes archaeological resources difficult to manage. It is hard to manage the unknown. To many people, archaeology is almost an abstraction. Sometimes, archaeologists fall short of engaging the public in interesting and meaningful ways. This creates missed opportunities to demonstrate what archaeology can reveal about their city’s past and forge connections of that past with living communities today. Because of the complexities in identifying, examining, and interpreting archaeological heritage, those charged with planning and implementing urban development may fail to consider archaeology. Sometimes archaeology is completely left out of preservation planning and protection processes. Ultimately, these inattentions to archaeology result in the damage or destruction of countless sites and the loss of the city’s archaeological heritage.

**The Urban Archaeological Supersite Paradigm**

To address some of the threats facing urban archaeological sites, I developed the Urban Archaeological Supersite Paradigm. It is a concept that considers all archaeological sites in the city as a single supersite. Moreover, the supersite paradigm is a mechanism to identify, manage,
analyze, and interpret urban archaeological heritage. To operationalize the Urban Archaeological Supersite Paradigm, I harness the power of historical Geographic Information Systems (HGIS). The goal is to improve the likelihood archaeology is incorporated in larger urban planning, management, and implementation processes thereby reducing the threats to the historic urban landscape. Moreover, creating a research paradigm in combination with HGIS creates opportunities for scholars to examine the historic city from a variety of perspectives and helps to link research themes spatially by adding a geographical component.

When investigating the urban environment, some archaeologists have proposed considering the historic city as a single, urban site (Cressey 1979; Dickens and Crimmins 1982; Salwen 1982). Building upon this research, I argue treating the city as a supersite does several things. First, the city becomes the object of study. Rather than examining and managing individual sites as separate resources, the supersite paradigm examines the city at a macro scale, where urban processes, research themes, and behaviors can be examined across space and time. Second, the supersite concept links all the archaeologically derived information gathered from various testing and excavation endeavors together as they relate to one another. Thus, all archaeological investigations, whether or not artifacts and features were identified, feed into a greater, holistic understanding of the historic city. Third, studying the city as a supersite treats archaeological resources as part of a historic system, which can improve the management, research, and interpretation of urban archaeological heritage, ultimately increasing public support for archaeology.

The underpinnings of the urban archaeological supersite paradigm include several key concepts. First, historic cities are palimpsests. Second, the palimpsestic nature of urban centers creates (and destroys) the city’s archaeological record. Third, archaeological resources within
the city, which are associated with historic urban occupation, should be viewed together as they relate to the operation of the city.

As discussed in more detail in Chapters 2 and 3, a major roadblock to managing archaeological resources and incorporating archaeological heritage into larger urban planning and implementation spheres is that archaeologists do not necessarily know where all resources are located. Too often archaeologists must devote a lot of time and efforts trying to identify sites or at least understand the probability of archaeological deposits being present or absent within a specific location. The supersite paradigm is a solution to this roadblock. By calling the city a supersite, I argue one has already identified the site’s location (i.e., the historic city). Thus, under the urban archaeological supersite paradigm, a more productive strategy is to assume (everywhere within the historic city) there is archaeological information present. The focus becomes understanding the length and types of historical occupations by urban communities within a supersite and what archaeology can reveal about these occupations. The emphasis shifts from the probability of containing archaeological resources to determining uses of spaces by former city dwellers within the supersite and refining the ages and activities of specific locations within the supersite. The supersite paradigm avoids designating the urban landscape into low/moderate/high probability where areas considered low probability might be overlooked and thought to contain little information about the city’s heritage. Instead, the paradigm values all the archaeologically derived information as holding the potential to contribute to the understanding of the city’s past.

Moreover, the urban archaeological supersite paradigm is a framework that can link and contextualize historical and archaeological information across various locations within the city through multiple eras, as well as explore the various uses and functions of space to create
multidimensional histories of the city. Using New Orleans as an example, I demonstrate how to combine historical, geographical, environmental, and archaeological data with GIS technology and methods to analyze and visualize historical land-use patterns and the locations of buried archaeological resources in a city that has been occupied for centuries. Instead of basic site identification, my research is concentrated on understanding the function and age of specific locations. To refine the age and function, I used primarily historical maps and archaeological data. Using a GIS platform, I created the New Orleans supersite geodatabase. A geodatabase is a database combined with spatial information. My particular geodatabase contains various datasets including georeferenced historical maps, relevant information about the various uses of urban spaces through time extracted from the historical maps, as well as archaeology and environmental data. I synthesize these data to enhance problem-oriented research using archaeological data buried beneath the city, and to examine and correlate the nature (i.e., age and function) of archaeological resources. My research project helps to link specific locations and archaeological data together across space and time. This can encourage people to see the archaeological resources as a city system. To demonstrate the application of my paradigm, I provide three different types of analyses. First, performing GIS analysis on my research data, I produce a series of maps documenting the growth of New Orleans from the French colonial period to the turn of the twentieth century. What is original about these maps is they consider areas used by marginalized groups often underrepresented in official documents and historical maps. Second, I examine and illustrate the spatial relationship between two variables (city growth and cemeteries) through time. Finally, I address a specific research question about the historical occupation around Bayou St. John to explain discrepancies between archaeological, historical, and environmental datasets.
Why did I select New Orleans as my case study? Founded in 1718, the city has a rich and complex history. Yet, modern urban challenges and the rapid pace of urbanization—in particular the intense urban renewal that has ensued since Hurricanes Katrina and Rita—are negatively impacting the New Orleans’ archaeological heritage at an unprecedented rate. Since the 2005 hurricanes, the greater New Orleans region has been engaged in one of the largest urban-renewal projects ever undertaken in the United States. In addition, there is no municipal archaeological preservation ordinance, resulting in minimal protections for archaeological resources unless there is federal involvement, as in the case with some recovery funding. Moreover, with parts of the city sitting below sea level, unquestionably the city is flood prone. Threats of hurricanes, intense rainstorms, land subsidence, and sea level rise pose real risks to the city’s heritage. The damages to the city’s archaeological heritage are mounting and future risks are very real. This year marks the city’s tricentennial commemoration; there is no time like the present to apply the urban archaeological supersite paradigm to New Orleans.

To avoid confusion, a few terms warrant definition. When using the word ‘site,’ I am referring to the basic unit of a concentrated activity area that an archaeologist defines spatially. An archaeological site can include an isolated household, village, warehouse, commercial facility, cemetery, planation, etc., but the idea is that there is a discrete area containing features and artifacts. Usually it is up to the recording archaeologist to determine the overall size and boundaries of the site. In an urban context where people are living and working in close proximity, property boundaries usually restricted past activities to a certain footprint. Likewise,

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4 Hurricane Rita struck Louisiana in September of 2005 and re-inundated the city.

5 Archaeologists have a wide variety of opinions regarding the lumping or splitting archaeological features and deposits into discrete ‘sites.’ Often site-boundary guidance comes from the National Park Service or the state historic preservation officers and their staff, who are the keepers of a state’s site files. Typically, the historic city is not documented as a single site/supersite, but rather a combination of numerous sites within the city footprint.
modern property boundaries limit the area available for archaeological excavation in the present. Yet, this often restricts the ways in which one may think about the information contained within this artificial boundary. The supersite or ‘city as the site’ references all of the ‘sites’ in the city together, creating a single, vast, multi-component site. Supersite is the term I prefer when discussing the archaeology of the city as a whole, hence the name of the urban archaeological supersite paradigm. When feasible, I attempt to minimize the usage of the term ‘site’ to avoid confusion with the term supersite and opt instead to use more precise terms such as historic activity areas, archaeological deposits, or locational areas. It should be noted that ‘site’ is the basis of management by state archaeology offices, so some use of the term is unavoidable. In some sections like the discussion about site location analysis and predictive modeling in Chapter 3, it is difficult to circumvent using the term ‘site’ since it so pervasive in the terminology of the subject matter.

**Chapters**

In the remaining six chapters, I provide a detailed explanation of the urban archaeological supersite paradigm. The next chapter provides an overview of pertinent literature to ground the supersite paradigm. As a way to address the mounting pressures on historic cities, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) adopted a set of recommendations for the Historic Urban Landscape (UNESCO 2011, 2013). I situate my research within this broader set of UNESCO recommendations and describe how the supersite paradigm can be used as a means to incorporate archaeology in the urban planning and heritage preservation management processes. I explore the palimpsestic processes that create the urban landscape and the sites archaeologists are interested in studying and preserving. I also discuss
the logistics and specifics unique to working in an urban environment and how those challenges affect the ways in which archaeology has or has not been incorporated into urban planning and management. I will also explore why urban archaeological sites in particular are difficult and time-consuming to locate; too often their discovery is a result of development and happenstance. Lastly, I review the existing literature on the concept of the city as a supersite and I build upon this research to outline my vision of how to conceptualize the urban past archaeologically.

In Chapter 3, I focus on GIS technologies. The chapter includes a synthesis of previous GIS applications used by archaeologists for modeling the location of sites in precolonial and historical archaeology. I argue that my approach is better anchored within HGIS scholarship; I review this literature and its applications for use by historical archaeologists. Additionally, I examine ways archaeologists have looked at New Orleans, using two previous studies that concentrated on predicting the location of archaeological resources with the New Orleans supersite. This chapter ends with an explanation of how I use HGIS to understand past urban landscapes.

All historic cities are unique to their environmental settings, cultural influences, and political histories. Data presented in Chapter 4 reviews the archaeological, historical, geographical, and environmental histories of New Orleans. These histories are integral to applying the supersite paradigm specifically to New Orleans and serve as vital contexts from which to select and evaluate historical and archaeological data to be added to the New Orleans supersite geodatabase. Since my research relies heavily on historical maps, I review the general types of maps made of the city. The discussion includes the aims and roles of the cartographers, what may have been left off a map, and what information maps privileged and trivialized in the past.
Chapter 5 reviews the methods used to create various components of HGIS data. The supersite paradigm is operationalized by using HGIS data within the GIS platform. This includes archival research and the georeferencing process for historical maps, how data were extracted from the historical maps, how the data were organized into temporal and research themes, and how additional historical, archaeological, and environmental data were incorporated into the New Orleans supersite geodatabase.

Chapter 6 contains examples of the efficacy of my approach. I pose three different research questions to demonstrate how the supersite paradigm can be implemented and provide some examples of how to use the New Orleans supersite geodatabase. Finally, Chapter 7 summarizes the results of my research and explores future directions.
Chapter 2. Urban Archaeology in the Historic City

Cities, as concentrated hubs of human activity, deserve extensive attention from archaeologists (Salwen 1978). Urban historical archaeology offers a unique perspective on the lives of past city dwellers, provides tangible and intangible connections to community heritage, and informs us about changes to the historic city experienced through time. During the 1970s and 1980s, American archaeologists began to recognize the significance of urban archaeology. Bert Salwen (1973, 1978) argued that instead of conducting archaeology in the city, archaeologists needed to be doing archaeology of the city. In response to the complexity of archaeological deposits within the city, urban historical archaeology emerged as a specialized field of study. Today urban archaeology represents a range of scholarship addressing increasingly complex research themes.

With the growth of the urban archaeology field, American cities have received considerable attention both in the gray literature of cultural resource management (CRM) and in peer-reviewed publications (Rothschild and Wall 2014). Dedicated compilations have examined the myriad of research avenues available for examining processes within urban settings (Dickens 1982; Mayne and Murray 2001; Mullins and Warner 2008; Rothschild and Wall 2014; Staski 1987; Young 2000). Furthermore, scholars studying the archaeology of American cities have made significant contributions to the understanding the range of human experiences and conditions within urban environment. These topics include, but are in no way limited to, gender and class, ethnicity and race, capitalism, and identity, as well as adaptation and creolization.

Examining urban historical processes through an archaeological lens has been challenging given that urban archaeology is often carried out by a variety of contract and/or academic archaeologists. Multiple scholars and research methods can impede archaeologists’
ability to synthesize multiple archaeological datasets from a particular city in any comprehensive way. Nevertheless, a few scholars have undertaken a more comprehensive approach to examining the archaeology of a specific city. Some notable examples of citywide syntheses include Annapolis (Potter 1994), New York (Cantwell and Wall 2001), Philadelphia (Cotter et al. 1993; Yamin 2008), and St. Augustine (Deagan 1983). At the citywide or macro scale, the archaeology of the city has been examined both as an artifact (Rothschild 1990; Rothschild and Wall 2014) and as a single, multicomponent site (Cantwell and Wall 2001; Cressey 1979, 1985; Cressey and Stephens 1982; Zierden and Reitz 2016; Zierden and Calhoun 1984). It is the latter, single-site concept that I explore in more detail later in this chapter. Building upon this principal concept, I present my interpretation of the single site, which I call the urban archaeological supersite.

First, I frame the need for the urban archaeological supersite paradigm and how it can assist with addressing urban archaeological heritage at risk. Derived from UNSCEO’s concern over urban encroachment and negative impacts to the world’s urban heritage, the Historic Urban Landscape Approach is an overall strategy to deal with the threats to the historic city. In addition to the threats placing the city’s archaeological heritage at risk, there are unique challenges to managing and conducting archaeology in an urban context. I examine these challenges, such as how archaeological deposits are difficult to locate, excavate, and interpret. This discussion includes why we need to understand the particulars of how archaeological resources are formed and potentially impacted (or preserved) through time. This is the palimpsest. Following this discussion, I consider how previous scholars have proposed examining the city as a collective resource, by studying the archaeology of the city. This is where I will present previous research
into the supersite and related concepts. I conclude this chapter by explaining in detail the urban archaeological supersite paradigm

**The Historic Urban Landscape Approach**

As of 2013, there were more than 250 historic cities included in UNESCO’s World Heritage List; these represent the largest resource theme on the list (UNESCO 2013). At the beginning of the twenty-first century, UNESCO acknowledged the mounting pressures on historic cities. These pressures include urbanization and globalization, development, mass tourism, and the environment. As a result, UNSECO sponsored an initiative to develop recommendations to conserve the Historic Urban Landscape and outline an approach for integrating the preservation of urban heritage into urban development decision-making. The Historic Urban Landscape comprises not only the historical structures and objects in a city, but also other aspects of the broader landscape such as cultural practices, social values and traditions, infrastructure, topography and environment, geology, and land-use patterns. Thus, the Historic Urban Landscape represents the historic layering and co-mingling of these cultural and natural values and attributes over time.

The term Historic Urban Landscape has roots in the landscape concept first pioneered by geographers. Influenced by the ideas from other disciplines, some of those engaged in urban designing, planning, and management fields adopted a landscape approach to their work (Bandarin 2015; Sonkoly 2012). Landscape urbanism emerged in the twenty-first century as an approach to urban design that takes into account natural, physical, and social contexts that could include input from multiple disciplines. While these different disciplines include natural sciences and some social sciences, it is only recently that there has been movement to
incorporate the field of urban heritage conservation (often called historic preservation in the United States). Likewise, urban heritage conservation/urban historic preservation evolved to include not only the physical environment comprised of historical buildings, ruins, and monuments, but past and present-day community meanings and values ascribed to urban spaces as well. Currently, both the landscape urbanism and preservation fields incorporate a holistic consideration of the various components that comprise the Historic Urban Landscape.

Incorporating this holistic idea of the urban landscape, the Historic Urban Landscape Approach is a way to consider and support the management and conservation of cultural heritage in a rapidly changing urban setting. The Historic Urban Landscape Approach acknowledges the complexity of urbanity, including both tangible and intangible historical resources, and cultural and social values. One goal of the approach is to incorporate cultural, environmental, and social concerns with urban development planning and implementation. The approach acknowledges that historic preservation does not have to be perceived as being in direct conflict with economic development and modernization. Instead, it attempts to address urban challenges by encouraging participation and integration from a variety of interests and expertise.

The Historic Urban Landscape Approach recognizes several key concepts: 1) historic cities are important in the past and in contemporary times; 2) historic cities possess cultural and heritage values and traditions for a variety of stakeholders and in a myriad of cultural contexts; 3) mobility and development pressures on the historic city and the need to adapt the city for contemporary living; 4) urban heritage is an economic generator; 5) modernization and historic preservation can be complimentary forces; they are not necessarily conflicting needs; and 6) there can be a framework that incorporates urban needs and concerns with urban heritage preservation.
To put the Historic Urban Landscape Approach into action, UNESCO outlined seven steps:

1. Undertake a full assessment of the city’s natural, cultural and human resources;
2. Use participatory planning and stakeholder consultations to decide on conservation aims and actions;
3. Assess the vulnerability of urban heritage to socio-economic pressures and impacts of climate change;
4. Integrate urban heritage values and their vulnerability status into a wider framework of city development;
5. Prioritize policies and actions for conservation and development, including good stewardship;
6. Establish the appropriate (public-private) partnerships and local management frameworks;
7. Develop mechanisms for the coordination of the various activities between different actors (UNESCO 2013:16).

The Historic Urban Landscape Approach and Archaeology

Clearly, there are advantages to using the Historic Urban Landscape Approach; it was developed explicitly to incorporate heritage preservation into public-policy planning.

Unfortunately, however, in the supporting literature outlining the history and the need for such an approach, archaeological heritage is relegated to just a few, brief mentions. Archaeology is not highlighted as a vital and threatened resource that can illuminate multiple cultural histories in the city through the examination of material remains (Bandarin and Oers 2012; UNESCO 2011, 2013; Williams 2015). In their follow-up edited volume about the Historic Urban Landscape, Bandarin and von Oers (2015) remedy this omission by including Tim Williams’ (2015) chapter on archaeology. This much-needed addition clarified the potential contribution archaeology can make to interpreting the historic city within the Historic Urban Landscape Approach. Yet, Williams acknowledged that public, private, and civic stakeholders still need to be convinced to include archaeology.
Drawing from the goals of the Historic Urban Landscape Approach, I argue that not only should archaeology be a prominent contributor to the historic preservation discipline, archaeology’s significance needs to be featured in the planning process. It is a common misconception by the public that archaeology’s primary goal is the recovery of artifacts without regard to spatial context. Archaeologists need to do a better job of conveying the goals and benefits of archaeology and illustrating how the archaeological record contributes to understanding past histories and community heritage. Additionally, urban archaeology can show how people in the past successfully (or unsuccessfully) responded to past urban challenges such as climate change, urbanization, and sustainability. The irony of urban development and the lengthy occupation of historic cities is these processes can create and preserve, as well as destroy, sites. The Historic Urban Landscape Approach even applies the concept of layering over time, almost like a stratigraphy or palimpsest, to describe the complexity of urban landscape production and the interweaving of cultural and natural values. Therefore, it seems archaeology is essential to unpacking and exploring the layering of the physical and material landscape through time and has much to offer in understanding and informing various interest groups. If archaeology is well suited to explore, examine, comprehend, and contribute to understanding urban phenomena, it is critical that archaeology be a part of this planning dialogue.

Challenges Discovering and Excavating the Urban Archaeological Supersite

Over the last several decades, the study of urban archaeology has become an important contributor to the field of historical archaeology. However, there are challenges unique to urban archaeology. These challenges affect the way in which archaeological deposits are discovered,
managed, and protected. While not completely universal, these circumstances and issues apply to most historic cities, including New Orleans.

One of the biggest challenges is that archaeological deposits lie beneath the active cityscape. Urban development can be very destructive to the archaeological record, especially more recent construction. The infrastructure used to support urbanity results in an increased number of transportation corridors, utility lines, and municipal services. Building codes and regulations may require substantial foundations and piles, retention walls and sheet pilings, storm water drainage and retention systems, and/or deep and wide trenching for pipe installation, all which could result in deep excavation, which could inadvertently disturb archaeological deposits. Nevertheless, the practice of archaeology has proven there are a surprising number of intact features below the cityscape that have not been disturbed or destroyed by urban development.

Population density is a central characteristic of cities and can affect urban archaeology in two ways. First, to accommodate increasing populations, land was often divided into smaller parcels. Within a single city block, there can be numerous lots with multiple property-owners. Numerous parcels, often in private ownership, make systematic archaeological survey on a large scale problematic since obtaining permission to investigate each individual property might be difficult. Second, changes in urban density can affect the value of property. Changes in land values can affect the use and the function of a property. As a result, changes to land values, parcel size, property functions, and population density can manifest in the archaeological record.

Continually living in the same location generates urban deposits which can be complex and deeply buried. As discussed below, the palimpsestic nature of city building involves both the construction and erasure of buildings and urban landscapes. As a result, persistent settlement over the course of hundreds or even thousands of years tends to produce deeply stratified
deposits. Urban processes such as landfilling can bury earlier sites like abandoned roads, wharfs, and watercraft. Thus, many urban sites resemble a jigsaw puzzle of filling episodes, features, and deposits.

Access to these deposits can be difficult. Buildings and hard surfaces, such as streets and parking lots, cover large portions of the urban environment. Until these surfaces are removed, it is difficult for archaeologists to know if intact archaeological deposits lie underneath. While in some cases, buildings and paved surfaces can protect archaeological data from disturbance, these must be removed for access to the deposits and features buried below. Therefore, the removal of interior building floors or tearing up of streets is sometimes necessary. Once hard surfaces are removed, archaeological testing is restricted to locations where the soil is exposed. Sometimes, the site can be crisscrossed with active utility lines that archaeologists must work around. Furthermore, surface removal and resurfacing post-excavation can be time consuming and can increase the cost of archaeological investigation.

Urban archaeology can also have increased costs once access to the deposits has been attained (Rothschild and Wall 2014). In the field, excavating and interpreting complex deposits can be time consuming. Living in cities provided increased access to goods and material culture. Consequently, urban archaeology produces large volumes of artifacts, which can take enormous efforts to collect, analyze, and curate. Furthermore, the availability of historical records in urban contexts means historical background research necessary to contextualize a resource might be laborious. Time and cost pressures can affect the cost and quality of the archaeology, including the amount of time and resources to complete fieldwork, research, analysis, and interpretation. Lastly, operating and housing costs are usually higher working in the city versus a rural setting.
Then there are the practical challenges of working in a living city. Although there is generally access to indoor plumbing and a variety of dining choices, problems such as parking, equipment logistics, and other urban nuisances prevail. Urban projects can attract a good deal of attention. Daily public interaction is an excellent way to engage interested citizens, attract positive publicity for archaeology, and even foster meaningful community engagement. However, intensive public interaction and visitation at a site can take time away from project tasks. Thus, urban projects should consider a specific plan to practice public archaeology. However, public attention may cause its own problems. Although looting can be a problem at any type of site, it is difficult to conceal site discovery in a heavily populated environment. For certain projects, fencing and/or site security are necessary to keep the public safe, as well as the site and the crew protected. While there is often a genuine public interest in urban archaeology, not everyone will perceive excavations favorably. Projects can be disruptive to the community and draw the ire of some citizens. Similarly, controversial construction development can cast an urban archaeological project in a negative light. However, in the right context, certain projects can generate positive engagement with the community.

Finally, too often urban archaeological excavation is opportunistic and reactionary. The opportunity to investigate sites in the city is often driven by redevelopment factors and accidental discoveries, rather than by archaeological research questions. Consequently, archaeology of most urban cities in the United States is not dictated by a purposeful archaeological research design. Pamela Cressey (1979:205) called this a “crisis approach” to urban archaeology stating:

By investing large amounts of time and funds in the mitigation of endangered sites without knowing the full range and quantities of sites within the urban environment, the long-term goals of comprehensive conservation are jeopardized. Thus, the individual sites project serves neither the goals of systematic research nor conservation and management.
There are other disadvantages to this reactionary approach to urban archaeology. Having to mobilize quickly when sites are inadvertently discovered or when last-minute monitoring is needed leaves little time to conduct historical research prior to the commencement of fieldwork. Depending on the archaeologist(s) involved, quick decisions about the value of a site and whether to conduct mitigation might be made without a full consideration of larger management strategies, including how a particular site should be contextualized in the large urban environment; decisions are also made without input from community stakeholders. As discussed above, the Historic Urban Landscape Approach—while more broadly focused—attempts to address this particular challenge by incorporating historic preservation and archaeology in longer-range planning initiatives so urban archaeology is less reactive to last minute discoveries.

**Palimpsest: Urbanization and the Process of Creating the Supersite**

Cities have never been static. The Historic Urban Landscape Approach recognizes the complexity and dynamic nature of historic cities as they developed over time. Often cities experienced punctuated periods of growth and decline as natural elements and human behavior reshaped the urban landscape (Smith 2014). Most of this morphogenesis is a result of the changing needs of society. The idea of the historic city is therefore a moving target, for what was once ‘modern’ will soon be ‘historical.’ As the city evolves, elements are constructed, then altered, removed, or abandoned. The process of urbanization leaves behind material evidence of previous city landscapes hidden under more recent layers of the contemporary city. Thus, like a palimpsest, faint traces of past cityscapes remain.

The traditional definition of palimpsest refers to a material used for writing—often parchment—where an earlier text has been removed and new text has been written (Merriam-
Webster 2018). However, even though the parchment has been reused, faint traces of the previous text remain. The definition of palimpsest has expanded to represent a metaphor in a myriad of disciplines and can be an appropriate way to articulate a complex layering process. It is easy to see the appeal of applying the word to convey the complex urbanization processes operating in an historic urban context (Bandarin 2015)

The palimpsestic nature of urbanization both creates and destroys the archaeological record. And it can help explain why archaeological deposits and lost landscapes are hard to see from the modern streetscape and are difficult to discover hidden underground. As the city cycles through redevelopment and rebuilding phases, the process leaves behind manifestations of the city’s former appearance and the remains of past human activities. These remnants and remains are erased or buried; they only become visible when archaeological or historical research unearths the information.

Not only is “palimpsestic” appropriate to describe the urbanization processes in a historic city, the term befits archaeology as well. Given the inherent meaning of the word, it is easy to see archaeologists’ attraction to the term (for an overview of how archaeologists have engaged with palimpsests see Bailey 2007; Lucas 2012). Archaeology is well-suited to examining the city through time (comparing things across time is a strength of archaeology). Urban locations can contain deeply stratified deposits representing both continuous occupation and/or abandonment and subsequent reuse of an area through time. A crucial part of archaeology is excavating and interpreting this stratigraphy. However, in order to examine archaeological deposits, archaeologists have to be able to locate them. In the next chapter, I present an overview of ways archaeologists have tackled this dilemma.
Toward a More Cohesive Archaeological Understanding of the Historic City

When urban archaeology first emerged as a specific field of study, a few scholars (Cressey 1979; Dickens and Crimmins 1982; Salwen 1982) advocated for studying the archaeology of the historic city as one immense archaeological site—what I have defined as the supersite. In response, Cressey (1979) noted that there was no framework from which to study the behavioral patterns within the city as a whole. If archaeologists were to examine the city as a single archaeological site, they needed a citywide research design. Using Alexandria, Virginia, as a case study, Cressey and her colleagues outlined the Alexandria city-site approach as a means to address anthropological research questions at a citywide scale and a means to integrate sound decision-making policies to avoid a crisis approach to managing urban archaeology (Cressey 1985; Cressey and Stephens 1982; Cressey et al. 1982). Their city-site approach was predicated on the need to have a well-developed research design specific for the urban environment under examination. Underpinning of all the Alexandria work was the idea that the city-site functioned as an integrated system and that all individual archaeological projects needed to be examined within the context of the larger city. With this research design in place, researchers could survey for and examine settlement and behavioral patterns via archaeological data within the city as a whole.

As part of the Alexandria city-site approach, Cressey and Stephens’s (1982) focused on recognizing and examining urban patterns and processes. They attempted to model residential settlement for various socioeconomic and ethnic households through space and time with the goal of examining material (artifact) and layout (spatial) patterns. Viewing Alexandria as a city-site meant various sections of the urban settlement were all tied to the city-site in terms of spatial
and socioeconomic organization, which included core, semi-periphery, and periphery areas. The program initiated a four-phased research strategy:

- **Phase I:** a citywide archival survey to understand land-use and socio-economic groups occupying the city;

- **Phase II:** residential archaeological testing to glean household patterns in the archaeological record;

- **Phase III:** contemporary survey looking at current land-use, as well as the accessibility to and possible disturbance of the archaeological record;

- **Phase IV:** a comprehensive neighborhood survey to provide information to contextualize areas of archaeological and community interest.

At the time of publication, implementation of the strategy was still in progress. However, future archaeology research, led to recognizing the significant contributions African-Americans made to the history of Alexandria (Cressey 1985).

Discussing the ideal urban archaeology program, Cressey and her colleagues concentrated on the initial founding years of the Alexandria Archaeology Program. Therefore, much of their research-design framework was most applicable for those who had or were establishing an urban archaeology program. Today, many long-standing urban programs have either a university-supported program or operate at a municipal level supported by an archaeological preservation ordinance. There are several advantages to integrated urban research designs operating under the auspices of an urban archaeology program. The archaeological research has established research protocols. As a result, the collection of data was/will be consistent and in the same format. Once collected, the overarching management and storage of data are processed and handled in similar systems. This makes comparisons of archaeological
data and the search for patterns and processes simpler (a major goal within historical archaeological scholarship at the time of the Alexandria study). Decision-making, both at the mitigation and planning levels, is easier when all the data available is known and previously synthesized.

In addition to Cressey and her Alexandria colleagues, other archaeologists have generally approached urban archaeology as the examination of the city at the macro scale, as one large site, including Charleston (Zierden and Reitz 2016; Zierden and Calhoun 1984), New York (Cantwell and Wall 2001), and Florida’s non-colonial historic cities (Weisman and Collins 2004). Envisioning the city as a site moves beyond studying archaeological loci within the city in isolation at the individual level, and instead places loci within the larger, holistic context. In other words, these authors encouraged archaeologists to examine the city as an integrated system rather than examining individual sites in a vacuum. In Charleston, Zierden and Calhoun (1984) created an archaeological preservation plan for the city. Inspired by the work in Alexandria, they outlined the history of Charleston and posed research questions for future archaeological research. Of note was their heavily reliance on archival sources, including historical maps, to outline broad patterns of urban growth and archaeological potential. Weisman and Collins (2004) recognized the problems with the ‘site’ definition in the urban setting and advocated for improved methods and research design for conducting urban archaeology. Their case study in Tampa, Florida, was limited in size and scale to a city park. The project focused on methods to identify rapidly urban archaeological deposits and argued for a new model for how these deposit should be evaluated under federal legislation parameters. These scholars produced valuable scholarly research, but refrained from outlining a specific framework for implementing the city-site concept in as much detail as those affiliated with Alexandria Archaeology Program.
The goal of incorporating citywide research designs could work well operating within an established urban research program at a university, at the municipal level, or even within the confines of a large-scale project. While an established program or well-supported, large-scale urban project is ideal to foster a greater archaeological understanding of a city, this is often not the reality for many historic cities. In historic cities that do not fit these examples, there can be multiple stakeholders and practitioners and/or no established organization spearheading archaeological research efforts. Small-scale CRM projects may not be able to afford the time or have the funds available to develop an encompassing research design for minor projects, especially in the case of crisis archaeology. This raises many unaddressed questions and concerns: In the absence of a principal urban program, how could multiple groups of archaeologists work together in research, crisis, and regulatory capacities? How can urban archaeology operate where there is not a local archaeology program? If there is no program or organization, how can we link data together to understand the large urban system? Is there a mechanism to implement a citywide research design and bring data together? Without this data collectively linked, how can individuals and/or groups make meaningful regulatory and management decisions? I offer the urban archaeological supersite paradigm as a possible solution.

The Alexandria city-site approach characterized an overall strategy or research design that could allow for the integration of data from various sites to examine urban processes. Despite various methods and approaches, the research presented above all have underlying notion of the entire city as the ultimate focus of inquiry. Cressey and her colleagues’ work was an advancement in the urban archaeology field for the time period, and was appropriate when starting an urban archaeology program and initial work within a city. My research and supersite
paradigm updates the Cressey’s “city as a site” concept for the twenty-first century by building on advancements in the urban archaeology field and using new GIS technology. In the next section, I build upon key concepts from Cressey and her colleagues’ work. I demonstrate the urban archaeological supersite paradigm by applying my concept with respect to New Orleans.

**Conceptualizing the City’s Archaeology via the Urban Archaeological Supersite Paradigm**

As briefly outlined in the previous chapter, there are many merits to envisioning the historic city as an urban archaeological supersite. First, examining archaeological resources as a part of an integrated system or supersite allows for an overall research design for the archaeology of the city. Situating individual deposits as part of a larger urban system provides a means to study the evolution of the city and urban development processes through time. Likewise, the supersite concept affords opportunities to link research themes spatially and temporally. The object of study becomes the city as a whole, rather than a series of discrete properties. All the data builds toward an improved understanding of the city.

In addition to examining processes and research themes, an important advantage of the supersite concept is the ability to connect loci within an urban setting, making all archaeologically derived data relevant. The holistic approach links small nuggets of archaeological data and adds them to a larger, cumulative body of research. Minor bits of data can be in two general forms: work generated from a limited sample size, and projects that gather and recover seeming nominal information (i.e., dearth of artifacts and features). For example, when assessing the impacts of development projects, additional archaeological testing beyond the footprint of construction may be considered outside the scope of review and therefore not permissible. In these situations, one may only get to sample and record a portion of a feature or
monitor a skinny, linear trench. In isolation, these small samples of past urban activity may not
provide much information on their own. However, if these are examined at a neighborhood or
city scale rather than at a property scale, they provide a more comprehensive picture of past
urban activity and land use. This means that even an isolated deposit or the absence of
archaeological material can contribute to the understanding of the historic city. Similarly, this
can give value to archaeological data that is restricted in size or documented in an area that did
not appear to have had heavy use in the past. Too often archaeologists have overlooked
resources that produced a limited number of artifacts or features, perceiving these small or
ephemeral occupations as lacking the ability to yield significant information about the past. Yet,
these resources too can provide insight to important patterns and observations in the
archaeological record. Sometimes areas that seem ephemeral archaeologically, could be
associated with short-term occupations by marginalized and fringe communities. By
overlooking these transient areas one might be disregarding the same groups of people that
archaeology is best suited to examine. The supersite paradigm aims to address this problem by
accounting for all archaeological data in combination with other historical and environmental
information available for synthesis even when cultural material and features are limited. The
goal is to make these types of deposits less likely to be overlooked in the future.

Another way to think about linking individual sets of archaeological data is the *tout ensemble* concept use in historic preservation. Which is to say it is not the individual resource,
but the collective whole that gives the city its character and value. Using the National Register
of Historic Places (NRHP) vocabulary, historic districts refer to a group of things (i.e., sites,
buildings, structures, or objects) that form a concentration or connection. For the built
environment, this most often refers to a collection of historic buildings, that when taken together,
contribute to a neighborhood-level historic district. While some individual buildings that contribute to the historic district could be individually eligible for inclusion in the NRHP, many contributing buildings do not meet the criteria of individual NRHP eligibility on their own. That is to say: not every building in a historic district is individually eligible for the National Register. However collectively, the contributing buildings hold value as an assemblage. So why, in urban settings, are archaeological resources so often evaluated separately as disjointed features, essentially isolated from their urban archaeological supersite context? For example, instead of evaluating the NRHP eligibility of features within a single house lot, it might make more sense to assess the archaeological deposits from the entire block or neighborhood together as contributors to a district. In historic cities, I argue archaeologists should stop assessing archaeological ‘sites’ on an individual basis. Instead, think of them more like contributors to a large archaeological district (or supersite) on the scale of the entire historic city by concentrating on what information, important to understanding the historic city, each archaeological resource can yield. This approach is more holistic and allows discrete deposits, isolated features, and small snippets of archaeological data to contribute to the study of the urban experience.

Furthermore, treating the city as an urban archaeological supersite is easier from a management and planning standpoint. It conveys the notion that urban archaeological resources make up a system, and thus, should be managed just like any other urban infrastructure or resource. Government agencies, boards, and industries manage roads, utilities, parks and many other classes of features as large systems, not as individual elements like a single water line, park bench, fire hydrant, or catch basin. Rather, it is the infrastructure system that is managed. So when it comes to managing and planning, why are archaeological resources all too often regarded individually, disassociated from other archaeological deposits within the entire city? If
the city’s archaeological heritage is perceived as another ‘system’ or a component of the historic urban environment, then it is more likely to be incorporated into urban planning at all levels, just like public works, for example.

Additionally, recognizing the city as a supersite, rather than a series of isolated locations, features, and deposits, aligns more closely with established heritage and urban planning models, which is effective for incorporating archaeology into the planning process and can help engage communities to value their archaeological heritage. A holistic view helps decision-makers—who most often are not archaeologists—and the public understand the overall significance of archaeology and what it collectively can reveal about the lifeways of historic communities. The idea of a supersite can shift the focus away from people assuming the goal of archaeology is recover artifacts, and place the attention on how archaeological deposits provide knowledge about the urban past.

The supersite concept is one essential component of the paradigm. Another component is placing an emphasis on examining and interpreting the archaeological record in relationship to other forces and elements in the urban past. It shifts the emphasis of archaeological efforts away from determining if there maybe archaeological deposits and features, and places the attention on understanding when and what types of past urban activities occurred at specific locations. Thus, in an urban environment, it is imperative that we view the city as a supersite with discrete areas of prolonged or brief occupation intervals.

It is rare to excavate in New Orleans and not find some type of artifact (including broken brick, concrete, or other construction material) or soil deposits that reflect human land use and modification (e.g., fill). While additional testing might not be required for locations with construction fill or very few artifacts, these locations are archaeological resources because they
produced evidence of past human activity and can contribute to our understanding of the urban past. As such, these archaeological resources should be considered a part of the supersite.

Since the archaeological record is a palimpsest, the use of a particular location likely changed through time. One way to read the palimpsest is via HGIS, which can link urban historical spatial and temporal data together. A strength of GIS technology is the ability of researchers to compile large amounts of data and relate the data spatially. More specifically, HGIS scholarship combines historical data in GIS to examine spatial relationships in the past at a single point in time, as well as through time. Cities generally have abundant historical documents—particularly historical maps, plans, surveys, and drawings—that outline developments through time. Detailed maps can be georeferenced to provide a visual overview of a city’s layout; archaeologists can correlate map details with specific material features of the past. Digitizing and assembling historical maps and archaeological data together using HGIS can provide archaeologists with a better understanding of the continual reuse of space in an evolving urban setting, identify the probable location of urban archaeological deposits, and serve as a valuable research tool for those interested in understanding New Orleans’ past.

My research was accomplished in two broad phases. The first phase was to create the New Orleans supersite geodatabase. This consisted of archival research at regional and digital archives; the selection of appropriate cartographic material; and the transformation of archival material into digital GIS data via georeferencing. Most urban HGIS scholarship involved the use of quantitative data such as census information (discussed in more detail in Chapter 3). While there is a growing numerous of studies, especially on a national scale, that have compiled and georeferenced historical maps, few involved the number that I have incorporated in this study, especially with an explicit goal for understanding urban archaeological heritage. Although they
are more difficult to work with and extract data from in a GIS platform, historical maps provide a visualization of space in the urban past unlike other historical records. Furthermore, I also utilize data extracted from the maps to understand how past human activity may be reflected in the material remains still buried in the ground. I do this by establishing various research themes based on data pictured in historical maps. For example, this could include various types of transportation corridors and support features associated with different modes of transit. The second phase of my research entails digitizing features from the historical maps into vector data, commonly called shape files. Organized by research themes, these shape files consist of polygon vector objects (i.e., polygons) and corresponding attribute information organized into tables. Thus, these temporal and research themes can be used to understand, correlate, and visualize the relationship of urban elements and they can be used as clues to identify the age and function of archaeological deposits. Vector data created from historical maps are combined with additional archaeological data in GIS to identify areas of archaeological interest within the urban landscape. Thus, the final New Orleans supersite geodatabase includes a raster geodatabase of georeferenced historical maps, a vector geodatabase of data extracted from the historical maps and combined with relevant archaeology and environmental data, and a synthesis of areas of archaeological interest. Once assembled, I use HGIS to analyze and ask historic research questions/perform geospatial analysis.

The urban archaeological supersite paradigm is not contingent on conducting new archaeological survey, as some of the other city-site models have included. Instead, it links a combination of existing archaeological, historical, and environmental data spatially in a new way. By conducting locational analysis in a GIS platform, my method does not require
landowner permissions, excavation, artifact analysis, curation, space, and a large staff for all the field and lab work. My approach is more suited to twenty-first-century scholarship.

Finally, historical archaeology has positioned itself as a discipline that is uniquely suited to examine the lives of those marginalized in dominant societies, who are underrepresented in the historical record. Since part of my geodatabase places a heavy reliance on the use of historical maps to interpret the age and function of activity areas in the supersite, how can I rationalize using these maps without reproducing the same dominate narratives those documents reflect? I address this deficiency by relying on archaeological and other environmental information, as well as creating buffer zones that extend the area of historical development beyond the core area of urban settlement. The buffer analysis, in combination with conceptualizing the entire landscape as part of the urban archaeological supersite, can avoid overlooking locations historically marginalized groups may have occupied.

*Incorporating the Supersite Paradigm with the Historic Urban Landscape Approach*

Both the Historic Urban Landscape Approach and the urban archaeological supersite paradigm aim to protect the historic city against modern threats. The supersite paradigm can be used to help achieve some of the steps outlined for Historic Urban Landscape Approach implementation. The first recommendation for operationalizing the Historic Urban Landscape Approach calls for conducting “comprehensive surveys and mapping of the city’s natural, cultural, and human resources” (UNESCO 2011:3). The geodatabase provides a framework for current knowledge and for the results of future fieldwork, which can help manage archaeological resources. The process of making an inventory is challenging, especially when you cannot readily observe the resources because they are often hidden below the surface of the cityscape.
To address this challenge and help ‘inventory’ the resources, the paradigm has already located the supersite. It helps one assess the ages and types of urban archaeological resources and it places the attention more on the cultural and research value that archaeological examination could provide about various resources in the city. Furthermore, the supersite paradigm can be used to develop ways to highlight and address archaeological heritage at risk. All of these uses are a critical to “integrating urban heritage values and their vulnerability status into a wider framework of city development” (UNESCO 2011:3)

**Conclusion**

This chapter summarized the immense value of the holistic, supersite concept. The urban archaeological supersite paradigm provides a framework for incorporating discrete activity areas and deposits in the urban environment into an HGIS geodatabase. As I will demonstrate in Chapter 6, the geodatabase allows one to appreciate the relationship of archaeological resources in one or more levels connected through either location or function woven together in a complex web across space and time. My paradigm can expand our ability to think about not just the likelihood of encountering some type of subsurface archaeological deposits. The objective becomes to refine the approximate age and distribution of deposits, as well as the multiple uses for a property over time. This information can then be used to move forward in evaluating a deposit’s potential to address research questions about New Orleans’ past and then determine the necessary action needed to protect it.

To examine urban processes operating within the city, in addition to managing and protecting urban archaeological data, we need to understand past urban land-use. This can include the locations of past activity in the historic city, the functions and types of activities, and
what time period they date to. In the next chapter, I review ways archaeologists have used site location analysis to understand human settlement patterns, including studies specifically focused on New Orleans. The chapter also provides a brief overview of other GIS applications researchers used to examine the past using various historical data. I follow this discussion by synthesizing my approach to understanding past landscapes of the urban supersite in combination with HGIS analysis.
Chapter 3. Using GIS to Examine and Manage the Past

The first step in conceptualizing the city as an archaeological supersite is to identify the material remains of the historic city and the areas of former human activity. One way archaeologists have traditionally identified potential archaeological locations is via traditional predictive or site location models. However, these models are not well suited for urban historical archaeology. The urban environment is a unique type of site—the city—and warrants a new approach. Instead of attempting to model locations that may or may not be conducive to human habitation in the traditional sense, the urban archaeological supersite paradigm stipulates the location of the historic city has already been identified. Within the supersite, however, how can one locate specific areas of past human activity if the palimpsestic nature of urbanization continually creates and obscures the city’s archaeology?

In this chapter, I present my approach to understanding the location of archaeological deposits and activity areas within the urban environment. First, I present an overview of archaeological predictive modeling and the ways archaeologists have engaged with GIS to locate sites. Next, I examine the role of GIS in historical archaeology in general, and the lack of published scholarship specifically addressing GIS use for urban archaeology. Since my research has a heavy reliance on historical documents and cartographical data to examine the historic city of New Orleans, I look beyond archaeology to see how other historical scholarship utilizes GIS. I discuss the merits of HGIS scholarship, its advantages for the urban context, and how it can be used to implement the urban archaeological supersite paradigm. Narrowing the focus to my supersite example, I summarize previous work using archaeological location modeling for New Orleans and I highlight the limitations on modeling within the city. The chapter concludes with a presentation of my approach to archaeological location analysis for the historic city.
Archaeological Site-Location Models and the Power of GIS

Archaeologists were among the first social scientists to apply GIS technologies to research designs (Bodenhamer 2010; Knowles 2008a). Today, the use of GIS and other spatial technologies is the norm for the field (for an overview, see Conolly 2008; Ebert 2004; González-Tennant 2016; Harris 2002; McCoy and Ladefoged 2009). Since GIS enhances one’s ability to perform complex analyses, archaeologists have frequently used GIS for modeling or predicting the location of archaeological sites.6

As the name implies, archaeological site-location modeling is a form of spatial analysis that attempts to predict the location of archaeological sites within a landscape. Commonly referred to as predictive modeling in the literature, it has also been termed probability/probabilistic, correlation, or sensitivity modeling. Modeling predicts where new sites could be located by projecting assumptions or observed patterns about known archaeological sites and past human behavior onto a study area. Modeling is predicated on an underlying assumption that areas of past human use and activity are not distributed randomly across the landscape; instead, environmental and cultural factors influence where humans chose to settle, extract resources, and bury their dead (Warren and Asch 2000).

Predictive modeling predates GIS technologies and first gained attention during the 1970s and 1980s, partly stemming from interests in the New Archaeology. Especially in North American where there are large tracts of unsurveyed land, modeling held promise for efficiently locating and managing archaeological sites. However, the task was often daunting for those unfamiliar with computer programing (for overview of this period see Judge and Sebastian 1988; Kvamme 1995, 2006). Given the ease of manipulating and correlating immense sets of data, the

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6 In this section, the term site follows a more traditional archaeological definition of a discrete area of archaeological activity, usually not in an urban setting.
The introduction of GIS encouraged the use of site-location modeling. In the past two decades, predictive modeling has emerged as a popular avenue of archaeological GIS, resulting in a fair amount of scholarly attention (in particular, Mehrer and Wescott 2006; Wescott and Brandon 2000). While there is a range of diverse methods, site-location modeling can be divided into two main approaches: inductive and deductive (e.g., Ebert 2000; Judge and Sebastian 1988; Kamermans 2000, 2006; van Leusen 1995). An inductive or correlative approach is data-driven and draws from observations about the archaeological record and discernible patterns in human settlement. Usually modeling looks for correlations between known archaeological sites and certain environmental (and sometimes cultural) variables. To accomplish this task, many inductive models use GIS to query for locations with overlapping environmental attributes thought to be conducive for human habitation, such as elevation, relatively flat land surfaces, well-drained and fertile soils, and proximity to fresh water (Church et al. 2000; Kvamme 2006; Warren and Asch 2000). GIS provides a cost-effective and easy way to conduct simplified inductive modeling and, as a result, dominates the field, especially in a CRM context. On the other hand, deductive or explanatory approaches are theory-driven and attempt to understand the physical and social environmental conditions considered important to a particular culture; a settlement pattern is deduced from these important considerations. It is a less common application and requires a full grasp of the study area both culturally and geographically. In reality, most models rely on a combination of both inductively and deductively derived information as theories are generally based on some empirical observations and observations are usually gathered under some form of theoretical scheme (Kvamme 2006; Wheatley and Gillings 2002).
Predictive modeling is not without criticism and does have disadvantages. Disadvantages fall into three broad categories: insufficient data quality; simplification and lack of explanation; and a heavy reliance on environmental variables rather than cultural influences (Church et al. 2000; Ebert 2000; contributors to Judge and Sebastian 1988; Kamermans 2000; Kvamme 2006). First, the most common form of predictive modeling uses inductive approaches, which are based on proxy data. If there are large data gaps or lack of recorded archaeological sites in a study area, it becomes difficult to make meaningful correlations between known site locations and environmental and social variables. Even in situations where there is abundant data, there could be problems regarding the quality of data including its accuracy; biases introduced when gathering data; types of sampling strategies; and the scales at which previous data was collected. Second, there is the notion that modeling lacks explanation and theory, and tends to overgeneralize complex factors that result in human occupation and use of past landscapes. While a model may find correlations between site location and environmental variables, it often falls short in explaining how certain variables relate to each other and to human behavior. Models that attempt to hypothesize and explain are challenging to create, require considerable time investment, and therefore, are often more costly. Finally, many critics claim that there is an inappropriate reliance on environmental factors over cultural ones. This has led some to equate predictive modeling to environmental determinism (e.g., Gaffney and van Leusen 1995). This overdependence is likely due to easily accessible environmental data that already exists in formats suitable for GIS, which can be easy to query for correlations. Moreover, most environmental data usually represents modern conditions; utilizing this data assumes the landscape is static, when in fact past conditions may not reflect present day environments. Experiential and cultural variables—often more qualitative in nature—are more difficult to
account for in a model because they are difficult to categorize, they can be particular to a culture or time period, and they need to be transcribed and consolidated for use in a GIS platform. Some scholars have tackled the challenges of incorporating cultural influences into site-location modeling, most often in conjunction with more deductive approaches (Lock and Harris 2006).

While some models zero in on a particular site type or cultural period, many are created without regard to temporal factors. In other words, some predictive models conflate all 12,000 plus years of human habitation in North America into a single output (e.g., site presence/absence in an area). Balla and colleagues (2014) reviewed the previous ten years of predictive modeling research. Recent predictive modeling research has been highlighting the nuances of landscape change over time, as well as cultural factors that affect site selection and land use. Recognizing that both the environment and human culture changes through time, these more recent models concentrated on a specific time period (e.g., Bronze Age) or site type (e.g., burial). However, Bella et al.’s review highlighted the fact that published studies are more prevalent in Europe than in North American. It is unclear if modeling remains prevalent in contract or CRM archaeology (and is thus buried in grey literature).

Kvamme (2006) argues that, while there are problems with site-location modeling, these are being addressed and modeling still has some benefit. Many practitioners agree predictive modeling is most beneficial within the context of cultural resource management and regulatory compliance (Conolly and Lake 2006; Kuna 2000; Wescott 2006). And, as noted above, it is within a CRM context that site-location modeling is often employed, because it can be efficient and economical when tasked with identifying archaeological sites within a given area. In a practical sense, one outcome of modeling is to concentrate field efforts in areas with the highest probability for site discovery and limit testing in areas with low probability for archaeological
sites (Kvamme 2006; Mehrer and Wescott 2006; Wescott and Brandon 2000). Equally, predictive models can help land managers protect archaeological sites and can be important tools for nonarchaeologists tasked with regulatory compliance, planning, and resource stewardship (Wescott 2006).

Since predictive modeling is most prevalent in CRM, most reports discussing modeling remain buried in gray literature, which raises a concern. Kvamme (2006:4) suggests there has been “lack of innovation” in modeling procedures since much of the funding is focused on application, rather than researching new methods or interpretations that can advance greater archaeological knowledge. Dore and Wandsnider (2006) argue for a different take on predictive modeling in CRM, focusing efforts on modeling the present landscape to predict future impacts to archaeological resources already identified, but there has been scant published research in response.

**Historical Archaeology and GIS**

In comparison to its precolonial counterpart, historical archaeology was slower in adopting GIS. However, since the 2000s, more historical archaeologists are realizing the benefits of GIS scholarship in their research. Edward González-Tennant (2016) recently synthesized the present state of GIS research and application in the field of historical archaeology, grouping current uses into three broad categories: inventory and geospatial database management, mapmaking and data visualization, and geospatial analysis.

Specific efforts to locate unknown historical archaeological sites in the United States via GIS-driven spatial analysis have been fairly limited (for examples see Ford 2007; Madry 2006). When historical site locations have been included as part of a larger modeling research program,
too often these models relied on minimal historical documentation and often correlated transportation corridors with high potential for site location (González-Tennant 2016; Madry 2006). However, there has been some work using document-driven site location models. Examples include one using property deeds to reconstruct the lost landscape of the Rosewood, Florida race riot (González-Tennant 2011), and one combining historical data in GIS to reconstruct land-use patterns in the Danish West Indies (Armstrong et al. 2009).

The practice of historical archaeology regularly draws from historical maps and other documentary resources to identify and interpret archaeological sites (Davidson 1986; Rothschild and Wall 2014). Yet, a perusal of published scholarship, as well as some of the gray literature, reveals there is limited discussion of the use of historical maps in GIS applications in the United States (Madry 2006). This is not to say archaeologists are not using historical maps via GIS in their research. In urban environments, it is fairly routine to georeference a historical map, usually at the block or lot level, for site-specific research projects. However, the use of historical maps at a large scale and a specific discourse about the practice of using maps has received little scholarly attention in published works.

One surprising absence from González-Tennant’s (2016) recent overview of GIS for historical archaeology was the specific mention of HGIS. It is unclear why more historical archaeologists are not contributing to HGIS research, especially when there is clear overlap in source materials and interests in historical inquiry. A review of the literature indicates that there has been limited scholarly attention to modeling archaeological sites in historical contexts and the incorporation of archaeological data in HGIS urban projects. Yet these two areas of study can certainly aid the historical archaeologists studying urban history and are critical to operationalizing the urban archaeological supersite paradigm. As a result, both fields miss out
on each other’s potential contribution to increasing understanding of the past. Therefore, it is paramount that historical archeologists participate in this discussion to introduce not only a unique dataset, but particular avenues of archaeological inquiry.

**Historical GIS (HGIS)**

While many of the archaeological applications of GIS have been focused on contexts prior to A.D. 1500, GIS studies for historical archaeology have seen more development in the twenty-first century as researchers have begun to utilize GIS for historical inquiry under the auspices of Historical GIS scholarship (Knowles 2000, 2002b). The application of GIS to historical research has been linked with the increased use of spatial information in the social sciences and humanities. One reason why HGIS has become popular is the accelerated growth of digital technology, and the way we are interconnected by, and rely on, new technology to probe, question, and improve our world.

Originally defined as a methodology, HGIS is now more diverse and encompasses a range of approaches to study the past spatially, mainly through a GIS platform (Knowles 2000, 2005, 2014). Although the discipline is still growing, many conceptualize HGIS less as a tool and more as a practice, which can lead to theory building, as has begun to happen in other branches of GIS application (Trepal and Lafreniere 2018). The merits of an HGIS approach to research has been outlined in special issues of several journals (including *Social Science History* 2000 and 2011; *Historical Geography* 2001 and 2005) and core works in the field, many of which include various case studies (Gregory and Ell 2007; Gregory and Geddes 2014; Gregory and Healey 2007; Knowles 2002b, 2008b). Several key advantages and some disadvantages of HGIS are summarized below.
HGIS is a framework that involves applying GIS technology to historical questions and data. The power of HGIS lies in its ability to visualize multiple data sources spatially. In the geodatabase environments, large volumes of data can be integrated and organized around geographic locations. The GIS medium provides an innovative way to graphically display, manipulate, and query historical data from numerous sources. GIS functions as a locational database; once assembled, there is no limit to the questions one can ask of the data. Furthermore, new data can be continually added. Moreover, historical research relies heavily on context and HGIS provides a new avenue to contextualize the past using geographic space. Thus, HGIS scholarship can introduce a spatial dynamic to research problems and allows us to explore older questions in new ways.

Additionally, HGIS functions like an umbrella under which scholars from a variety of fields can form interdisciplinary connections for historic scholarship (Knowles 2002a, 2014). GIS allows us to link disjointed pieces of historical information. By using locational data as the bridge, a variety of datasets can be linked together (DeBats and Gregory 2011). This includes the quantitative data so often associated with GIS, and qualitative data as well (e.g., Ray 2002). This data can also include physical geography, or in the case of my own research, archaeological information.

Within a GIS platform, one has the capacity to perform spatial analysis on the information collected in a geodatabase to look for patterns and changing relationships in the past. HGIS can also tie datasets across localities that have endured the same development processes. Using GIS to recognize historical patterns will certainly lead to explanations that can enrich our understanding of the past. Gregory and Healey (2007:650) have stated it is a “moot point” if an explanation is derived through GIS or if the answers come from other methods of historical
analysis. What is important is that we seek to discover and explain the underlying processes responsible for these patterns. By visualizing change and asking spatial questions, HGIS is advancing scholarly interpretations of history.

There are drawbacks to examining historical data and questions with GIS, and there are some limitations within the HGIS field as a whole (DeBats and Gregory 2011; Gregory and Ell 2007; Knowles 2014; Lloyd et al. 2012). From a practical level, HGIS can be time consuming in terms of a technical learning curve needed to master the programs. Building a geodatabase requires significant amounts of time to gather and process information, including researching and collecting data, designing and entering information into a database, and linking data spatially. There are limits to historical data, including inaccuracies and misrepresentations, information gaps and lack of sources, and ensuring comparability of different datasets, but these are issues many face when working with historical documents in any context. Then there is the difficulty of visually analyzing data within a spatio-temporal context (Gregory and Knowles 2011).

Nevertheless, enough researchers have demonstrated the benefits and potential of HGIS to make it a worthwhile endeavor and, as HGIS research expands, many of the drawbacks and conceptual issues are receiving attention (Gregory and Geddes 2014; Gregory and Healey 2007; Knowles 2014; von Lunen and Travis 2013).

 HGIS scholars have included a wide array of subjects and source material in their research. Projects have effectively used both quantitative and qualitative data; census enumerations and public records, environmental and land-use surveys, and transportation data have dominated the published research. However, the use of historical maps in HGIS scholarship has been surprisingly limited, especially since historical cartography has played an important role in exploring and understanding the past (Southall 2013). Scanning,
georectification, and digitizing historical maps with GIS technology hold great potential for examining and comparing these maps in new ways (Gregory 2005; Rumsey and Punt 2004; Rumsey and Williams 2002). Despite the allure of historical maps, however, this task can be daunting. There can be difficulty in obtaining digital scans of historical maps, as well as challenges associated with accurately georeferencing cartographic material in a GIS platform. Additionally, there may be issues obtaining permission to use copyrighted material, especially if one want to share the HGIS data or distribute it on the web (Southall 2013). As a result, the incorporation of historical maps in HGIS research has been modest, but is growing (for examples see contributors to Working Digitally with Historical Maps guest edited by Southall 2013).

Moreover, HGIS has been done at a number of scales. Numerous countries have sponsored national HGIS projects; the include the United States National Historic GIS, the Great Britain Historical GIS, and the China Historical GIS, to promote research7 (Bol 2008; Fitch and Ruggles 2003; Knowles 2008a; McMaster et al. 2005). Similarly, metropolitan areas are attractive research topics and, arguably, urban history is where HGIS has contributed the most to understanding the past (DeBats and Gregory 2011). For example, projects such as Siebert’s (2000) Tokyo and Emory Libraries’ Re-Mapping Segregated Atlanta (Page et al. 2013) examine the development of a city over space and time. Other notable examples of city projects include Sydney (Wilson 2001), Philadelphia8 (Hillier 2002), St. Louis (Gordon 2008), Montreal9 (Dufaux and Olson 2014; Gilliland and Olson 2003), and London (Davies 2012; Hitchcock et al. 2011).

8 www.philageohistory.org.
9 www.mun.ca/mapm/.
Historic cities have proven to be popular research topics for HGIS scholars. Urban environments are appealing because they usually have a vast array of archival materials detailing aspects of urban history (DeBats and Gregory 2011; Gregory and Healey 2007). Examples of these materials include historical maps, census enumerations, city directories, and building and survey data, just to name a few.

Clearly, HGIS scholarship is playing a key role in addressing urban historical research problems. At a simple level, HGIS allows us to more easily visualize geographic and physical configurations in the cityscape and to understand if they maintain continuity or change significantly through time (Gregory and Ell 2007). HGIS can also be used to examine social and cultural patterning in the urban landscape, and to determine if, and how, these patterns are replicated across time and space (e.g., Beveridge 2002). Armed with the recognition of changes in urban environment, scholars are searching for explanations and asking questions about the relationship of these changes to other social and economic factors within the urban system. Popular research topics have included investigating the role of race, ethnicity, and social inequality in US cities and the intersection of social, economic, and political life (Diamond and Bodenhamer 2001; Gordon 2008; Hillier 2002; Page et al. 2013). Several of these studies have questioned previous assumptions about changes in a community’s population and/or the social and economic processes responsible for such changes.

Many large-scale city HGIS projects bring together and rely on a large research teams. However, urban archaeologists are usually not part of these research teams. But they should be included. Lloyd and colleagues (2012) have advocated for incorporating archaeological data in HGIS geodatabases to examine urban history and there have been a few examples (Hitchcock et al. 2011; Lilley et al. 2005). Archaeology and HGIS scholarly research clearly demonstrates
important GIS applications for understanding the past. What follows is a review of previous efforts to model archaeological-site location in New Orleans.

**Previous Archaeological Modeling in New Orleans**

Since 1987, there have been occasional calls to utilize historical map overlays to suggest areas of past settlement in the greater New Orleans area (Dawdy 1996; Goodwin et al. 1987). As a result, two studies were completed that attempted to model archaeological site location in New Orleans. The first effort, entitled *New Orleans is Looking Forward to Its Past*, was a small-scale study and occurred prior to the mainstream use of GIS technology (Goodwin et al. 1987). The second effort was in 2005, when State Historic Preservation Officer (SHPO) staff and the Federal Emergency Management Agency (FEMA) staff quickly created a probability model to assist with post-Katrina disaster recovery.

*Goodwin’s Pre-Katrina Archaeological Modeling: New Orleans is Looking Forward to Its Past*

In the 1980s, the Louisiana Division of Archaeology engaged R. Christopher Goodwin and Associates, Inc. to undertake a New Orleans survey and planning project concentrated on three of the oldest urban areas, namely the French Quarter and the two neighborhoods or faubourgs that bounded it on the up and down river sides (Goodwin et al. 1987). One main goal of the study to identify areas in the historic core of the city with the greatest likelihood to have archaeological deposits and to determine what socio-economic groups might be associated with these resources. Researchers drew from historical data, but also took into account both land-use activities that could have destroyed archaeological deposits in the past as well as anticipated land
uses in the future. Much of the mapmaking was done the old-fashioned way—transparencies and colored pencils.

The study produced two types of archaeological maps: 1) a series of maps created for four time periods depicting potential archaeological deposits based on site function (e.g., what the study called classes, like residential, military, government, commercial), and socioeconomic-group affiliation and 2) one composite map suggesting areas of archeological sensitivity, which was not broken down by time periods. One concept presented in the research, which is similar to my study was the ability to refine the age of sites and determine the types of sites one could anticipate within three historic neighborhoods. The Goodwin model refined the age of sites by stratifying sites chronologically and creating a series of maps for each time period. The study also placed importance or “historic value ranking” on socio-economic groups that could be represented by undiscovered archaeological resources. This ranking system looked at 15 different groups (e.g., Germans, Merchants, Free People of Color, Isleños, Clergy) and five criteria to evaluate the likelihood that archaeological deposits existed that could elucidate a group’s contribution to the development of New Orleans. Each of the fifteen groups ended up with a composite rank value. Even if the intention was to bring attention to underrepresented groups, the idea of assigning value to groups based on ethnicity, social position, and occupation introduced discriminatory bias.

The sensitivity maps defined five levels of archaeological sensitivity: highest, high, medium, low, and lowest (Figure 3.1). Sensitivity in this case was the likelihood sites will be impacted by future development. Calling them sensitivity maps rather than predictive or probability maps is an important and subtle shift in terminology; this could go a long way to convey to users unfamiliar with archaeology that modeling archaeological-site location is an
Figure 3.1. The Goodwin sensitivity model for portions of New Orleans. Note there are no lowest areas of sensitivity marked and the map is warped due to rubber sheeting in a GIS platform. Map from the Louisiana Division of Archaeology.
inexact process. Researchers used site function and socioeconomic groups along with the modern-day zoning maps and city surface conditions to suggest areas with historic activity, as well as areas presumed to be undisturbed by previous development. It is important to note that in the end, it appears the Goodwin model’s predictions of historic activity were entirely based on historical information, as there was minimal archaeological data available about New Orleans. At the time of their research, only a limited number of archaeological excavations had been conducted in the subject areas (see Chapter 4). In fact, only around seven properties had been recorded as archaeological sites in the French Quarter prior to the study. While the work was small in scope, it was a good start at examining different uses of space in New Orleans during different eras. However, today the study has limited application due to narrow geographic range, and a dated understanding of the importance and ‘ranking’ of socio-economic groups as they relate to the archaeological heritage of the urban past.

FEMA’s Archaeological Probability Zone Model

Following Hurricanes Katrina and Rita in 2005, historic preservation staff from FEMA and SHPO worked together to create an archaeological probability model for greater New Orleans (Dawdy 2011; Dawdy et al. 2007). Additionally, FEMA staff georeferenced some historical maps of New Orleans, which were used to inform the model’s creation. Referred to as the Archaeological Probability Zone Model (dated May 3, 2006), its purpose was to assist FEMA and SHPO staff with decisions involving cultural resources during hurricane-recovery efforts. The model covered portions of Orleans, Jefferson, St. Bernard, and Plaquemines parishes (Figure 3.2). Shannon Dawdy and Jason Emery, along with assistance from FEMA GIS staff, created a single map that divided the region into three archaeological probability zones—high, moderate,
and low—that suggested the likelihood of areas to contain “significant or well-preserved archaeological sites” (not just evidence of any archaeological site) (Dawdy et al. 2007). These defined zones were not temporally specific and apply across all periods of human occupation.

Figure 3.2. The FEMA archaeological probability zone model.

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10 This language likely refers to the quality of significance and integrity—criteria set forth for eligibility for listing in the National Register of Historic Places as outlined in 36 CFR 60.4. It is worth noting Dore and Wandsnider (2006) have pointed out that locating a site outside of a high probability area, that is in an area where a site was not predicted to be, may actually have a greater potential to provide information relevant to understanding the past and therefore may be evaluated just as eligible for listing in the National Register of Historic Places, than a site located in a high probability area.
No formal report accompanied the model creation (although Handly et al. 2010 provided a brief summary) and most of the information about the model creation was gleaned from the geodatabase metadata and personal communications. The best summary for the process used to create the database is outlined in the model’s metadata and is quoted in its entirety below. The metadata reads:

The data compiled for the database was used to create an entirely new map that visually represents predicted zones of probability for significant and well-preserved archaeological sites in New Orleans. [Shannon] Dawdy's 12 years of research experience in New Orleans and consultation with other senior archaeologists in the state also informed the zone designations, as did an earlier planning initiative undertaken by Goodwin and Associates in the 1980s (Archaeological Plan of New Orleans). The latter, however, did not cover the entire city, nor code areas of high-mid-low probability. Criteria used to determine the probability zones were as follows.

1. Geological. Higher elevations (generally greater than 1 meter above sea level) along natural levees of the Mississippi, Lake Pontchartrain and the relict bayous that cut through the center of the city (Gentilly, Metairie, and St. John) were targeted as higher probability areas since they are areas known to have concentrated colonial era sites and have been useful predictors of prehistoric sites throughout the lower Mississippi Valley and coastal Louisiana. On the other hands [sic], areas of known infilling (such as certain areas of the lakeshore), cut-bank erosion, modern batture creation, or extensive modern disturbance (e.g., the Superdome) were considered lower probability areas.

2. Previously Recorded Sites and National Register Historic Districts. The second most important criterion was the location of previously recorded sites. In the case of prehistoric sites, the patterns noted were particularly important for drawing boundaries along the lakeshore and Bayou St. John. It was also assumed that most of the National Register Historic Districts would have associated archaeological features related to the character and development of the neighborhood. As only a handful of New Orleans' 22+ historic districts have received serious archaeological attention (principally the French Quarter, the CBD, and the Lower Garden District), these boundaries accounted for many of the high to middle probability areas.

3. Historic Map Database. While the first two criteria made it possible to draw the general outlines of archaeological probability, examination of georeferenced historic maps in the newly created database made it possible to fine-tune the boundaries to understand the shifts of the river, the creation of new batture lands, and most importantly, the precise location of important historic occupations (for
example, the Jesuit Plantation, Bienville's plantation, frontier settlements along Bayou St. John, as well as later sites such as the Pontchartrain Beach amusement park, and "lost New Orleans" — neighborhoods and landmarks no longer represented by standing architecture and historic districts.

4. Research Value: Number of Components and Estimation of Uniqueness/Redundancy [sic]. The fourth criterion involved estimating the number of occupational components that might be found in an area, as well as the relative uniqueness of the type of data it would yield. Areas that have the potential to yield information on multiple time periods (prehistoric, French, Spanish, antebellum, postbellum, etc.) were given a higher probability rating than those that would likely yield data from only one or two time periods (generally these were postbellum and later sites occupying former backswamps). Site type was also considered. For example, a handful of major Section 106 projects in the city have provided quite a bit of data regarding antebellum domestic sites (particularly those associated with Irish and German immigrants). In contrast, we have very little archaeological data regarding African American domestic sites (of any era), or of industrial and commercial sites in New Orleans, or of sites relating to shipping and transportation, so areas related to these research themes were ranked highly regardless of time period. Some 20th-century sites, such as Pontchartrain Beach and Milneburg, were rated as high probability because the archaeology of tourism and recreational sites is underdeveloped, not only in Louisiana, but in the nation as a whole. Louisiana's Archaeological Plan (1983) was used as a general guideline to identify periods and themes, and updated with more current information and research priorities.

Caveats. A final caution should be sounded about the Archaeological Probability Map. It should be used only as a general guide, particularly when project areas lie within a quarter mile or less of the boundary zones. Historic maps never have the accuracy of aerial photography, nor are there any perfect solutions in rubber sheeting and geo-rectifying. Further, our knowledge of the prehistoric, protohistoric, and colonial period settlement of New Orleans is spotty at best. For example, no maps or historic documents predicted that a protohistoric Indian village would be found in the French Quarter, but excavations in 2005 revealed just that (16OR225, Dawdy et al., in prep). In order to remain a useful tool, it is recommended that the map be redrawn every 5-10 years using updated information. Ideally, it would be attached to an updated Archaeological Plan for New Orleans and/or the State of Louisiana, should that be feasible.

This file was created from outlines defined by Shannon Dawdy, supporting work was completed by David Whitlock and Kyle Gonterwitz, of FEMA Geospatial Intelligence Unit (GIU). It was created in December of 2005. Some of the boundaries are based upon negotiations [sic] with Ken Carleton, representing the Mississippi Band of Choctaw Indians. A later addition was created from lines defined by Jason Emery and digitized by Chris Ard in December 2007.
This data should be considered provisional until such time as it is updated following the Secondary Programmatic Agreement for Orleans Parish (Dawdy et al. 2007).

As outlined in the metadata presented above, the Archaeological Probability Zone Model is based on the following criteria (listed in order of importance): geological features, previously recorded archaeological sites and National Register Historic Districts, historical maps, and research value (i.e., length and variety of occupational periods in a location and the perceived uniqueness of the data recovered). It appears the model creators did not use statistical analysis or purely inductive methods to delineate probability zones. Although previously recorded sites were considered, researchers used a combination of environmental, historical, and archaeological variables to delineate high, moderate, and low probability zones on a map. These zones appear to be partially defined based on empirical observations from the archaeologists’ extensive years of research in the region and vetted by the professional community.

Additionally, Dawdy and Emery outlined several caveats to the model. They used historical maps, but stress that historical maps have limitations and biases. In the research-value criteria, model creators gave underrepresented sites in terms of archaeological knowledge (e.g., African-American, precolonial, colonial) a higher ranking. As the creators pointed out, the model should be subject to revisions every five to ten years on the basis of new archaeological (e.g., newly recorded archaeological sites, recently surveyed areas), environmental, and historical data. Finally, the Archaeological Probability Zone Model should only be used as a general guide when making planning decisions, including whether an archaeological survey should be conducted in an area prior to a construction project.
Testing and Critiquing the Model

The FEMA model was quickly employed in hurricane-recovery decisions and is still routinely cited in Section 106 documentation. As part of federally funded projects, FEMA relied on the model to create a monitoring strategy for the demolition of residential properties with hurricane-related damage in Orleans Parish (Federal Emergency Management Agency 2006). This action provided an opportunity to test the Archaeological Probability Zone Model as archaeologists monitored properties for the evidence of archaeological evidence. Based on initial observations, the model was good at predicting areas of low archaeological-site probability. However, other results were unexpected. Archaeologists recorded more sites in moderate probability zones (96 sites) than in high probability zones (64 sites) despite the fact that almost twice as many demolitions were monitored in the high probability zone (54.3 percent of sites monitored) than the moderate probability zone (28.8 percent of sites monitored). David Harlan (2010) summarized the results best by pointing out in the high probability zone, archaeologists documented a site in one out of every 7.1 monitored demolitions and in the moderate probability zones, archaeologists documented a site in one out of every 2.5 monitored demolitions. At first blush, the unexpected results suggest that a portion of the Archaeological Probability Zone Model may be problematic; however, the results must be viewed critically as many factors influenced the recordation of sites. For example, archaeological monitors recorded a location on a state site record form based on surface collections and they did not assess a research value (an important factor used when defining the model’s zones of probability). Nevertheless, the results of the exercise suggest the need for periodic reassessment when determining the likelihood of archaeological sites in New Orleans.
Recognizing potential problems with FEMA’s model, Harlan (2010) used archaeological predictive modeling to examine the spatial distribution of sites in New Orleans. He assessed what effects disaster recovery efforts had on locating archaeological deposits by looking at sites recorded before and after Hurricane Katrina. Using the results of the FEMA-sponsored demolition-monitoring project (Handly et al. 2010), Harlan documented a measurable geographical difference in the location of sites recorded pre- and post-Katrina. Harlan determined this difference was likely the result of increased archaeological investigation due to the hurricane-recovery efforts and increased sampling across areas thought to have moderate or lower probability for containing archaeological resources.

Harlan also studied the ways in which archaeological sites were positioned relative to the physical geography of New Orleans using the following variables: elevation (via LiDAR images), distance to water sources, and flood depths associated with the inundation of the city during Hurricane Katrina. Harlan suggested that biased survey methods (e.g., concentrating archaeological testing in areas with a higher number of recorded sites or in areas of highest elevation) and previously held theories about the best location for site discovery resulted in some geographical biases in archaeological testing and an inaccurate representation of unrecorded archaeological-site location. Relying on these variables serves to reify ideas about past urban occupation rather than truly test the accuracy of models. Based on his statistical and spatial analysis, variables such as elevation are somewhat useful in modeling the archaeological probability of the city; however, they are not necessarily the strongest indicators of site location in urban settings. Harlan concluded that in order to be better at predicting archaeological-site location in urban areas, we must rethink the way we view probability modeling in New Orleans.

It is important to note that Harlan did not stratify sites chronologically when performing his GIS analysis.
and other historic cities; one alternative conceptual model could be treating the city as one archaeological site.

Building on Harlan’s results, I argue it is best not to think of presence or absence of a site when assessing archaeological probability in urban New Orleans. As I outlined in the previous chapter, it is best to treat the city as a supersite. A more productive strategy to locate deposits within a supersite assumes there are archaeological deposits present at any given location and instead focuses on understanding the length of occupation and the research value of a potential resource. The emphasis shifts from probability (i.e., presence or absence of past human activity) to determining the function of an area within the supersite and refining the age of potential intact archaeological deposits within that location.

In conclusion, previous efforts to understand and predict site location in New Orleans have been met with both positive results and areas that needed improvement. The Goodwin and FEMA models did draw from historical data, especially historical maps. And their research brought into focus an improved archaeological understand about New Orleans’ past. Yet, both studies resulted in a single map of archaeological sensitivity (the Goodwin model) or probability zones (the FEMA model) instead of modeled archaeological probability for different time periods. The Goodwin model did consider the use of specific locations within their small study area, but this stemmed from an outdated value about who and what is important and worthy of historical study. The FEMA model minimally took into account site function and length of occupation, yet, it too used research-value criteria. The surprising results of the FEMA demolition monitoring, as pointed out by Harlan (2010), suggest that it is more useful to conduct

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12 Albeit a key goal of the model as part of a compliance rather than research framework.
GIS analysis to create multiple maps refining archaeological deposits by age rather than a single one-size-fits-all probability model.

Data and Biases of the New Orleans Archaeological Record

As a result of challenges associated with the opportunistic nature of urban archaeology (as outlined in Chapter 2), what ends up being recorded as a site in most urban cities in the United States results in a biased sample of the actual archaeological record. A many factors have influenced what types of sites archaeologists have recorded in New Orleans. There are no local ordinances protecting archaeological sites despite the city’s unique history and heritage; this has limited the number of archaeological sites documented in the city. Moreover, there has been no systematic survey of the city or the larger metropolitan area. Therefore, the number and locations of recorded sites broadly reflects a combined product of compliance-driven testing, academic research interests, and opportunistic salvage as the result of redevelopment projects. As a result, the locations of recorded archaeological sites do not necessarily correlate with the areas of significant and/or intense occupation in the past.

By 2016, there were just over 700 sites recorded in the Louisiana Division of Archeology’s site geodatabase for Orleans Parish. Nearly 500 of these sites have been recorded since 2005 as part of projects associated with the post-Katrina rebuilding process. Private archaeology firms—usually under the auspices of Federal Section 106 legislation—have documented a vast majority of these sites.

However, the number of sites recorded can be misleading. Archaeologists in Louisiana now record urban sites at the block level, even though there can be multiple lots (or loci) within a single block. In other words, a distinct site number assigned to a city block can represent
multiple sites (e.g., residences, businesses, institutions) or a particular site may stretch over several blocks. While this system helps keep the recordation of sites manageable in an urban context, it can skew the number of just how many properties (i.e., individual lots) have been subject to archaeological testing. According to the Louisiana Archaeology’s Excavation Database, only around 1 in 7 sites in Orleans Parish have been subject to any type of testing beyond a Phase I survey. Many of the sites were recorded during small monitoring projects or on properties with a few excavated shovel tests. One example of this type of project discussed above was associated with post-Katrina residential demolition; approximately 170 sites were recorded with little or no subsurface testing (Handly et al. 2010). Due to the nature of other fieldwork, only nominal information about the properties were documented. This is certainly not enough information to use in the creation or testing of a correlative predictive model.

There are also biases with regard to the age and function of site recorded in New Orleans, particularly with respect to those recorded during post-Katrina recovery. The failures of the levee system and inundation of the city disproportionally affected the areas of lowest elevation. These low-lying areas were mostly uninhabitable until the development and installation of large drainage pumps in the late nineteenth and early twentieth centuries (Colten 2005). A large percentage of FEMA-funded rebuilding has been directed towards these flooded neighborhoods: higher percentages of late nineteenth and early twentieth-centuries activity areas were recorded as discrete archaeological sites in comparison to archaeological deposits that date earlier in time. Thus, the archaeological record is biased with regard to the age of documented archaeological resources. Similarly, the existing archaeological record is biased in terms of the types and functions of recorded resources. As in other cities, urban archaeologists in New Orleans have devoted a great deal of attention to domestic residences (Rothschild and Wall 2014).
Conversely, there have only been a handful of institutional locations examined (Eller et al. 2014). Additionally, few submerged resources and Native American deposits have been documented and investigated within the Crescent City.

In summary, the types of locations documented and the age of these deposits bias the archaeological record of New Orleans. These biases can be attributed to: 1) limited opportunities to test locations in the city; 2) the way in which deposits have been recorded including how archaeological sites in urban contexts are defined and designated for management purposes; 3) the various levels of archaeological field work conducted on properties, ranging from a walk over with no subsurface testing to full-scale data recovery; and 4) the likelihood that some archaeological deposits in the city have been lost to development.

A survey of existing archaeological data for New Orleans makes it clear that the existing inventory is not suitable for any type of correlative predictive modeling. Aside from the many existing critiques of correlative predictive models (e.g., Church et al. 2000; Ebert 2000; contributors to Judge and Sebastian 1988; Kamermans 2000; Kvamme 2006), historical urban locations are usually not as well suited for these traditional predictive modeling approaches because they represent complicated urban environments. Most correlative models do not address impacts to sites associated with modern development and human-induced changes to the landscape. Furthermore, New Orleans presents yet another wrinkle because it is located in a geomorphologically dynamic setting that has undergone rapid change (discussed in more detail in the next chapter).
Conceptualizing Site Location in the Urban Archaeological Supersite

In the previous chapter, I argued for visualizing historic cities like New Orleans as supersites. With the supersite concept in mind, below I delve into how to combine the supersite concept with HGIS applications.

In envisioning the historic city as a supersite, one step in the process is already complete—we have already identified the site location in the general sense. With the historic city identified as the supersite, the next step is to use historical maps, archival resources, and archaeological data to understand the temporal, spatial, and functional uses of specific locations through HGIS analysis. My goal is not just to hypothesize the location of material remains using historical maps and archaeological data, but to understand the ages and functions of specific locations as well. I use HGIS to uncover the palimpsest. Furthermore, by looking at the macro scale, HGIS is a way for archaeologists to connect various activity areas spatially as part of a single city system.

Using a pre-existing HGIS database, it will be far less time consuming to process and recognize relationships within the archaeological and historical datasets, to understand the location of archaeological deposits, and to account for planning and management-decision making. Specifically, my research, using HGIS analysis and creating the New Orleans supersite geodatabase, can be used to accomplish several things:

1. Create a visual illustration of the city as a palimpsest—revealing lost landscapes and change over time.
2. Link disparate, but contemporaneous, activity areas together.
3. Search for and connect areas where specific activities took place through space and through time.
4. Highlight areas of greater or lesser archaeological concern depending on criteria are used to define the topic of concern.

5. Extrapolate information for areas without archaeological testing data (known to unknown).

6. Incorporate multiple datasets across disciplines and combine qualitative and quantitative data by integrating information.

My approach is a novel way to understand the evolution of the urban past and histories of specific locations in historic cities. This approach is the opposite of traditional predictive modeling, which assume the absence of a human occupation unless there are places that meet certain criteria. Essentially, my new approach flips the script by assuming the site is everywhere. This is a new way of thinking about site location models in historical archaeology. However, I stress that while my research contribution does aid in identifying areas of archaeological deposits, I refrain from calling it a probability modeling of urban historical archaeology; document-driven site location analysis might be a more fitting description.

**Conclusion**

In the previous chapter, I outlined why cities like New Orleans should be conceived as an urban archaeological supersite, and I enumerated the challenges in locating archaeological sites within the urban environment using traditional archaeological survey methods. These methods and models used to locate sites have not been as fruitful in urban settings. The historic city should be treated as a distinctive environment and archaeological resource; it requires a different approach. Although there are exceptions, many historic cities have long histories complete with written records that can be used to reveal the past. When these written sources are combined
with archaeological information, urban archaeological research has much to say about the urban experience.

In this chapter, I reviewed ways archaeologists have attempted to locate archaeological sites using predictive modeling and GIS technologies. Most methods have focused on predicting the location of sites prior to the colonial period in the United States, and therefore, are ill suited for historic cities. Next, I examined approaches to using historical information in GIS, the benefits of HGIS, and how this approach is applicable for my research. Combining these factors, I outlined how to use the supersite idea and combine it with HGIS to create the urban archaeological supersite paradigm. In the next chapter, I provide information to contextualize specific information about New Orleans since the city is my example to operationalize the paradigm.
Chapter 4. Contextualizing the New Orleans Supersite

The purpose of this chapter is to provide a brief archaeological, historical, geographical, and environmental context for the New Orleans supersite relevant to my research. To accomplish this task, I divide the chapter into four sections. First, using archaeology as the guide, I present a concise history of New Orleans. For brevity, this history spans the first European exploration in the region through the nineteenth century. The overview sets the stage for the reader to place my research within a broader historical context. Following is a concise overview of historical archaeology in New Orleans from its first days in the 1970s into the ongoing post-hurricane rebuilding efforts. Next, is a discussion about the physical geography and how humans have been altering and struggling with the natural environment as the city began to take shape. Since historical maps play such a prominent source of historical data, this chapter would not be complete with a contextualization of the historical maps used as part of my research. Therefore, this chapter concludes with a review of the cartography of urban landscape production in New Orleans.

Archaeological and Historical Overview of New Orleans

Prior to 1682, European exploration was limited in the greater New Orleans area. Even though direct contact between indigenous and European people was minimal, the effects of disease emanating from colonial exploration and settlement to the east resulted in native depopulation and reduced village size in the area that would become southern Louisiana. Once contact was more permanent, indigenous populations had to negotiate relationships with the French and other European polities as they competed for political alliances with various native groups. Beginning in the seventeenth century, the British encouraged eastern tribes to engage in
slave-raiding activities; when slaving became less profitable, they emphasized the fur trade. These activities disrupted Native American populations living in the lower Mississippi River valley. Combined, the effects of disease and political instability in the region altered traditional ways of life, resulting in changes to settlement patterns and sociopolitical organization.

In the New Orleans metropolitan area, scant archaeological evidence exists of Native American settlements dating prior to 1700. At the Rising Sun Hotel Site (16OR225), archaeologists recovered four Native American ceramic sherds in a silt stratum below the French colonial deposits, suggesting Native American settlement or use of the land in the area of the modern-day French Quarter before the founding of New Orleans (Dawdy, Gray, et al. 2008). Excavations at the Kingsley House Site (16OR221) encountered a high number of Native American ceramics dating to the late Mississippi period. These were mixed with early-nineteenth-century material; however, it is possible that there was an earlier occupation in the area (Gray et al. 2008). Material recovered from Spanish Fort (16OR19) at the mouth of Bayou St. John, indicated a Native American component dating to the middle Woodland period and historical documents noted a precolonial village at this location (Boyko, Smith, et al. 2013; Kidder 2000). Current evidence suggests that historic and modern development may not have destroyed all evidence of pre- and early colonial Native American occupations in the the New Orleans supersite.

In 1698, Pierre Le Moyne d’Iberville began to explore the gulf coast region. His journal provided detailed descriptions of the region as Native Americans guided Iberville through the countryside (Le Moyne de Iberville 1981). Local natives showed him Bayou St. John and the short overland portage connecting the bayou to the Mississippi River, where his brother Jean
Baptiste Le Moyne Sieur de Bienville would eventually establish New Orleans. To date, no archaeological evidence of these early explorations has been found close to New Orleans.

During the first decade of the 1700s, Iberville and Bienville established a series of forts and settlements along the modern-day Alabama, Mississippi, and Louisiana coastlines. In 1708, Bienville encouraged a handful of people to settle along Bayou St. John to cultivate wheat for the colony (Giraud 1974). This marks the first permanent French settlement in the New Orleans area. The settlement was named Biloxi (not to be confused with the town of Biloxi, Mississippi). Crop cultivation was met with minimal success and by 1716, around ten men were living in the area. Settlers probably constructed small, temporary housing scattered along the bayou.

Properties were laid out in French long lots measuring two and a half to three arpents wide, with frontage on the waterway. Along Bayou St. John, archaeological survey investigations at City Park and the Pitot House (16OR224) (Boyko, Fogg, et al. 2013; Boyko, Smith, et al. 2013; White, Foster, et al. 2009) did not locate archaeological evidence of any homesteads, and no other evidence of these early colonial sites has been located to date.

In 1718, Bienville formally established New Orleans along the east bank of the Mississippi River in the area known as the Vieux Carré (Old Square), now commonly called the French Quarter. The initial settlers hastily constructed buildings, most of which were destroyed by a hurricane in 1722. Archaeological research has unearthed evidence of some of these pre-1722 structures. Behind St. Louis Cathedral in the center of the Vieux Carré, researchers at St. Antoine’s Garden (16OR443) identified two early structures: the corner of a small hut and a poteaux-en-terre structure. Shannon Dawdy and her colleagues (Dawdy, Gremillion, et al. 2008) suggested that because the orientation of the hut does not align with the city’s more formal city grid established circa 1721, the hut could represent the remains of one of the earliest buildings of
colonial New Orleans. Adjacent to St. Antoine’s Garden is the Cabildo, a municipal complex that would undergo a series of rebuilding efforts during the colonial period. In 1997, Earth Search, Inc., conducted excavations at the site of the Cabildo complex (16OR129) and was able to interpret several construction episodes on the property. In the Cabildo’s rear courtyard, researchers uncovered foundations of the 1830s civil prison and a brick floor dating to 1790 (Yakubik and Franks 1997). A few blocks away, underneath a cottage on Toulouse Street, archaeologists discovered well-preserved wooden timbers buried in the earth. These timbers are structural evidence correlating to the Royal Military Barracks (16OR136) constructed around 1731, and represents early French-colonial construction methods (Yakubik ca. 1991; Yakubik and Franks 1997). The St. Antoine’s Garden, Cabildo, and the Royal Military Barracks excavations clearly illustrate that many French-era deposits lay intact underneath buildings, courtyards, and garden surfaces of the modern city.

In 1763, France ceded to Spain the Louisiana Territory west of the Mississippi River along with the Island of Orleans, which contained the town and port of New Orleans. At this time, New Orleans was still a small town of under 5,000 residents (Campanella 2006). The Creole ruling class had grown accustomed to autonomy under a neglectful French government and were aggravated to learn of their new Spanish leaders (Dawdy 2008). It took the Spanish until 1769 to establish firm control over the town, which required a sizable military presence.

Contrary to what is depicted on many French-colonial maps, the French administration had failed to construct much of a defensive perimeter around the town until the very end of French tenure. Upon their arrival, the Spanish helped to shore up the town’s defenses. In the 1790s, Governor Carondelet oversaw the construction of a wall encircling the city, anchored with five bastion forts (Forts San Carlos, San Luis, San Juan, San Fernando, and Borgona).
Archaeologists have uncovered buried features from two of these forts, including the moat and rampart wall at Fort San Carlos (16OR52) and timbers thought to be used in the construction of the scarp and counter scarp of the moat at Fort San Fernando (16OR48) (Shenkel et al. 1979; White, Foster, et al. 2009).\(^\text{13}\)

Fires in 1788 and 1794 destroyed the urban core of the city, cumulatively burning nearly 80 percent of the city. Residents needed temporary living facilities. After the 1788 fire, the cathedral rector, Pere Antoine, allowed many refugees to establish temporary shelters in the garden and green space behind St. Louis Cathedral (16OR443). At this site, archaeologists have documented deposits associated with camp residents and the evidence suggests they may have stayed for many years (Dawdy, Gremillion, et al. 2008). A more permanent solution to the housing shortage was to create new neighborhoods called faubourgs. The Gravier Plantation, adjacent to the upriver side of town, was the first to be subdivided; it later became the Faubourg St. Marie (St. Mary’s). In an effort to guard against the potential damage of future fires, the Spanish ushered in new building standards, thus profoundly altering the architectural appearance of the town. Buildings were required to move to the front of the street, to be constructed with brick between posts and to be covered in plaster (Campanella 2008). High brick walls separating lots became more common. Jay Edwards (2009) has illustrated the change of the residential house lot pattern from the French to the new Spanish style.

Archaeological evidence of the two fires is one of the most identifiable temporal markers in the archaeological record for the colonial city. Archaeologists have documented a layer of burned material and charcoal attributed to the fires at several sites including Hermann-Grima (16OR45), Madame John’s Legacy (16OR51), the Royal Military Barracks (16OR136), St.

\(^{13}\) For further discussion of 16OR48 and its possible relation to Site 16OR174 see Godzinski et al. 2002.
Antoine’s Garden (16OR443), the Rising Sun Hotel (16OR225), and 400 Chartres (16OR467). The archaeological signature of the fires provides an absolute date in the archaeological record, which archaeologists can use to date deposits above and below the burn layer. These datable deposits can provide insight to pre-fire and post-fire conditions and disaster recovery in the city.

Despite an initial distaste for the Spanish government, the Louisiana colonists enjoyed the benefits of a steady growth of industry, public infrastructure, and an overall rise in the quality of life under the Spanish administration. The Spanish colonial period was marked by growth of the city; population increased, starting slowly, but increasing steadily. Increased river trade to the city partially fueled population growth as settlers upriver brought their products to market. During the Spanish colonial period, the demographics of the colonies began to shift as English, Scottish, American, Creole, Isleños from the Canary Islands, and a new wave of enslaved Africans relocated to the New Orleans area.

New Orleans served as the core of the larger Louisiana colonial community; however, the surrounding plantations and Native American settlements supported the town in a symbiotic relationship. Usner (1992) indicated that Native settlements moved around, and that over time, different groups may have occupied the same locations. Historical maps suggest locations of these petite nations. However, Native American settlements contemporaneous with colonial-period New Orleans have not been identified archaeologically. Locally produced ceramics, thought to be made by Native Americans, have been uncovered in small amounts at most colonial-era sites. Current research suggests that these sites were not occupied by indigenous peoples, but rather reflect social interactions and trade relations between the petite nations and the colonial settlers.
During the colonial period, the majority of the plantation sites in the greater New Orleans area clustered on the highest ground and along transportation corridors. Known plantation locations include concessions along the Mississippi River, on smaller bayous and relic levee ridges, and adjacent to Bayou Road. Archaeologists have documented a few of these colonial plantation sites. One example is the Duplessis Plantation (16OR144), which was home to several Creole families (Dawdy and Ibáñez 1997). Excavators documented the foundations of the great house, built in 1765, and used the material culture associated with the structure for insight into wealthy Creole households during the Spanish and American periods. Likewise, the St. Augustine Site (16OR148) yielded French- and Spanish-colonial-era deposits useful for understanding plantation households (Matthews 1999). Located along Bayou Road, the St. Augustine Site served as an industrial plantation with a brickyard and tilery.

The American purchase of the Louisiana Territory in 1803 marked the end of the colonial era, and in 1812, Louisiana became a state. During the post-colonial period, greater New Orleans grew from a small urban center of just over 8,000 residents to one of the largest cities in America, with a population of 174,000 by 1860 (Campanella 2006; Lemmon et al. 2003). Anglo-Americans from other parts of the United States, French Creole refugees from Saint-Domingue (including Free People of Color), enslaved people from Africa and the Caribbean, and many European immigrants inundated the city.

An influx of workers—both free and enslaved—laid the basis for the sugar and cotton industries that dominated the antebellum economy. Industrial improvements helped to grow the region’s economy. These improvements included a method to crystalize sugar, the development of the cotton gin, and the invention of the steam engine. With the application of the steam engine to power steamboats, merchants and farmers increasingly used the navigable waterways
as a method to get their goods to market. Due to its prominent location near the mouth of the Mississippi River, New Orleans became the commercial and exchange hub for goods from the interior of the continent to be exported for transoceanic sale. Many profited from the trade goods and services, including enslaved human capital, and the agricultural economy. Agricultural goods like cotton and sugar were now shipped via steamboat all over North America and the world. By the 1830s, New Orleans had become the world’s largest cotton market. The hospitality industry catered to those that conducted business in New Orleans. Scholars have researched the archaeology of hospitality and gender at the Rising Sun Hotel Site (16OR225) (Dawdy, Gray, et al. 2008; Dawdy and Weyhing 2008).

Maritime trade increased the availability of goods in the New Orleans markets. The archaeological record at many domestic sites and at the St. Mary’s Market (16OR128) reflects the myriad of imported goods. Imported good included French wines, European table and glass wares, and items of personal adornment. Economic wealth can be seen at sites associated with high status families such as the Hermann-Grima House (16OR45), the Gallier House (16OR46), and Madame John’s Legacy (16OR51).

The rapid pace of economic growth, coupled with increased immigration to the city, required housing and services. Plantation owners close to the city realized that their land was more valuable as a commodity than for agricultural production. As a result, some large landholders elected to subdivide their property into new faubourgs. The result, at least on paper, was the creation of orderly city blocks divided into lots to accommodate the waves of new immigrants arriving in the city. Archaeologists have documented some of these early faubourgs near the Mississippi River in the Lower Garden District at the St. Thomas Development-City Square 33 (16OR177), the Le Citron Bistro Site (16OR355), Kingsley House (16OR221); and
behind the French Quarter in the Faubourg Tremé at the New Orleans Post Office Site (16OR63), Villa Meilleur (16OR146), McShane Place (16OR172 and 16OR173), and Iberville Square 130 (16OR180) (Castille et al. 1982; Godzinski et al. 2002; Gray 2011; Gray et al. 2008; Gray and Yakubik 2010; Lee et al. 1997; White, Barth, et al. 2009). Urban planning played a role in the growing city, and included areas for open public space. Use of this space has been examined through archaeology at Congo Square (16OR48), at pleasure garden behind St. Louis Cathedral (16OR443), and in a public yard space at the Old U.S. Mint (16OR52) (Dawdy, Gremillion, et al. 2008; Dawdy and Matthews 2010; Shenkel et al. 1979; White, Foster, et al. 2009). During the early American period, French Creoles and Free People of Color settled in the French Quarter and in the expanding faubourgs behind or downriver from the French Quarter. In contrast, Anglo settlers and immigrants took up residence along the upriver side of the French Quarter. However, Campanella (2006) argued these lines were often more fuzzy than historians might think.

The result of the population influx to New Orleans was a mix of people from many different backgrounds. Arguably, it was at this time in the city’s history that so many of the traditions of the people (Creole, Afro, and Anglo) intermingled, forming the roots of New Orleans culture. However, tension between groups—in particular between the established Creoles and new American settlers—resulted in the division of city government into three semiautonomous municipalities in 1836. Archaeologists have explored this time of transition through creolization theories (Dawdy 2000; Dawdy and Matthews 2010; Hardy 2011). Based on the archaeological evidence, it seems that while many groups in New Orleans retained some elements of their individual cultures, all groups grew more similar—they all became New Orleanians.
Nuisance and undesirable activities, as well as many poor and destitute people were consigned to the edges of New Orleans (Colten 2005; Gray and Yakubik 2010). Often those of lower socioeconomic status were relegated to lower-lying areas along the swampy fringes near the “back of town” and areas surrounded by unwanted and offensive conditions. Such was the case at City Square 33 (16OR177) where archaeologists investigated a tavern located on the edge of town near the riverfront, away from the more desirable and affluent parts of the city (Gray 2011). Despite ambiguities in the historical record over who used and inhabited the block, researchers explored the livelihood of those occupying these marginalized spaces and offered a more nuanced approach to study the urban populations that did not always conform to societal norms.

Disease and epidemics certainly plagued the city residents, disproportionately affecting the lower classes of society. Close living conditions, poor drainage, and disease-carrying mosquitoes helped to spread epidemics such as yellow fever. Disease outbreaks killed thousands of New Orleanians; these deceased required expedited burial. Many corpses ended up in cemeteries such as Locust Grove (16OR565) and Charity Hospital No. 2 (16OR108). Archaeologists and physical anthropologists examined the remains from Charity Hospital No. 2, which was used by the hospital between the 1850s and the 1920s. The cemetery became the final resting place for countless indigent people (Owsley et al. 1990). Multiple burials showed signs of historical medical procedures such as amputations, post-mortem autopsies, and the practice of surgical techniques rarely observed in a skeletal collection. The research provided information on health and disease for this working-class population. Death of parents left many children homeless and several social organizations founded orphanages in the city. At the St. Joseph Orphan Asylum (16OR153), established just after the 1853 yellow fever outbreak,
archaeologists have documented the lives of the children and caretakers who lived at the facility (Gray and Yakubik 2010). Research at these site speaks to the hardship of urban life before the modern era.

**Antecedents of New Orleans’ Urban Historical Archaeology and the Data Generated**

Urban historical archaeology in New Orleans began in the 1970s with excavations at the Gallier House. Early archaeological projects such as this one were often associated with the renovations of historic properties and sometimes consisted of only monitoring construction activities. Many of the projects involved archaeologists at the University of New Orleans and Tulane University. Avocational groups, such as the Louisiana Archaeology Society and the local archaeological organization, Delta Chapter, were heavily involved in local excavations and many of their research efforts are underreported. Often excavation techniques such as arbitrary excavation levels were used without regard to natural strata, which hamper the interpretation of the site and correlation with historical documentation. However, as the field of historical archaeology developed, practitioners created specific methods and theories to excavate and interpret urban historic sites. By the 1980s, New Orleans researchers began to apply these methods and practices. Some of the best research of this time period came not out of universities, but out of private cultural resources management firms. Examples of these projects include the Greater New Orleans Bridge No. 2 Project, the New Orleans Post Office site, and the Algiers Point site (Castille et al. 1986; Castille et al. 1982; Goodwin et al. 1984). This early research documented the preservation of archaeological remains in New Orleans supersite.

By the 1990s, it became apparent that many sites in the city were being lost to development. As part of the state’s Regional Archaeology Program, the Louisiana Division of
Archaeology sponsored a feasibility study for an archaeologist in the greater New Orleans region. The Greater New Orleans Archaeology Program (GNOAP) was established at the University of New Orleans in the mid 1990s, with Shannon Dawdy serving as the first director. The program has been responsible for several, important research projects in the city. However, over the years, funding support for the program was variable. In 2013, all of Louisiana’s Regional Archaeology Program effectively ended, including the GNOAP. Dawdy, now with the University of Chicago, along with her students, maintained her research interests in New Orleans. Likewise, archaeologists at the University of New Orleans, notably D. Ryan Gray, have continued to be active in local archaeological research.

Due to the lack of a local ordinance protecting archaeological sites, much of the archaeological research in New Orleans, especially prior to 2005, occurred at archive and museum properties, governmental facilities, and at locales owned by the Catholic Church. In particular, almost all of the research conducted in the French Quarter—containing the core colonial development—was undertaken as archaeological salvage and/or academic and research-driven projects. As a result, some projects had poor or little funding. Therefore, the level of analysis, synthesis, and reporting for the projects varies. Outside the French Quarter, local CRM firms have conducted most of the research in the parish in compliance with cultural resource laws—with some notable exceptions including several precolonial sites in New Orleans East.

During the 1990s and early 2000s, research by these CRM firms continued to generate the bulk of the data for understanding New Orleans’ past. The recovery efforts following Hurricanes Katrina and Rita in 2005 drastically changed the intensity of fieldwork in New Orleans as well as the areas of archaeological focus. Several post-hurricane reconstruction projects (and a few projects predating the storm), such as the redevelopment of the city’s public
housing projects and the planned construction of two new hospitals, involved multi-block tracts that were in the lower-lying portions of the city, outside of the colonial footprint. The fieldwork for many of these projects has been completed. At the time of this writing, many reports summarizing the results of the investigations are in various stages of preparation and should eventually contribute to our understanding urban life. Presentations and published sources hint at the significance of some of these sites, but the reports have not been finalized (Gray 2011; Gray and Yakubik 2010). Future researchers should consult these reports and comparative material should they become available.

Finally, to date, there has been no systematic survey of the supersite or the larger metropolitan area. As noted above, in the 1980s, Goodwin and colleagues (1987) created a model to highlight areas of archaeological interest and sensitivity within three of New Orleans’ earliest neighborhoods. Additionally, two planning surveys explored the feasibility and need for a local archaeology program dedicated to understanding and protecting the metropolitan area’s archaeological resources (Dawdy 1996; Pendley 1992), but the recommendations from these studies were never implemented.

**Physical Geography and Human-Environment Interaction in New Orleans**

The landform of the greater New Orleans area, south of Lake Pontchartrain, is fairly young in terms of the geologic time scale. As the Mississippi River flowed to the Gulf of Mexico, sediment was deposited at the mouth of the river. The alluvium that amassed created new sediment lobes or deltas. As the Mississippi River changed course, a new delta formed at the mouth of the new river course. The land around New Orleans is mainly a product of the St. Bernard and Plaquemines deltaic complexes, which formed 4,300 to 1,000 years ago and 1,100
years ago to present, respectively (Campanella 2006; Frazier 1967). Natural levees and ridges (or relict levees) were produced by the accumulation of waterborne sediment during flooding episodes when the banks of rivers were overtopped. These ridges and levees were the most conducive landforms for human habitation since they would be the highest ground and thus were ideal for settlement (Simmons 2002).

The dynamic geomorphology means several things for the human occupation of the region, as well as for archaeologists’ ability to locate sites. First, sites can only date as far back as circa 4,300 years ago, when there was available land to occupy. Second, in areas where there is active reshaping of the landscape, fluvial action can quickly erode archaeological deposits or bury sites under deep deposits of sediment. Third, the areas desirable for habitation and resource extraction do not remain constant. Thus, settlement patterns have changed over time. In addition to natural processes, human landscape alterations could have impacted sites, which will be demonstrated in Chapter 6.

Since fluvial processes created the landform where New Orleans sits, it is no surprise that water surrounds the region. Freshwater is necessary to sustain life and is a vital factor in the location of human activity across the New Orleans landscape. Lake Pontchartrain, Lake Borgne, the Barataria Basin, and many small bayous and swamps attract and host subsistence resources, making the New Orleans region ideal for resource extraction. These water bodies also acted as transportation corridors to move people, goods, and ideas across the landscape.

Of all the waterways in the area, the Mississippi River and its tributaries played the largest role in shaping the current landscape. While the overflow of the river produced elevated landforms, river flooding could be catastrophic to a community. Soon after the establishment of

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14 For more information, please refer to Kolb and Van Lopik (1958), Frazier (1967), and Saucier (1994).
New Orleans, residents began to increase the height of the natural river levees to prevent inundation from unusually high river levels common in the springtime.

Environmental constraints kept urban expansion to the natural levees, the highest ground bordering the river. The back swamp, subject to frequent flooding, retarded the city’s growth. The 1878 map titled, *Topographical and Drainage Map of New Orleans and Surroundings* by T.S. Hardee highlighted the need for drainage in the city to deal with constant flooding and sanitation issues exacerbated by the low terrain (Figure 4.1). Increased population coupled with limited territory wedged New Orleans residents in a safe habitation zone between the river and swamp with nowhere to expand (Lemmon et al. 2003:304).

Throughout New Orleans’ history, city policy-makers and developers made efforts to drain the swampy terrain. During the nineteenth century, drainage canals helped to alleviate some of the nuisance flooding issues. In 1913, A. Baldwin Wood invented a pump capable of removing standing water on the large tracts of backswamp behind the city (Romagossa 2010). By the 1920s, new powerful pump systems began to drain the lower-lying swamps, allowing for urban expansion toward the Metairie and Gentilly ridges and eventually spreading northward toward Lake Pontchartrain. Nevertheless, draining the swamps was a slow process. It took several decades for the process to be completed. Today, an elaborate system of engineered levees, canals, and pumps drain naturally wet areas and keep developed areas dry.

Today, the elevation of New Orleans ranges from -8 feet to 25 feet above mean sea level (Campanella 2006; U. S. Geological Survey 2001). However, the range between the highest and lowest elevation points was likely much less historically. The highest elevation represents the engineered Mississippi River levees, which bar the river waters from inundating the city. At
times of high water, the river can flow past the city at a level above the tops of most buildings.

The lowest elevations lie below sea level and coincide with areas of drained backswamp toward the center and back of town. These areas saw limited habitation until the installation of modern city drainage systems. Today, the elevation is lower due to land subsidence. With the water removed from the swampy ground, the soils are compacting and sinking. Currently, when
flooding inundates these areas, elaborate human engineering is needed to effectively pump and drain the water away.

United States Department of Agriculture (USDA) classifies soil series, which can be useful for understanding past landscapes and environmental traits thought to be desirable for archaeological-site location. Examples of soils found in the region include but are not limited to Commerce Silt Loam, Commerce Silty Clay Loam, Sharkey Silty Clay Loam, Sharkey Clay, Frequently Flooded Commerce and Sharkey Soils, Harahan Clay, Drained Kenner Clay, Clovelly Muck, Lafitte Muck, Dredged Aquents, Frequently Flooded Dredged Aquents, Drained Allemands Muck, Westwego Clay, and Gentilly Muck. Loam soils tend to be located closer to the natural levees and are more fertile than clays and muck, which are typically located in the backswamps behind the levees (Campanella 2006; U.S. Department of Agriculture 1989).

Densely occupied areas such as the French Quarter are classified as urban soils, areas in which over 85 percent of the surface is covered with buildings, roads, and development. The classification of soils as urban can be an indicator of intense human occupation and palimpsest, but does not provide insight to the types of soil composition (e.g., clay, silt), the fertility of the sediment for cultivation, nor the ability to drain water quickly in historic times.

Archaeologists have routinely used LiDAR imaging to locate areas of past human activity by observing changes in a terrain’s elevation. Unfortunately, in an active historic city, LiDAR imagery also includes the elevation of high-rise buildings and other modern landscape features making it difficult to tease apart historical occupation from modern urban elements, but certainly not impossible. One benefit of LiDAR is the ability to observe minor differences in elevation. In a low-lying region with minimal topography such as New Orleans, subtle changes can be
difficult to see without computer enhancements and can be useful for determining areas of human activity and landscape modification.

**A Cartographic Overview of Urban Landscape Production in New Orleans**

Historical maps must be viewed as a product of their time and contextualized as such. Since they are a social product, we need to attempt to enter the world within which the map was produced to understand it at a deeper level (Prunty 2004). There is power in map creation and it is important that we recognize the connections between political power and cartographic knowledge. As with any historical record, many maps were created to serve a purpose. Historical maps often privilege the dominate narratives and ideologies about urban space, which can include imposing order and promoting imperialism, nationalism, or other particular viewpoints.

Maps represent graphic depictions of spatial relationships in the human world. If metropolitan areas are palimpsests, they are operating in a continual state of building and rebuilding. Therefore, historical maps provide important insights into former cityscapes erased by urbanization processes. Cartographic plans provide clues to both the human and physical landscapes at a certain point in time. Because of the information they provide, historical maps play an important role in my research.

In this section, my goal is to provide highlights of the history of map making as it pertains to New Orleans and present a concise overview of the development of the city. Additionally, the well-known surveyors and cartographers are interwoven into the discussion. These surveyors and engineers played an important role in the growth of New Orleans. Their
work trying to imposing order in the form of neat lot lines and street grids left a lasting impression on the physical shape of the community today.\textsuperscript{15}

\textit{Imposing Order on the Landscape: Mapping the French Colonial Beginnings}

In 1718, Bienville chose the Mississippi River front—also called the Flueve St. Louis—for the site of the town of New Orleans. This location linked the important transportation corridor of the river with Lake Pontchartrain via an old Indian portage on high ground that stretches between the town and Bayou St. John. Between 1718 and 1721, the land along the river was cleared of cane and trees.

In 1721, French military engineer Adrien de Pauger established a formal city grid according to the design of Le Blond de la Tour. The focal point of the community was a central plaza, Palace d’Armes (modern-day Jackson Square) with the church at the head of this plaza and municipal buildings on the upriver side. Lots closest to the river and central plaza were reserved for governmental functions and the most prominent members of society.

The gridded street plan is typical of eighteenth-century town planning. Each \textit{ilot} (i.e., city block) measured 300 French feet on each side and contained twelve lots. Ten lots measured 60 French feet facing the street and 120 French feet deep, while the two key lots in the center of the \textit{ilot} were 150 French feet deep (Wilson 1968). This arrangement was depicted on the map in Figure 4.2.

Pauger’s plan probably did not include the randomly dispersed temporary structures built by the first colonists. One map by Le Blond de la Tour, dated January 12, 1723, outlined the “old land cleared by several individuals” and marks what was probably an original structure built

\textsuperscript{15} Specific details about the archival sources for historical maps discussed can be found in Appendix A.
prior to the establishment of the city grid. Even though settlers had recently constructed these buildings, these early structures were misaligned and needed to be demolished. This did not go over well with residents (Dawdy 2008). However, a hurricane in 1722 blew down most of the makeshift structures, quelling the controversy.

Figure 4.2 illustrates an anonymous map, titled Plan de la Nouvelle Orleans; it is one of the first maps that accurately illustrated Pauger’s layout of the city with structures on the individual lots. A map key provided locational information for important structures. The fortifications shown surrounding the town did not exist and represented a typical vision of a
fortified colonial city popular at the time. Unlike the de la Tour plan of the same year, no street names were provided in this plan. Several other maps from the 1720s were made to illustrate the development of the city and are likely copies of one another.

Pauger died in 1726 and Ignace Broutin took over as Engineer-in-Chief of the Colony (Wilson 1968). In 1728, Broutin certified a ‘map of the New Orleans and the surrounding swamp’ made by his assistant Gonichon. It not only depicted the buildings, but the property owners too. Gonichon offers a realistic portrayal of the settlement on the ground amid the reality of city building in the inhospitable environment. In this map, the city squares are not completely surveyed and the swampy terrain seems to swallow up the outlines of structures and streets toward the rear of town (Wilson 1968).

After the 1729 massacre of the French by the Natchez, construction of a defensive ditch began, but was never completed (Wilson 1968). Several maps from the French colonial period illustrate the ditch and the feature helps to date and gauge the accuracy of subsequent maps of the Vieux Carré. One of the most accurate maps of the town during the French colonial period is the 1731 Plan de la Nouvelle Orleans by Gonichon. It is worth noting, however, that the location of Conti and St. Louis streets should be reversed. This mix-up of street names will continue to plague colonial maps for decades. Two subsequent maps dating to 1732, Ignace Broutin’s, dating to January 20, and another map by an anonymous cartographer both titled, Plan de la Nouvelle Orleans, are similar to the Gonichon plan. The likenesses suggest that they are copied from the Gonichon plan, but they both label Conti and St. Louis streets correctly. All three plans show houses that have been constructed as well as the parterre gardens and important public buildings. These maps were created in tandem with the return of the colony to the King after the failure of the Company of the Indies. These maps eventually became published in many
languages and cartographers copied the maps several times during the colonial period when the city was under French and Spanish rule (Wilson 1968).

Brouzin continued in his role as City Engineer until his death in 1751. He created building plans of prominent architecture such as the Ursuline Convent, the military barracks, the powder magazine, and other public structures in the town; many of the plans can be viewed in the French Archives (Wilson 1987). Another source for colonial vernacular architecture plans and illustrations is Memoires of Louisiana by Jean-Francois-Benjamin Dumont de Montigny (1747). These distinctive drawings were not necessarily the most accurate plans, but they provided details of the environs that surrounded the city and are sometimes presented in birds-eye view, thus providing a unique perspective on architectural detail.

A few other detailed maps of the town were created, notably maps attributed to Jacques Nicolas Bellin (1742) and Thomas Jefferys (1759). Both indicated a growth of the city since 1732. However, there are certain errors on the maps that were repeated; for example, the reversing of Conti and St. Louis streets. Also, new errors appeared, such as the transposing of complete city squares. Indeed, colonial maps became progressively more incorrect as errors were reproduced through time.

Urbanizing New Orleans and Data Gaps in the Spanish Colonial Period Record

In 1763, the Spanish Government took over New Orleans as part of the peace treaty at the end of the Seven Years /French and Indian War. The creation of maps normally accompanies an exchange in colonial power as a means to document property ownership. However, there are surprisingly few maps from this time period. One exception is a map by Tomás López de Vargas Machuca dated to 1762. In the second half of the eighteenth century, López was the
cartographer for the King of Spain and he created this map in preparation for the transfer of the colony from France to Spain. The inset of New Orleans was inspired by Jacques Nicolas Bellin’s 1742 map mentioned above and it contained some inaccuracies.

During the Spanish colonial period, the city grew at a steady pace. However, without maps for this period, there is little cartographic information on urban expansion during this timeframe; therefore, archaeological evidence can contribute to our understanding the supersite during this time period. Some historical and archaeological evidence has come from the 1788 and 1794 fires (see above), that nearly wiped out the town. Juan Maria Perchet (ca. 1794) made a sketch map reflecting the 212 buildings that were destroyed by the 1794 great fire. In the lower left portion of the map, the líneas rojas (red lines) are hand-drawn footprints of the buildings damaged by the fire (Lemmon et al. 2003). As a result of both fires, almost the entire city was rebuilt.

As noted previously, after these devastating fires, the Spanish administration created stricter building codes to prevent such disasters from occurring again. The colonial government used this opportunity to rebuild the city’s defenses, constructing five forts and a defensive wall around the town. The military works were completed in 1794 and are featured prominently on many maps. Unfortunately, most of the Spanish colonial period maps only show the location of important buildings, not the entire community.

Historical maps produced after the fires illustrate how the city began to expand. Carlos Laveau Trudeau was the principle surveyor during the Spanish period. As the surveyor general of Spanish Louisiana, his responsibilities included creating maps of the growing city, surveying and subdividing land tracts, and designing buildings. During the transfer of power to the Americans, Trudeau refused to provide his records to the incoming government. Vicente
Sebastián Pintado, a surveyor apprentice under Trudeau from the late 1790s to the early 1800s, held his documents. From 1805 to 1817, Pintado served as the surveyor-general of Spanish West Florida (Lemmon et al. 2003; Toledano 2010). After the death of both of these surveyors, many of their important documents ended up in Havana. However, some are included in the American State Papers and the Pintado Papers and can be found at various archives including the Louisiana State University, Special Collections, and the Louisiana State Museum (Louisiana State Archives and Records Service 1983; Toledano 2010).

In New Orleans, the practice of careful record keeping and notarization developed during the French and Spanish colonial periods and was continued into the American legal system. According to civil law, it was common practice to notarize contracts of many kinds including marriages, business and organization dealings, building and construction agreements, deaths and probates, and other legal arrangements (Toledano 2010). Independent notaries kept track of the acts they notarized. Eventually, many of these bounded volumes were donated to the New Orleans Notarial Archives. The notarial records provide information on property descriptions and sales, business contracts, and sometimes plan drawings of the property. Some of the plan drawings are in the forms of affiches or gouaches, watercolor advertisements that illustrate a plan view and the elevation of the property for sale. The drawings are gorgeous works of art and depict information such as paint colors, landscaping, architectural details, city block numbers, surrounding street names, property measurements, various outbuildings and amenities, and room arrangements within the structures (Bacot et al. 2000). The tradition of creating the affiches to advertise property for sale at public auction seems to be a custom unique to New Orleans (Toledano 2010). Artists include Adrien Persac, Joseph Pilié, Louis H. Pilié, Louis Surgi, Eugéne Surgi, Carl Axtel Hedin, and many others. Today, the New Orleans Notarial Archives
has close to 6,000 affiches in their collection (Bacot et al. 2000; Toledano 2010). The notarial records are housed at the New Orleans Notarial Archives, a division of the City of New Orleans.

Dividing the Land: Changes in Government and Surveying during the Nineteenth Century

Between 1800 and 1803, the change in power from the Spanish to the French and ultimately to the Americans resulted in numerous property disputes, as well as changes in land survey methods. Out of this legal conflict came maps aimed at documenting claimed land grants and surveying unclaimed public lands. During the colonial period in Louisiana, the French surveyed the land using the long-lot cadastral method, providing a narrow frontage along a waterway or road with the remaining portion of the lot extended back a considerable distance. Soon after the Americans took possession of Louisiana, they implemented the township, range, and section method of surveying the landscape. The General Land Office was charged with surveying and dividing the land for tax purposes and for settling land claims for those who had previously acquired property prior to 1803. In areas previously unsurveyed, sections measured one square mile in size. However, in locations already settled, sections often took irregular forms to reflect the colonial concessions previously granted by the French or Spanish governments (Sluyter et al. 2015). Many maps illustrate both types of land survey systems.

Barthélémy Lafon was a surveyor, architect, cartographer, and engineer who created numerous maps and surveys of New Orleans and Louisiana between 1795 and 1820. He was responsible for subdividing the area of the Lower Garden District and resurveying and preparing plats originally issued under French and Spanish rule (Toledano 2010). His map Plan of the City and Environs of New Orleans, made in 1816, showed the eight faubourgs that existed at the time: Annunciations, City of New Orleans, Daunois, Declouet Suburb, Marigny, St. Claude, St. John
Burgh, and St. Mary Suburb. It also illustrated some of the surrounding natural environment and the growth of the city since the Louisiana Purchase. Lafon was quite the colorful character and his résumé even included being a pirate.

The City of New Orleans was incorporated in 1805 and the City Survey Office was established in 1817 by a city ordinance (Reeves 1983b; Toledano 2010). The Survey Office was responsible for a host of duties that included making all plans, surveys, and estimates as required by the mayor and the city council. This work also encompassed establishing the official lines of properties, sidewalks, and streets; overseeing the public works; designing public buildings; supervising city-employed cart drivers; executing building ordinances; planting trees in public spaces such as streets and squares; and implementing laws that govern street names and numbers. With all that responsibility, the city surveyors were de facto city planners, helping to shape the built environment of the city. Many of the surveyors were trained professional engineers.

Like the maps made during the Spanish period, early-American-era maps focused on plantation subdivision, along with drainage, and other public works projects. Some maps, such as Charles Zimpel’s *Topographical Map of New Orleans and its Vicinity*, dating to 1834 suggested the extent of growth surrounding New Orleans; however, the map includes some areas, like Milneburg, where development is proposed rather than extant (Figure 4.3). Zimpel’s map is special in that it is a citywide map, which also illustrated individual structures on the outlying concessions and plantations.

In 1836, the city was divided into three independent municipalities and separate surveyors were appointed to each municipality. Henry B Moelhausen, a civil engineer, created *Norman's Plan of New Orleans & Environs*, which illustrated the division of the city into three
municipalities and the City of Lafayette. The latter would eventually be annexed into the city as the Fourth District. As the city expanded during the early American years, the surveyor’s role became increasingly complex; he functioned as a public safety officer, local health inspector, city planner, cost estimator, and real estate record keeper. It was not until the late nineteenth century that the office was relieved of some of these duties. As city government expanded, other
offices performed the multitude of tasks once managed by the city surveyor's office (Reeves 1983a). In 1890, the City Surveyor's Office was subsumed under the City Engineer's Office, thus ending the unique role the surveyor’s office played in the creation and shape of city. Nevertheless, given their job responsibilities, the city surveyors had a profound influence in shaping the settlement patterns of New Orleans.

Joseph Pilié was another cartographer whose work appears frequently in the archival records. In 1818, he was appointed first city surveyor (Toledano 2010). In 1836, when the city was divided into three separate municipalities, Pilié became the city surveyor for the second district, also known as the American sector. His son, Louis, and grandson, Edgar, continued the family surveying tradition into the twentieth century. Many of their family records can be found at the Historic New Orleans Collection and the City Archives at the New Orleans Public Library. *Plan pour servir au prolongement projeté de la rue de l'Esplanade jusqu'an Bayou St. Jean,* created by Pilié in 1822 is an example of his artistic and carefully measured work.

Often absent from maps and archival documents are temporary or seasonal settlements and vernacular buildings along the fringes of a community. In New Orleans, there were people living in the “back of town.” Squatters constructed many of these houses and there were people who moved into abandoned structures and adapted them for temporary living. Occasionally these fringe or temporary communities are documented on maps.

*Mapping for Disaster*

Natural hazards such as hurricanes and flooding events, as well as disasters like fires, can alter the landscape at a citywide, neighborhood, or even at the block level. As with the fires
during the Spanish colonial period, disasters and disaster planning prompted mapping of the urban environment after Louisiana was transferred to the United States.

Starting in 1867, the Sanborn Map Company produced comprehensive fire insurance maps of cities and communities in the United States. In New Orleans, the Sanborn Map Company produced comprehensive block-by-block-level maps of New Orleans every few years (Lemmon et al. 2003; Sanborn Map Company 2002-16; Wilson 1968). The purpose of the Sanborn maps was to help insurance underwriters determine the level of risk associated with insuring certain properties. Teams of surveyors would map and document the uses of buildings to create the maps. Each map depicts individual structures, and properties and outbuildings at an unprecedented level of detail; the maps are popular with researchers across the nation. The maps were produced every few years and ultimately were bound into a volume. Due to the meticulous record keeping on each property, each map sheet contained only a few blocks. To keep up with changes resulting from new construction and urban expansion, new sets would be issued every ten years or so. After 1908/1909, when surveyors documented property alterations, they would paste the changes on top of the old sheet. This practice reduced the number of sheets the company produced and, unfortunately, concealed the early manifestations of the properties (Oswald 1997). Despite this loss of information, studying the maps of a particular location through time illustrates urban growth and changes in the built environment of a community.

Each map conveyed not only the footprint of the building, but architectural features such as property function, construction material, number of stories, window and door locations, and sometimes property ownership. Additionally, details like street names, addresses, block numbers, lot boundaries, street condition (e.g., paved, unpaved), public utilities (e.g., electrical,

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16 The Sanborn maps are a staple in historic research, but were not included in this research due to copyright issues and limits of project time and funding.
water, sewer), and transportation lines are noted on the scaled maps. The Sanborn Map Company copyrighted the map symbols and standardized the map key for maps across the country.

The first Sanborn maps of New Orleans appear in 1876 (Lemmon et al. 2003; Wilson 1968). The earliest maps focus on the areas of dense urban and commercial development. As city growth expanded toward the lake, the Sanborn surveyors created maps for more areas of the city. By 1909, there were seven volumes. By 1951, there were ten volumes and additional sheets for the surrounding metro area.

Although undeniably useful, there are some problems with the Sanborn maps. There is a lag time between the development of an area and the creation of a corresponding map. Likewise, areas where residents were unlikely to insure their property due to socioeconomic reasons or in areas where insurance was unavailable were unlikely to be mapped.

The Atlas of the City of New Orleans, Louisiana published in 1883 (commonly called the Robinson Atlas), was similar to Sanborn maps, but lacked the exacting detail. The atlas consisted of 30 hand-colored lithograph sheets and was published by E. Robinson and R. H. Pidgeon. The sheets or plates in the atlas are taken from City Surveyor and Architect John F. Braun’s earlier surveys, and therefore, they are more a reflection of the late 1870s, than their publication year (Lemmon et al. 2003; New Orleans Notarial Archives 2015). The footprint of each structure (red shading for brick and yellow shading to denote wooden buildings) and the lot lines are visible on the atlas plates. The New Orleans Notarial Archives has digitally scanned the large plates—most measuring 18-by-28 inches in size. The high resolution map scans can now be accessed online (New Orleans Notarial Archives 2015).
Numerous historical maps and images have been created throughout the history of New Orleans, for a variety of purposes including military survey, insurance underwriting, surveying and building, and property sale and transfer, to name a few. Each map was created for a particular purpose and may reflect particular ideas. And each past reflects a particular point in time, whether real or imagined by the mapmaker. Cartographers and surveyors not only influenced urban landscape production, but also influenced how people perceived New Orleans from city maps.

**Conclusion**

This chapter reviewed the relevant data needed to contextualize the history of New Orleans as it relates to my research. This chapter also reviewed the types of data available to incorporate into HGIS. The historical and environmental overviews presenting in the chapter were used to help evaluate and select what types of datasets would be the most useful and accurate to include when designing the New Orleans supersite geodatabase. In the following chapter, I discuss the selection, creation, and incorporation of historical, archaeological, and environmental data in the New Orleans supersite geodatabase.
Chapter 5. The New Orleans Supersite Geodatabase Research Methods

This chapter reviews the research and methods used to create the New Orleans supersite geodatabase. The work plan included two broad phases of research. Phase I involved archival research and selection, map acquisition, georeferencing, and constructing raster catalogs to contain the historical maps. Working from an inventory of known historical maps of New Orleans, I conducted archival research to select maps useful in determining the historical development of New Orleans. This information included features such as standing structures, roads, and other elements of historic land-use that could inform about the palimpsest of the urban landscape and indicate the locations of historical activity. Once maps were selected, archival repositories provided digital files of the selected maps. I imported these digital map-files into ArcGIS by georeferencing the historical maps to the modern landscape and organized these raster map files into various raster catalogs (containers for the datasets).

The focus of Phase II was to create and input vector data. Much of this data involved extracting information from the historical maps georeferenced in Phase I. This information would later be used to examine specific locations within the supersite, as well as refine the age and function of historical activities in New Orleans. The first task involved creating vector data (i.e., shape files) from features illustrated on the historical maps in the geodatabase. This task was accomplished by digitizing historical map features into polygon vector objects (commonly referred to as polygons) and assigning thematic categories to the polygons. Next, I examined the base site and survey GIS data provided by the Louisiana Division of Archaeology and the archaeological reports housed at the Division in order to compile a spreadsheet of previous archaeological projects in New Orleans. The data was then tied into the temporal and research
topic themes, which are reviewed below. Additionally, the inventory summarized details on previously recovered archaeological collections and surveys.

A GIS project of this magnitude needed a defined research area in order to maximize effectiveness. Thus, the extent of the historical urban settlement in the New Orleans area determined the geographical scope of the project area. It encompassed the New Orleans city limits and parts of the Westbank in both the City of New Orleans, as well as areas along the western bank of the Mississippi River directly across from the east bank of New Orleans. It excluded New Orleans East, which developed later than other parts of the city. The HGIS study begins circa 1700, with the earliest historical maps of the area. These maps correspond with the dates of intensified, European-led exploration and eventual settlement of the city of New Orleans. I close the study at the beginning of the twentieth century, because almost the entire supersite has been developed in some capacity by this point.

With the spatial and temporal scope of the GIS project defined, the next critical step in the research project involved organizing the structure of the GIS data. ESRI ArcGIS software was used to create the GIS data stored in the various geodatabases. GIS practitioners prefer to organize large volumes of information into file geodatabases since they act as a container that can store large amounts of data. My project consists mainly of two geodatabases, representing two types of data—raster and vector data (discussed in further detail below). Raster data are made up of pixels or cells that contain information. Digital scans of historical maps are examples of raster data. The HGIS raster geodatabase contains a collection of raster images organized into raster catalogs. These raster catalogs are organized by map category (e.g., *Robinson Atlas* maps, Mississippi River Commission maps).
Vector data are spatial data displayed as a combination of x-y coordinates that create vector objects. These vector objects can be points, lines, or polygons. Vector objects also have associated information organized in a tabular format. For this project, all vector objects consisted of polygons, which represent various historical features illustrated on historical maps, archaeological resources, and other pertinent data. The various polygon data is stored as feature datasets in a separate HGIS vector geodatabase.

Finally, each raster file and vector feature class has a separate metadata file which includes information about the creation of each file. Information includes file description, keywords, abstract and notes, publication information and sources, data storage and access information, creator of the document, spatial information, and coordinate system. All GIS work was projected in North American Datum 1983 (NAD 83).

**Raster Data: Historical Map Research and Turning Historical Maps into Digital Data**

Through data-sharing agreements, I was able to incorporate the set of historical maps FEMA georeferenced circa 2005, which included the *Robinson Atlas* plates from the New Orleans Notarial Archives, relevant Mississippi River Commission maps, and some historical USGS quadrangle maps. These historical maps were reorganized into separate raster catalogs so they could be incorporated into the HGIS raster geodatabase. Next, I updated the metadata for each map.

Following the incorporation of the map data proved by FEMA, I increased the New Orleans supersite geodatabase by adding additional historical maps, included some of the ones discussed above. The HGIS raster geodatabase construction involved two major components:
archival research and historical map georeferencing. The first component consisted of archival research, which included selecting historical cartographic material and converting these maps into digital images. The focus was on selecting maps that illustrated standing structures, roads, and other historical features that could indicate the locations of archaeological deposits beneath the city. The second component entailed creating a geodatabase by transforming archival material into digital GIS data. Historical maps were entered into GIS by georeferencing them to modern topography. Both components are discussed in detail below.

*Historical Map Research*

As reviewed in the previous chapter, numerous maps of New Orleans illustrate the development of the city over the course of its 300-year history. Many of these maps are stored in local, national, and foreign archives. Building upon the historical maps already acquired by FEMA, research started with an initial list of maps that should be included in the HGIS raster geodatabase. This list comprised maps depicting detailed information about historical settlement in the New Orleans area. From this list of desired maps, I targeted archives that curate cartographic collections pertaining to historic New Orleans. During each archival visit, I assessed each map to decide if it was suitable for inclusion in the geodatabase. Suitable maps had accurate cartographic information (i.e., drawn to scale) and illustrated topographical and cultural features in the city that could be used as georeferencing points. Additional criteria included: a map’s cartographic purpose, the accuracy of its content when compared to other historical data sources, and its relevance in providing clues to buried archaeological features (discussed in more detail in the next section). As the research unfolded, I refined the list of maps for the geodatabase by combining my knowledge of maps and archival sources with information
provided in several secondary sources pertaining to maps of the city (e.g., Dawdy 1996; Lemmon et al. 2003; Rolston and Stanton 1999).

I conducted most of my archival research in New Orleans, which allowed me to develop relationships with various institutes and their archivists. This relationship was fruitful when it came to working with certain archives to find a method to scan certain maps into digital format (a challenge discussed below). Archives chosen for primary research include: The Historic New Orleans Collection; Special Collections of the Hill Memorial Library at Louisiana State University; the Cartographic Information Center in the Department of Geography and Anthropology at Louisiana State University; the Louisiana State Museum Map Collection; the New Orleans City Archives at the New Orleans Public Library; and the Louisiana Office of State Lands. Certain maps in non-local archives such as the Geography and Map Division of the Library of Congress and the Archives Nationales d'Outre-Mer in France would make excellent additions to the database, but travel to these archives was not feasible. Some maps housed at out-of-state archives were available online in a digital format that could be downloaded and added to the geodatabase.

Over the course of this project, I inspected more than 500 maps to see if they contained suitable information for the GIS project. If deemed suitable, I ordered a digital copy of the map from the archive, photographed the map (when the map could not be georeferenced due to scale), or marked the map for scanning at a later time. Close to 200 maps were selected for the HGIS raster geodatabase.
Historical Map Research and Selection Criteria

Criteria used to select historical maps fall into several broad categories: critical map assessment, cartographic accuracy, time and cost constraints, availability of the historical record, and technical limitations. Below, I elaborate on each of the selection-criteria categories. Additionally, I discuss some of the theoretical, methodological, and practical consequences of using certain criteria and what biases may have been introduced into the HGIS project as a result of certain selection criteria.

While not necessarily a criterion *per se*, I examined each historical map with a critical eye. Like any historical document, maps are human constructs made with a particular purpose in mind. The mapmaker’s decision of what to include and exclude in a map may reflect a particular idea or objective. For example, Work Projects Administration (WPA) maps inaccurately labeled the former Storyville red-light district as dilapidated and unsuitable for habitation to promote support for slum clearance in preparation for a new public housing project (Carter 1941).

During the selection process, I examined each map critically by asking certain questions: 
What is the purpose of the map? Who was involved in making the map? Who was the sponsor, technical producer, surveyor, or local informant would aided in the map creation? Who was the intended audience of the map? What did the map include, omit, or emphasize over other attributes? How does it compare to contemporaneous maps? Are there companion documents that need to be examined? When selecting each map for my study, I kept the answers to these questions in mind and, if appropriate, included specific information in the metadata of each raster file regarding mapping errors and inaccuracies, and documented some of the decisions made during the selection processes.
Cartographic accuracy played a central role in selection criteria. Accuracy encompasses the precision of map scale, the presumed truthfulness or authenticity of what was being represented on a map, and whether the map reflected historical reality. Map scale played a role when assessing map accuracy. For example, the historic core of the city was drawn to a fairly accurate scale; however, the scaling of the less-developed areas outside the historic core, may be less precise. The more spatially accurate a map, the less need to stretch (i.e., rubber sheet) the historical maps when georeferencing to the modern landscape.

Even maps that appear to be truthful may not have been completely correct. Publishers sometimes copied maps from earlier versions, resulting in misleading publication dates and potentially reproducing and compounding previous map errors (Wilson 1968). As discussed in the previous chapter, other cartographers, Jacques Nicolas Bellin (1742) and Thomas Jefferys (1759), reproduced Gonichon’s 1731 *Plan de la Nouvelle Orleans* in other languages years later. Given the later publication dates, one might assume these later maps reflected New Orleans circa 1742 and 1759, rather than its layout in 1732. Furthermore, Bellin and Jefferys introduced additional errors, including transposing entire city squares.

Historical cartography sometimes depicts planned development rather than actuality; sometimes the renditions of the city were stylized. For example, many maps exaggerated the extent to which surveyors had divided the land into orderly city blocks; maps reflected planned development that would take decades to materialize (see the Zimpel Map illustrated in Figure 4.3 of the previous chapter). In another example, the French crown sent funds to fortify the city and some French-colonial maps illustrate an extensive defensive wall surrounding New Orleans. Yet, these mapped fortifications did not reflect historical reality. The money was spent
elsewhere and a fortification was not constructed until the end of the French colonial period (Dawdy 2008).

When I considered most of the information accurate, I digitized the map features, but excluded known errors like idealized features or exaggerated sections. I did not include romanticized, overly stylized, or spatially inaccurate maps. Of course, in making these decisions, I introduced my own bias into the New Orleans supersite geodatabase.

Relying on accurate maps and omitting erroneous information was intended to produce a more realistic depiction of the city’s evolution than if every map of the city had been incorporated. Methodologically, more accurate maps were easier to work with in a GIS platform. Theoretically, relying on accuracy elevates the importance of maps created by skilled surveyors over maps made at the vernacular level. However, this may privilege maps depicting planned and orderly growth over the messy reality of city building and it also may misrepresent the control city officials had over marginalized spaces (Gray and Yakubik 2010:298).

While not necessarily a criterion, the availability of maps influenced what time periods and which parts of the city were privileged over others. Furthermore, cartographers did not produce maps at evenly spaced, time intervals. Unfortunately, the maps available did not provide a continuous chronology of city growth. For example, during the first 15 years after the establishment of New Orleans, there were numerous maps documenting the planning and growth of the city (circa 1722 to 1732). Likely, due to reduced royal interest and investment in the colony, there were fewer maps of the town dating to between 1733 and 1769, and many of these maps were based on earlier maps. Thus, the number of maps depicting the region during the French colonial period is biased towards the earliest years of the period.
Time and costs of map use were other criteria used during the map-selection process. Due to limited finances, research was restricted to local and regional archives and available online sources. This precluded maps from repositories such as the Library of Congress and foreign archives due to travel costs. Fortunately, there were a number of New Orleans maps available online and some local archives have made a concerted effort to collect maps of the city from nonlocal collections. Some archives provided copies of maps for free or a nominal charge, while others charged up to $75 for a scan and usage fee. Fortunately, grant funding from the Louisiana Division of Archaeology was able to cover most usage costs; however, a limited budget ultimately was a factor that influenced the final inventory of maps.

Still, some important resources are not included in the geodatabase. For example, there are richly, detailed maps of individual properties in the nineteenth and early twentieth centuries. These include the New Orleans notarial records, the city surveyor records, and the Sanborn Map Company fire insurance maps, which provide block-level detail of historical development, sometimes at ten-year intervals. Recently, Environmental Data Resources laid claim to the copyright of the Sanborn maps and the company charges a hefty licensing fee to use them. Other property records are bound in volumes, prohibiting scanning, or, as in the case with the city surveyor records, they are scattered across numerous archives in various states of preservation. The time to research each property and the cost associated with obtaining copies of the records were beyond the scope of this dissertation research. Including some of these maps would provide an incredibly detailed geodatabase. As time and funding allows, these can be added to the HGIS data in the future.
Historical Map Scanning and Digitization

Working with qualitative and quantitative data in a complex HGIS platform presented several technical challenges that were considered during map selection. Some challenges, like cartographic accuracies of map scales, were discussed above. Another challenge was the transformation of archival material into digital files. While this process seems simple, map scanning can be one of the most challenging and costly aspects of an HGIS project because scanners capable of handling over-sized maps without damaging the fragile paper are uncommon (Gregory 2005). Furthermore, an image scan is a replica of the map rendered in a digital-image file format, but it is an inexact copy. The angle of the camera heads and the resolution of the scan can introduce minor alterations to the image. To account for this situation, the scan of each map needed to meet certain requirements including a minimum image resolution, preferably at a 1:1 scale.

In order to import and manipulate the maps in GIS, there needed to be a high-resolution digital copy of each map. In many cases, map scanning needed to be outsourced since few archives possessed the ability to scan their maps in-house. Outsourced scanning was done either at the Louisiana State Museum (LSM), which used a Cruse large-format scanner, or at Letterman’s Reprographics, Inc., who used a modified drum-scanning process. This process encapsulated the map in an envelope of a Plexiglas-like material called Lexan that prevented the paper-feeding rollers, used on a conventional drum scanner, from tearing the paper. Other archives provided digital images produced using a variety of methods, including a flatbed scanner or digital camera mounted on a photo stand. Digital map-images varied in file format and resolution depending on the reproduction capabilities of the holding archive. Overall, the goal was to obtain the highest-resolution image of an historical map possible. High resolution
improved the sharpness of the digital image and provided more detail of the features and text on the map. This level of detail was essential when analyzing a map close-up, using the zoom functions in GIS software. When known, the metadata provides general information about the map-digitization process and resolution of each image file. Due to the diversity of file formats and ranges in the quality of image resolution, it is important to keep in mind that the digital-image file of each map in the geodatabase are inexact copies.

**Historical Map Georeferencing**

After the historical maps were converted to digital-image files (i.e., scans or digital photographs), they were stored in two locations. The first location consisted of a typical file-folder organizational system (e.g., Windows Explorer) where digital images were stored without any modification. File-folder storage allows for the digital image to be opened outside of GIS software applications. This is an important step that ensured there would be a clean copy of the digital image in case it needed to be altered in the future or georeferenced again. The second location was the raster catalogs, where the digital map-image was georeferenced in ArcGIS and stored with the metadata information. Raster catalogs are the preferred way to organize raster data for this project: they can store large amounts of data, they are a good method for storing overlapping data (i.e., stacked data over the same geographic area), they can handle multiple file formats, and they allow one to mosaic images. I created various raster catalogs; these catalogs contain digital-image files of historical maps structured by organization (e.g., Mississippi River Commission) and by date.

Using the georeferencing tool in ArcMap, each digital map-image was georeferenced to modern map features (Figure 5.1). Georeferencing entailed overlaying the digital image of the
map (i.e., scans or digital photographs) over digital images of the current landscape by correlating as many known geographic points that appear on both maps. The more points used, the higher the accuracy of the georeference. Since this project relied on plans made in the past, the data was imperfect. Sometimes the digital map images needed to be stretched a little to fit, a process called rubber sheeting, which warps the digital map-image slightly. Finally, any major georeferencing problems were noted in the metadata. Appendix A contains a spreadsheet of the maps included in the New Orleans supersite geodatabase.

Figure 5.1. A historical map georeferenced to modern topography.
Once the digital maps were georeferenced, I used ArcCatalog to organize them into several raster catalogs that were stored in a single geodatabase. I assigned each digital map a file name with a three-part code organized chronologically by date (e.g., A_1794_Perchet_Map). In ArcGIS, a file name cannot start with a number. Therefore, all raster files were labeled first with a letter preceding the date, A, B, or C: A= eighteenth century, B= nineteenth century, and C= twentieth century. The map date and cartographer and/or a short map description followed the letter. To display (i.e., layer) the map files in ArcMap, I organized the maps chronologically. Once layered over each other in chronological order, the maps could be turned on, turned off, or made transparent to trace the development of New Orleans through time.

**Historical Map Metadata**

Metadata is an important component of the HGIS raster geodatabase and each georeferenced map file (i.e., raster file) usually required individual metadata about the historical map. These details included the archival source of the map, detailed information about the map, the map digitization process, and user restriction on the distribution of the data layer. Drawing from standard ESRI metadata templates, I established a template for the metadata using the Federal Geographic Data Committee standards (available at www.fgdc.gov). This style includes the three standard sections: Description, Spatial, and Attributes.

The Description section includes several subsections. The Abstract subsection included the title of the map and a general description of the entire historical raster maps catalog. The Supplementary Information subsection detailed the map name/title; map cartographer; map publisher; map creation or publication date; notes on the condition and media format of the map; map size and original scale; holding archive; and the holding archive’s accession number and
contact information. I noted any specific detail about a map, such as errors, similarities to other maps, map descriptions, map text translations, and other collections details from the holding archive. Technical notes described the details of the map digitization process, including the scanner or camera used to create the digital image, the digital format, and the image resolution (if known). Finally, Data Storage and Access Information provided details about the user constraints on the map files. Some libraries required a user agreement for the use of map images housed in their collections; therefore, the distribution of certain map files is limited.

The other two sections, Spatial and Attributes, provided additional data about the GIS aspect of the map files. Spatial data included map projections and GIS processes used to georeference the historical maps. The Attributes section contained minimal information due to the nature of the raster images; raster files do not have a table of attributes like vector data does.

The compilation of historical maps georeferenced to the modern landscape is an exciting research tool for urban archaeologists. However, limitations come with sharing and distributing GIS data derived from archival sources. First, the maps come from a variety of archives, each with their own policies regarding the copyright of the historical map scan and image distribution. In other words, there are certain maps that cannot be shared without user fees and agreements. Additionally, some of the map scans are extremely large, making them difficult to transfer and process. Since there are challenges and limitations associated with distributing the historical maps, the features on historical maps needed to be digitized and converted into another form of data—vector data—so they could be shared more easily. Furthermore, by extracting information about the map features and turning this information into vector data, the power of database analysis can be employed in a GIS platform. The following section details the process of turning raster data into vector data.
Vector Data: Extracting Information from Historical Maps:

Once the HGIS raster geodatabase was completed, the next step involved extracting information from the features depicted on historical maps into meaningful vector data (i.e., shape files). This task involved tracing historical map features and converting them into polygon vector objects. These polygons represent historical features illustrated on a map. Therefore, the polygons are strong indicators of areas that could contain archaeological deposits buried beneath the surface of the supersite. With assistance from two students from the University of New Orleans (UNO), I entered additional data about each polygon (and by extension each map feature) into a corresponding attribute table based on the information obtained from the map and historical information about New Orleans. The attribute table included information such as the description of the polygon, the research topic and temporal themes, and the corresponding map source. In the geodatabase, polygons and their corresponding attribute tables are known as feature classes and these were organized by thematic categories in order to address urban research questions. Additionally, the HGIS vector geodatabase incorporates data such as previously recorded archaeological-site information. The goal of the vector geodatabase was to facilitate the understanding and interpretation of the development of New Orleans through time as it related to the archaeological record.

Thematic Categories

Before converting historical map features into polygons, I outlined two types of thematic categories: temporal and research topic. The next step involved creating corresponding features classes in ArcCatalog. These feature classes were organized first by temporal themes, ranging from the French colonial period to the early twentieth century, and second by research topic
themes and subthemes. Many of the themes are based on the types of features often depicted on historical maps as many reflect the various representations of urban landscape production. I provide a discussion of the various themes below.

In an effort to link the feature classes with other GIS datasets, many of the temporal and research topic themes were tied to those used by the Louisiana Division of Archaeology for their GIS data, specifically their archaeological site inventory (discussed in more detail below). In the Division’s GIS data, a polygon vector object with associated attribute information is available for each recorded site. The associated attribute information is based on data from site forms that categorize archaeological resources according to function (i.e., research theme) and age (i.e., temporal theme). When appropriate, some of the research and temporal thematic attribute categories used in my study were the same ones used in the Division’s GIS data. Replicating the themes used by the Division provided consistency in the GIS tabular data and provided the ability to integrate and perform GIS analysis on the Division’s and other GIS datasets.

*Temporal Periods*

Temporal periods for the HGIS vector geodatabase reflected the generally recognized periods in New Orleans history and correlated to those used by the Louisiana Division of Archaeology LACAD system and on archaeological site forms. The temporal themes included the following with the attribute code in parentheses:

- French Colonial (FR) (1718-1769)
- Spanish Colonial (SP) (1769-1803)
- Antebellum (ANT) (1803-1860)
• War and Aftermath/Civil War and Reconstruction (WAR) (1860-1890)
• Industrial and Modern (IN) (1890-1940)

Research Topic Themes

Research topic themes relate to a loci’s function. Generally, I based these themes on the attributes or types of information provided by historical maps, in combination with historical and archaeological research questions that can be addressed via a GIS analysis. The research topic themes include: historic structures, agricultural areas, banks, cemeteries, commercial establishments, early settlements, governmental and public facilities, historic Native American settlements, hospitals, industrial and manufacturing areas, institutional facilities, levees, military installations, areas impacted by development, plantations, port facilities, public baths, religious, residential locations, recreational areas, public squares, historical town limits, historical transportation corridors, and utilities. Some topical themes have subthemes. For example, the transportation corridors theme is broken down into roads, canals, waterways, railroads, and streetcar lines. Some archaeological polygons overlapped two or more themes; as a result, some polygons were included in multiple thematic categories. Some themes, such as Native American settlements, did not span all temporal categories. Below is a discussion of the research topic themes with the attribute codes in parentheses.

Historic Structures: It was beyond the scope of this project to document all the various historic structures in the project area through time. However, some specific classes of buildings were consistently included. Important or long-standing religious establishments (rel) such as churches, synagogues, religious hospitals, convents, and missions were noted. Educational institutions (it) include colleges and schools, both
religious and secular. Hospitals (ho) are another type of historical structure and include public, religious, and military hospitals and medical facilities. Commercial areas (ci) include markets, known commerce areas, royal magazines and the public commons. Government and public (gv) represent a host of facilities that changed over time. These include prisons, the King's stores, residences of government officials, the customs house, the state house, public hotels, asylums, arcades, city halls, courthouses, hotels, and exchanges. Finally, banks (bnk) represent banking facilities and public baths (pb) indicate bath houses for men. Both the bank and public bath were only noted on maps dating to nineteenth century, and therefore, are restricted to this time period.

**Agricultural Areas** (ag): Originally, it was thought that historical maps would illustrate areas used for agriculture like known farmsteads, large tracts of cultivated land, and areas used for cattle grazing. Unfortunately, only a small number of maps provided enough detail to understand the agricultural uses of areas. Many of these features overlapped with the plantation and commercial (the city commons areas often used for livestock grazing) themes.

**Cemeteries** (cr): Cemeteries are numerous in the metro area. They normally occupy locations that were originally on the outskirts of the community. As the city expanded, development grew around the cemeteries and sometimes traces of a cemetery were erased as builders constructed over them. Today, knowing the locations of cemeteries are extremely important due to state laws concerning buried human remains.

**Early Settlements** (es)- These include areas outside Vieux Carré oriented towards certain physical features such as Bayou St. John, Bayou Road, the Mississippi River, and the Gentilly and Metairie Ridges. Early settlements were scattered across the landscape and
not concentrated in the urban core of the colonial and early American period, making it difficult to pinpoint their precise location. Polygons associated with this theme represent the general vicinity of the early settlements and were drawn slightly larger than the known occupation area due to assumed historical map inaccuracies.

**Historic Native American Settlements** (na): There have been few locations in the urban core of New Orleans that have produced evidence of Native American occupation just prior to or during the early colonial period, when tribal groups moved their settlements frequently (Dawdy 2008). Although historical documents describe Native American settlements along the Mississippi River, Bayou St. John, and other areas, little is known archaeologically about the exact location or extent of these types of deposits. When drawing polygons associated with this category, I created a large buffer around a Native American settlement due to the inaccuracy of pinpointing a settlement location.

**Industrial and Manufacturing Areas** (id): During the colonial period, industry and manufacturing included cooperages, brick works, forges, and work yards. After 1880, some operations grew quite large and included processing plants, brick yards, factories, chandleries, ship yards, and slaughter houses. As urban areas grew, city government relegated industry to certain locations, often away from public and residential areas.

**Levees** (lv): This polygon category represents constructed levees (as opposed to natural ones), most of which stretch along the Mississippi River.

**Military** (ml): Polygons associated with the military include troops’ barracks, defensive outposts, military camps and fortifications, and military bases. During times of conflict, militaries often drafted plans or detailed maps. Maps that indicated military engagements are limited to the War of 1812 and the Civil War.
Previously Impacted Areas (imp): This category was originally proposed, but after additional thought, I decided there was an inherent danger in labeling areas as previously impacted without any subsurface testing. For example, in the 1970s, two separate excavations were carried out at the Old U.S. Mint (16OR52) (Castille 1978; Gibbens 1978). Based on these excavations, it was though that the Mint’s construction destroyed any subsurface remains of Fort St. Charles, which occupied the site at an earlier date, as well as any other archaeological deposits. However, in 2008, my research team uncovered intact portions of the fort’s wall and moat, demonstrating that there is remarkable archaeological preservation at some locations within the city, even after intensive urbanization (White, Foster, et al. 2009). Even historical canals, that may have impacted earlier material remains during their construction, were filled in eventually and may contain retaining walls and dumped historical material useful for understanding the historical past. Therefore, this thematic category has few associated polygons and does not take into account all potential disturbances that may have impacted the archaeological record (e.g., underground parking garages, large construction projects, historical canals, areas affected by river migration), and especially possible disturbances to archaeological data after 1940.

Plantations (pt): Historically, plantations normally comprised an estate with large tracts of land used for agricultural purposes. As the New Orleans population expanded, the land around the city became more valuable. As a result, many plantation owners near New Orleans subdivided their property into city blocks and lots. Some of the city streets represent old plantation boundaries. When possible, some polygons (e.g., those drawn from the B_1834_Zimpel map) indicate the concentration of structures with a higher
potential for discarded material culture and subsurface deposits within the larger plantation complex instead of the entire plantation. There is not a plantation theme for the French colonial period.

**Port Facilities** (prt): Locations associated with maritime activity such as wharves and docks, anchorages, and lighthouses represent this theme.

**Recreation** (rec): The recreation category includes areas such as fairgrounds, amusement parks, and other recreation areas. This theme is limited to the nineteenth and twentieth centuries.

**Residential** (rs): The French colonial period is the only temporal category that has residential as a thematic category. The only residences that were digitized for the French colonial period were those labeled in map keys. It was outside the scope of this GIS project to digitize every residential structure on the historical maps due to the sheer number of domestic locations in the later periods and the variability of how (and how many) individual residences were included on historical maps.

**Squares** (sq): This category focuses on open, planned spaces such as city squares.

**Historic Town Limits** (hs): The metro area is comprised of many municipalities. Historically, many more existed, such as the towns of Lafayette, Carrollton, and Jefferson. These towns were eventually annexed into the current cities and towns that fall within the project boundary. In some instances, the names for communities have changed. The names and limits for previous historical communities were documented so that researchers will know the locations of these settlements. These polygons were useful for the archaeological buffering in subsequent analyses presented in the following chapter since they marked core concentrations of urban settlement.
**Transportation Corridors** (ht): Linear corridors were important features that often marked the beginning of development in an area of the supersite, and subsequently served as important routes to move people and goods. These features were divided into canals (can), roads (rd), railroads (rr), and streetcar lines (car). Inevitably, other development sprang up along these routes. As modes of preferred transportation changed through time, certain types of transportation died out, like many of the streetcar lines that once crisscrossed the city. Additionally, other historical features associated with transportation were documented such as switching stations, rail yards, depots, streetcar barns, and powerhouses.

**Utilities** (utl): Utilities are associated with water, sewer, drainage, trash collection, and dumps. The access to water, sewer, and trash removal services is especially important to understand the locations, types, and ages of archaeological deposits. Before, these services were established, city residents and businesses typically had wells for water, privies for human waste, and disposed of trash on or near their property. Once governments or companies orchestrated these services, properties contained less trash and associated utility features such as privies, wells, and cisterns were abandoned. Furthermore, historical water, drainage, and sewer lines are important archaeological features themselves, as these lines were constructed in different locations in the city at different times. This research theme is restricted to the nineteenth and twentieth centuries. It should be noted that even today, the configuration of many older, inactive utility lines are not accurately documented, because it was easier to abandon lines rather than remove them once they were no longer needed.
Map-Feature Polygon Digitization

With the thematic categories outlined, research progressed to digitizing historical map features into polygons. The digitization process involved tracing the outlines of the historical-map features with the ArcMap editor tools (Figure 5.2). Once digitized, the map feature is represented as a polygon in the HGIS vector geodatabase. This process was repeated for every map in the raster geodatabase.

Figure 5.2. Polygon digitization of historical map features. The blue areas represent map features digitized into polygons.
Some map features were digitized even when the map may not be included in the raster geodatabase. In particular, maps dating to the early eighteenth century could not be georeferenced because the scale and/or physical landscape features were inexact—inaccuracies were due to the limits of geographical knowledge at that time. However, these drawings contain crucial information about the earliest days of the city’s founding. Using the information on the maps, I created polygons that suggest the general vicinity of these early settlements. This afforded a chance to capture the approximate location these significant features in GIS even if the exact coordinates in Euclidean space are unknown.

The purpose for the polygon digitization is three-fold. First, it turns a feature depicted on a historical map into polygon vector object that can be selected, statistically manipulated, quantified, or queried with GIS analysis. GIS accomplishes this by assigning attributes to the vector objects (discussed in more detail below). Second, it creates a visual object in the form of a polygon that is a spatial representation of an area of past human activity, which could contain archaeological deposits. The importance of creating a visual object to mark a potential archaeological deposit cannot be overstated, especially when the distribution of the geodatabase extends beyond archaeologists and gets into the hands of planners, developers, and other non-heritage-minded decision makers. Finally, the digitization process provided a way to comply with archival user agreements restricting image redistribution by extracting map feature data into sharable feature class files. Information about the digitized map-features is recorded in the feature class metadata, directing the user to the appropriate holding archive.

In summary, the vector component of the HGIS geodatabase comprised five datasets reflecting the five major periods in the city’s history (feature class totals in parentheses): French Colonial (16), Spanish Colonial (17) Antebellum (20), War & Aftermath (17), and Industrial &
Within each temporal dataset was a series of feature classes. Each feature class represented a research topic theme within each temporal theme. There were 74 feature classes representing over 3,000 polygons.

**Attribute Tables and Data-Entry Methods**

Each feature class has an attribute table that contains information about individual polygons and what features on a particular historical map the polygon represents (Figure 5.3). Each map-feature polygon has corresponding attribute data. Attribute data in the tables include the name and/or description of the feature (e.g., St. Louis Cathedral), the maps used to provide the feature information (i.e., map name, date, cartographer, and holding archive), thematic category (e.g., religious) and temporal period (e.g., Spanish Colonial). Below are the specific tabular fields:

- Polygon Name
- Map ID- the short file name used in the historical map in the raster dataset
- Map name
- Map date
- Map cartographer
- Holding archive for the original map source
- Corresponding temporal themes (maximum of three categories)
- Corresponding research topic themes (maximum of three categories)
- Map label name (this the name for the feature on the historical map)
- Description of the item
- Any associated archaeological site number
Some attribute fields have abbreviated codes similar to the two to three letter thematic codes. The attribute data provided an opportunity to perform additional GIS analysis and querying for future research.

Figure 5.3. Data entry of tabular attributes.

During the polygon digitization, just enough attribute data was entered into the tables to distinguish one polygon from another. Once the polygons for a particular attribute table (i.e., feature classes) were complete, I exported the attribute tables out of ArcMap into Microsoft Excel where it was easier to enter data and edit tables. Once the tables had correct data in Excel, columns of data were copied and pasted back into the attribute tables in ArcMap. As a final step, the attribute tables were checked for accuracy and data entry errors.
In an effort to minimize data-entry errors in the attribute tables, I created domains for several attribute categories, both in ArcGIS and Excel. Domains are the range of valid values for a particular attribute field. Database domains function like a drop-down menu and will only allow certain predefined values to be entered into a field (Tennant 2007). This minimized data-entry error while ensuring consistency and facilitating speedier entry.

In the tabular data, the main research topic theme (i.e., topical_theme_1) was always the feature class in the HGIS geodatabase. For example, for the religious feature class in the French-colonial-period dataset, the main research topic theme would always be religious. Secondary assigned themes overlapped with the main research topic theme. For example, the Ursuline Hospital is a polygon in the hospital feature class; therefore, the main research theme was hospital. The secondary research theme is religious because the Ursuline Hospital was run by a religious order. This allows researchers to search across all theme fields when querying for a particular topic of interest.

Vector Data: Previous Archaeological Research and Collections

Another component of the HGIS vector data included information about previously recorded archeological sites, archaeological surveys, and associated collections material within New Orleans. The Division maintains an inventory of known and recorded archaeological sites in Louisiana as mandated by the National Historic Preservation Act of 1966, as amended. In 2005, the Division began maintaining their archaeological site and survey inventory in a GIS platform. As mentioned above, each recorded site and survey in GIS has corresponding tabular information. Tabular information is based on data from site forms and the Division’s LACAD

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17 In this section, I use the term site in the conventional sense and do not make reference to the supersite.
coding forms, which include information such as the site-number, cultural-affiliation, and site-function categories.

The Division provided two vector datasets for the GIS analysis: recorded archaeological sites (i.e., site polygons) and survey shape files. I supplemented the datasets by adding information including the level of effort from previous archaeological investigations (e.g., monitoring, shovel testing, excavation), current collections repository information, and how information gathered might relate to the temporal and research topic themes defined in the HGIS geodatabase. This information was an integral component of the HGIS vector geodatabase because it provided an overview about what is known archaeologically about the New Orleans supersite.

Using the Division’s data, it was necessary to determine first which sites and surveys were located in my geographical area of study area. In other words, I needed to limit the data to just what was within the footprint of the New Orleans supersite. Next, I created a spreadsheet for these sites. Spreadsheet fields included the following categories: the Louisiana state assigned site number, site name, site recorder, dates of field work, site survey methods, associated report numbers, curation facility location (if applicable), accession numbers, number of boxes of curated material, any collections notes, temporal and research themes associated with the site, and themes notes. Using site forms and archaeological reports, I was able to complete these fields and obtained an initial understanding of the amount of archaeological work conducted at a particular site. Most site reports are on file at the Division, and many are available electronically. I was able to include information from the survey reports that not only identified archaeological sites, but also locations that were tested, but did not yield artifacts.
For information on where archaeological collections were curated, I examined site forms and reports. However, it is common knowledge that some of the information on site forms is incorrect; just like some historical maps, the curation information is simply copied from one form to the next. I contacted the various private CRM companies, universities, the Division, and other potential repositories to confirm that an organization did indeed have the collections. If the organization did have materials, they were asked for the accession numbers and estimated number of boxes. Older collections—especially those collected prior to the 1980s—often were more problematic to locate. Many sites had multiple years of fieldwork, and thus had collections from various years that were curated by different organizations. The spreadsheet contains all of this collections information, including sites that may have materials at more than one organization. The final spreadsheet includes information about nearly 600 sites in Orleans Parish. In ArcGIS, users can join or relate the spreadsheet data to the Division’s archaeological-site data by the site number or other feature-class attributes.

Additionally, I used the Division’s recorded site data to link and relate overlapping historic and archaeological datasets. When deciding if there were archaeological data that could correlate with digitized map features, a comparison was made between overlapping map-feature and archaeological-site polygons in ArcMap. Some sites had known feature correlates (e.g., St. Louis Cemetery), so I would enter the archaeological sites number in the relevant data tables. However, in some cases where polygons overlapped, it was difficult to correlate map-features and recorded archaeological sites. For example, there were numerous map-feature polygons that overlapped with the archaeological-site polygons for the customs house. While these do not seem to have clear correlations, the customs house site was listed in the associated-sites field to help guide researchers. In the cases of large map-feature polygons like early settlements, even if
there were overlapping polygons, these map-feature polygons were not given site number correlates due to their large size and inaccurate depictions on historical maps.

**Vector Data Limitations**

There are some drawbacks to working digitally with historical maps (Rumsey and Punt 2004). It is important to note these disadvantages since they can affect the data generated in GIS and the interpretations drawn from GIS about archaeological sites. These limitations are especially relevant since the data drawn from the selected maps is used in subsequent GIS analysis. Limitations include: gaps in the date ranges of the selected maps; the intended purpose of a map; cartographic inaccuracies and surveyor errors; and exaggerations and/or omissions of map features. Any users of the New Orleans supersite geodatabase must be aware of these limitations; they are briefly summarized below.

First, New Orleans did not develop at a steady pace, but rather in spurts. As a result, there are gaps in the availability of historical maps for certain date ranges. Users of historical maps should be aware of a map’s intended purpose and should realize historical maps may not be entirely correct. A few maps, especially some earlier colonial maps, may have cartographic inaccuracies and surveyor errors, especially in areas outside the developed core of the city. Some maps exaggerated or omitted elements of the historical landscape of New Orleans. These omissions and exaggerations can translate into inaccuracies in the HGIS data. Users should be aware that just because an area is not illustrated as developed does not mean that the area was void of human activity and settlement. This is especially true for disenfranchised groups that may have settled on the fringes of urban society—the very groups that archaeology is particularly well-suited to study. While inaccurate cartographic sources have flaws, they still
contain important information for understanding the past and should not be ignored. Furthermore, inaccuracies on maps and in historical records underscore the need for archaeological testing, in combination with other historical research, to create a more accurate and holistic understanding of the past.

Conclusion

This chapter discussed the creation of the New Orleans supersite geodatabase. Phase I included archival research and the georeferencing process for the historical maps included in the raster geodatabase. The second phase focused on vector data creation. This research involved extracting data from the historical maps and organizing the data into temporal and research topic themes useful to archaeologists, planners, and other scholars. The New Orleans supersite geodatabase now comprises a raster geodatabase of georeferenced historical maps and a vector geodatabase of data extracted from the historical maps and combined with relevant archaeology and environmental data. With the completion of the HGIS geodatabase, I moved on to the final phase of geospatial analysis. In next chapter, I demonstrate how to utilize the New Orleans supersite geodatabase.
Chapter 6. Analysis and Results

By researching, creating, organizing, compiling, and analyzing various historical, archaeological, and environmental datasets via HGIS, as discussed in Chapters 4 and 5, I have provided the framework for a more detailed view of past urban activity in New Orleans. This body of work operationalizes the urban archaeological supersite paradigm, which can help archaeologists locate buried archaeological deposits for study and/or protection. In this chapter, I demonstrate the utility of the geodatabase to research aspects of the New Orleans supersite. Weaving disparate datasets together harnesses the powerful capabilities of GIS. The benefit of using all the data in tandem is that one can ask increasingly specific questions as one delves into the data. I illustrate this, first by describing how I used HGIS analysis to chart the urban growth of New Orleans and produce temporal growth maps. These maps are a quick way to gauge the age of past activity areas and the estimated limits of the supersite’s size at selected points in time. Next, to show how the temporal and functional data can be used, I provide an example of the process of researching the spatial relationships between city development and cemetery location. Finally, in the last section of this chapter, I research a specific location to understand discrepancies in the historical and archaeological data. Using the area surrounding Bayou St. John, I examine the existing FEMA probability model in relationship to my research. Relying on this probability map prompted numerous surveys on properties adjacent to the bayou, with limited results. Using the New Orleans supersite geodatabase, I investigate possible explanations for the survey results and propose a revised map of archaeological sensitivity along the banks of Bayou St. John. My results demonstrate the success of conceptualizing the city as a supersite, and the benefit of different approaches to using GIS in an urban context in comparison to traditional archaeological probability models.
Mapping New Orleans through Time and Accounting for Marginalized Populations

Using the New Orleans supersite geodatabase of georeferenced historical maps in combination with the thematic and temporal polygons, I produced several maps that chronicled the areas of urban settlement through time with a focus on archaeological resources. This task was achieved by selecting certain temporal and thematic polygons representing areas of historical land use. The temporal and thematic polygons were created by extracting data from historical maps. However, as discussed in Chapters 4 and 5, maps do not always reflect historical realities and there can be a time lag between the development of areas and when maps depict these developments. To account for this discrepancy, I applied buffering analysis to the polygons. Buffering is a type of spatial analysis that creates a zone or series of zones around a map feature (polygon). The buffer can be set at defined units of measurement such as distance. More specifically, I relied on buffering analysis to create graduated rings of potentially occupied areas in order to identify those most likely to contain archaeological deposits. I employed buffering to take into account mapping discrepancies, and the time lag between gathering map data and map publication. I also used buffering as a way to consider those who occupied the margins of a community and may have been selectively omitted from official records.

Mapping the City’s General Growth through Time

In order to create a series of maps that model the general growth of the historic city core, I performed GIS analysis in the New Orleans supersite geodatabase. To map the city’s growth through time, I first selected individual polygons from the vector datasets to use in the geospatial analysis. Certain larger polygons in thematic categories such as the town and the early settlement overlapped the smaller polygons (e.g., banks, cemeteries categories). Therefore, it
was not necessary to use the smaller polygons since they were redundant. Additionally, these large-polygon categories outline the core limits of historical development as depicted on historical maps in the HGIS raster data and thus they were the best indicators of the geographical limits of historical land use and occupation for each temporal period. Therefore, these larger polygons (and some of the smaller ones) were merged into a new feature class (e.g., FR_All_Model_Polygon) used to run subsequent GIS analysis. To see which polygons were incorporated into the analysis, users should refer to the feature class dataset for each time period located in the HGIS vector geodatabase. While the majority of the polygons for a particular temporal period were represented in the newly created feature class, some categories, such as transportation corridors, were not used in this process as they were not the best indicator of the urban settlement core. Essentially, I overlaid the footprint of the historic city through time to produce a single composite map. Figure 6.1 illustrates the growth of the urban core of New Orleans across nearly 300 years.

**Accounting for Time Lag and Marginalized Communities**

As discussed in Chapter 4, historical maps do not always reflect reality. Marginalized and less affluent groups were more likely to be excluded from maps and other ‘official’ historical records. Cartographers may have been less inclined to chart activity located on the fringes of a city because they assumed activity was less permanent, less desirable, and/or was associated with disenfranchised people and communities. Additionally, there can be a gap in time from when people occupy an area to when the area appeared as occupied on a map. Since the analysis drew directly from the polygons in the HGIS vector geodatabase, I needed a way to compensate for archaeological deposits that may be situated on the periphery of more well-established, urban
development. To account for some of the historical map omissions and inaccuracies, I was generous when drafting certain polygon boundaries, such as the general location for Native American settlements, during the vector-data creation phase. Additionally, I applied a 1000-meter buffer (in ten, concentric 100-meter buffering intervals) around select polygons during the GIS analysis process resulting in a series of concentric rings around the polygons. The buffering distance of 100 meters was selected because this distance corresponds roughly to the size of a
city block. To accomplish the buffering analysis, I used the multi-ring buffer tool in ArcMap employing both the dissolve-all and the outside-polygons-only options. The buffering process created a new feature class displaying the buffering intervals (e.g., FR_All_Model_Polygon_Multiring). The results of the buffering effect should be seen more of as a gradient of sensitivity, with the known areas of activity and occupation at the core, the darkest colors, and fading to lighter colors representing a reduction in archaeological sensitivity. Together, these gradients create a buffer zone around the historic urban core. This is in contrast to typical probability maps, which have sharp boundaries for high, moderate, or low probability for archaeological sites.

Once I used ArcGIS to draft the buffer zones, erroneous material needed to be trimmed to clean up the maps. Erroneous material comprised buffer rings that extended outside the project boundaries or into the areas of major water bodies, such as the Mississippi River. I used the ArcGIS clip and erase tools to clean up the maps. Each time the ArcGIS program utilizes these tools, the program creates a new feature class. The first step involved clipping the polygon feature and the buffer feature classes to match the project boundaries.

The nest step involved the erase tool, which I used to erase erroneous buffering rings or historical-map feature polygons that extending into areas of major water bodies (i.e., the Mississippi River, Lake Pontchartrain, and parts of the Industrial Canal). It was assumed that major dredging in the river, Industrial Canal, and along the lakefront would have negatively impacted traces of past human activity. To accomplish this task, I used the major-water-bodies feature class to erase areas from the two boundary clipped feature classes. The reasoning for this step was to remove polygon data from major water bodies because archaeological features and deposits, which might have once been located in the areas of these major water bodies, would no
longer be intact—at least in theory. For example, the nineteenth-century location of the Ursuline Convent was located within the footprint of the existing Industrial Canal. Presumably, the canal’s construction would have destroyed the remains of the convent.

The result of this geoprocessing was the creation of two sets of data: 1) a series of new feature classes illustrating the buffer zones, and 2) illustrated map images. Once the steps to create a map were completed, I repeated the steps for each of the identified temporal periods. Due to the explosive growth during the antebellum period, there are two maps representing urban growth for this temporal period (circa 1829 and 1855). The results are presented in a series of six maps (Figures 6.2 to 6.4). These maps represent the core of urban settlement during the following periods: French colonial, Spanish colonial, early antebellum, late antebellum, war and aftermath, and industrial.

As a means to test the buffer analysis, I attempted to plot sites designated as containing an antebellum component in relationship to the circa 1855 antebellum buffers. If the majority of the sites designated as affiliated with the antebellum period overlapped with the antebellum town core and buffer zones, it would support the usefulness of the buffering analysis. Using the Division’s site polygons, I queried for sites with an antebellum cultural affiliation (occupation date). At first blush, most of the sites appeared to be located within the core or the buffer zones. However, when I looked more closely at the data, 25 out of 66 sites were located outside the buffer zones. A few sites were either associated with shipwrecks or predated the colonial settlement of New Orleans, and thus deleted from this exercise. A cluster of 17 sites were single house lots located in the lower ninth ward, located outside the antebellum buffer zone in an area unlikely to have been occupied with any regularly as it was still swampy during that time period.
Figure 6.2. Areas of concentrated historical development in New Orleans ca. 1731 and ca. 1790s.
Figure 6.3. Areas of concentrated historical development in New Orleans ca. 1829 and ca. 1855.
Figure 6.4. Areas of concentrated historical development in New Orleans ca. 1880s and ca. 1930s.
Most of these sites were recorded during the FEMA-funded demolition-monitoring project discussed in Chapter 3 and, in most instances, the level of field work was limited to surface inspection. I reviewed some of the site forms for these sites, which confirmed my suspicions that the GIS attribute data did not reflect an accurate understanding about the occupation of these sites. While filling out the LACAD coding form, recorders could have marked cultural affiliation (occupation dates) based on a combination of archaeological and historical documentation or based on the range of the manufacturing dates for the artifacts. For example, if whiteware or ironstone ceramics were recovered from the site, an archaeologist might have checked the antebellum period since that is when these ceramic types were first manufactured, even if the site was not occupied until the 1930s. Alternatively, there could be erroneous errors in the GIS data.

Subsequently, I took a closer look at all the attribute data for the Division’s Orleans Parish site polygons to see there if there were any suitable fields for testing the buffering analysis. Overall, I concluded there are too many inconsistencies to use the data reliably. For example, out of 691 sites in Orleans Parish, only 23 were designated as being associated with the urban setting! This number should be considerably higher since the majority of historic sites in Orleans Parish are historic and their site function should be considered urban.\(^\text{18}\) Therefore, inconsistencies among how archaeologists complete the LACAD forms and/or errors in GIS data-entry make the use of these attributes questionable at this time. A considerable amount of effort would be needed to cross-reference the LACAD data with archaeological site forms and reports, which is beyond the scope of this research.

\(^{18}\) There is no limit to the number of site functions a recorder can mark on the Louisiana site form because a site can be multi-component and multi-functional. For example, a site can be marked as urban, industrial, and associated with historic transportation.
Understanding the Urban via HGIS

In addition to the temporal growth maps, users have many supplemental data at their disposal in the various HGIS datasets. In order to best use the New Orleans supersite data, all components need to be used in tandem. Since the temporal growth maps represent the historic urban core, one should never assume the urban settlement and archaeological buffering analysis maps are the only sources of information regarding historical development and archaeological potential. Users should consult additional data in the New Orleans supersite geodatabase, such as the research-theme vector data, environmental data, and the historical-map raster data.

Moreover, it is crucial to remember that one premise for the urban archaeological supersite paradigm is that the entire city comprises an archaeological site. That is, one should assume there is always a potential for archaeological data and focus efforts on examining the ages and functions of locations and use of spaces in the urban past. The urban settlement and archaeological buffering analysis provide only general information for management decisions. If there is to be ground disturbance as part of a development project, archaeological investigation should be considered to ensure that there is solid information to base any management decision.

In other words, a host of tools should be used for wise decision-making. Below is an outline for how to examine a particular geographic location or area of interest followed by steps to examine particular research themes. Next, I provide an example of research using specific data.

Examining a Particular Research Location

To examine a particular geographic location or area of interest follow these steps:

1. Using ESRI ArcMap and the HGIS data, find the geographic location, area of interest, or area of potential effects.
2. Check the archaeological datasets, which include the Louisiana Division of Archaeology site and survey information to see if there is already a recorded archaeological resource in the general area.

3. Look at each of the temporal growth maps to see if the area falls within the outline areas of historical development or within any buffered polygons.

4. If the area of interest does fall within the one or more areas of historical development, the temporal growth maps will provide general dates for the historical occupation and/or activity. If the area does not appear in any of the urban settlement modeling maps, then the area was likely developed after 1930 (provided the area looks developed on a modern aerial map). Note the temporal range of my research only extended to circa 1930. Material remains and archaeological data of human activity after 1930 are certainly abundant in New Orleans and would be considered archaeological resources as they fall within the 50-years-or-older parameter established by the National Park Service.

5. Use the thematic vector data (i.e., the thematic polygons) to provide a general understanding of the function or types of archaeological areas and historic activity in the location of interest.

6. Once the temporal growth maps and the thematic data have been used, inspect the various georeferenced historical maps (i.e., the raster data) to provide more detailed information about documented human occupation in the project area.

7. Finally, explore the metadata, as well as additional archaeological and environmental GIS datasets in the New Orleans supersite geodatabase for supplemental information.
Examining a Particular Research Theme, Time Period, or Site Function

For users interested in a particular research theme, time period, or particular function, follow the general outline of steps presented below:

1. In ESRI ArcMap, add the temporal and research topic feature classes from the New Orleans supersite geodatabase.

2. Within the feature class of interest, the user should select the particular polygons that correspond to their research interest or temporal period. Next, they should note the historical maps used to create the selected polygons (these are referenced in the tabular data), as they may want to consult these maps as well.

3. Next, using the HGIS raster geodatabase, select and examine the georeferenced historical maps that correspond to the data selected above. These georeferenced historical maps, as well as the supporting metadata, can inform the user about the digitized features and can provide a more detailed understanding of their research interest.

The two basic guides outlined above serve as a start for someone using the New Orleans supersite geodatabase. However, the real power of the HGIS database is best illustrated by addressing a specific research problem. Below I explore the spatial relationship between cemeteries and urban development at a specific point in time, and through time, to see if cemeteries can be markers of city growth in New Orleans. Below, I outline the process and research results.
Understanding Spatial Relationships between Cities of the Living and Cities of the Dead.

The aboveground cemeteries in New Orleans are popular heritage tourism sites. Many outsiders perceive these cities of the dead, and the practices associated with the deceased, such as jazz funerals and All Saints Day, as exotic. Today, over forty cemeteries are extant across the New Orleans supersite. They represent a mix of elaborate marble crypts and memorials, above-ground brick tombs and *fours*\(^{19}\), and potter’s fields for the burial of the indigent and unknown.

Urban cemeteries provide valuable insight to a community’s attitudes toward death, reflect the cultural and religious beliefs of the living, and can inform how those attitudes and beliefs changed over time. In many cities, cemeteries—known in the past for foul odors—were deemed nuisance activities and often were relegated to the outskirts of town away from populated areas. Examining colonial and nineteenth-century American cities, scholars have observed a common pattern of placing burial grounds outside the urban core, only to have these parcels of land subsumed into the cityscape by subsequent growth (LaRoche and Blakey 1987; Rothschild and Wall 2014; Sloane 1995; Upton 1997, 2008). Occasionally, older cemeteries and potter’s fields, which more often were no longer marked with grave markers and/or contained disenfranchised populations, were built over, the land being too valuable once it was surrounded by urban expansion. When the function of the land changed, human remains were sometimes relocated; in other instances, the bodies were left behind.

Examining New Orleans, Craig Colton (2005) and Richard Campanella (2008) have discussed the geography of situating undesirable activities toward the rear of the city—otherwise known as the back-of-town. Both authors discussed the placement of the city’s first cemetery beyond the limits of the town and suggested that New Orleans may have a similar geographical

\(^{19}\) Fours are tombs often built as walls surrounding a cemetery, although they are not unique to the city, they are often associated with New Orleans cemeteries (Upton 1997).
pattern of cemetery placement observed in other American cities. During my research, I too observed a possible pattern of cemetery placement when looking at maps of New Orleans. By examining the geographic locations and ages of New Orleans cemeteries, can we understand the limits of city growth through time?

To test this research question with respect to New Orleans, I examined the location of cemeteries through time using data from the New Orleans supersite geodatabase. First, I selected the various shape files (i.e., feature classes) that had information about cemeteries. This included the cemeteries shape file (one of the research topic themes), but I also queried archaeological site polygons for records of sites that are known cemeteries. Once the cemeteries were selected, I used the ArcMap join tool to merge these two feature classes (cemeteries and recorded archaeological sites). Using all the merged data, I created a new shape file called cemetery_location. Next, I used attribute data to ascertain an approximate founding date for each cemetery. Examining the spatial data and attribute tables also provided insight regarding how long a cemetery remained in use. This included information about a handful of cemeteries that closed, and whether they had been built over or were deconsecrated and the individuals relocated to another cemetery. Since the data in the cemetery_location tables were abbreviated due to limited character space, I referred back to the historical maps and consulted any references in the metadata that could provide additional context or clarification. This reference material included archaeological site forms, reports, and other historical sources. Table 6.1 provides an inventory of the cemeteries illustrated in Figures 6.5 through 6.8.

With the locations of the cemeteries plotted in ArcMap, I added a new feature class illustrating the limits of historical development through time. Conducting this spatial analysis, I was able to understand when each cemetery was established and if its location corresponded to
Table 6.1. Cemeteries in the New Orleans supersite.

<table>
<thead>
<tr>
<th>Cemetery Name</th>
<th>Est. Date</th>
<th>Site Number</th>
<th>Maps</th>
<th>Secondary Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Peter Street</td>
<td>1720s</td>
<td>16OR92</td>
<td>Anonymous 1725; Gonichon 1731</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>St. Louis No. 1</td>
<td>1789</td>
<td>16OR179</td>
<td>Trudeau 1798; Ogden 1829</td>
<td>Colten 2005; Campanella 2006</td>
</tr>
<tr>
<td>Girod</td>
<td>1822</td>
<td>16OR115</td>
<td>Ogden 1829</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>St. Louis No. 2</td>
<td>1823</td>
<td>16OR95</td>
<td>Ogden 1829</td>
<td>Colten 2005; Huber et. al 1974</td>
</tr>
<tr>
<td>Lafayette No. 1</td>
<td>ca. 1832</td>
<td></td>
<td>Mollausen 1845</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>Cypress Grove/Firemen's</td>
<td>1840</td>
<td></td>
<td>Walter 1955</td>
<td>Colten 2005; Upton 2008</td>
</tr>
<tr>
<td>Dispersed Judah</td>
<td>1846</td>
<td></td>
<td>Walter 1955</td>
<td></td>
</tr>
<tr>
<td>Charity Hospital</td>
<td>1847</td>
<td>16OR175</td>
<td>Walter 1955</td>
<td>Colten 2005; Upton 2008</td>
</tr>
<tr>
<td>Odd Fellow's Rest</td>
<td>1849</td>
<td></td>
<td>Walter 1955</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>Carrollton</td>
<td>1849</td>
<td></td>
<td>Walter 1855; USGS 1932</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>Greenwood</td>
<td>1852</td>
<td></td>
<td>Robinson 1883; Boesch 1934</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>1854</td>
<td></td>
<td>Walter 1855</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>Lafayette No. 2</td>
<td>by 1855</td>
<td></td>
<td>Walter 1855</td>
<td></td>
</tr>
<tr>
<td>Valence</td>
<td>by 1855</td>
<td></td>
<td>Walter 1855</td>
<td></td>
</tr>
<tr>
<td>St. Vincent de Paul</td>
<td>by 1855</td>
<td></td>
<td>Walter 1855</td>
<td></td>
</tr>
<tr>
<td>Joseph Street/Gates of Prayer No. 2</td>
<td>1850s</td>
<td></td>
<td>Robinson 1883</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>St. Louis No. 3</td>
<td>1854</td>
<td></td>
<td>Robinson 1883; USGS 1939</td>
<td>Colten 2005; Huber et. al 1974</td>
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<tr>
<td>Gates of Prayer No. 1</td>
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<td></td>
<td>Robinson 1883</td>
<td></td>
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<tr>
<td>St. Vincent</td>
<td>1859</td>
<td></td>
<td>Robinson 1883</td>
<td>Huber et. al 1974</td>
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<tr>
<td>Locust Grove</td>
<td>1865</td>
<td>16OR565</td>
<td>Robinson 1883</td>
<td>Hahn and McCarthy 2012</td>
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(table cont’d)
Table 6.1. Cemeteries in the New Orleans supersite.

<table>
<thead>
<tr>
<th>Cemetery Name</th>
<th>Est. Date</th>
<th>Site Number</th>
<th>Maps</th>
<th>Secondary Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masonic</td>
<td>1868</td>
<td></td>
<td>USGS 1932</td>
<td></td>
</tr>
<tr>
<td>Metairie Cemetery</td>
<td>1872</td>
<td></td>
<td>Robinson 1883; Boesch 1934 (expanded)</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>Holt</td>
<td>ca. 1879</td>
<td>16OR693</td>
<td>USGS 1939</td>
<td></td>
</tr>
<tr>
<td>Hebrew’s Rest</td>
<td>1918</td>
<td></td>
<td>USGS 1932</td>
<td></td>
</tr>
<tr>
<td>St. Mary (Uptown)</td>
<td>by the early twentieth century</td>
<td>USGS 1934</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Bartholomew</td>
<td>ca. 1850s</td>
<td></td>
<td>Robinson 1883</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>St. Mary (Algiers)</td>
<td>1860s</td>
<td></td>
<td>Robinson 1883</td>
<td>Huber et. al 1974</td>
</tr>
<tr>
<td>McDonoghville</td>
<td></td>
<td></td>
<td>USGS 1934</td>
<td></td>
</tr>
<tr>
<td>Olive Branch</td>
<td></td>
<td></td>
<td>USGS 1939</td>
<td></td>
</tr>
<tr>
<td>Unnamed Westbank</td>
<td></td>
<td></td>
<td>USGS 1939</td>
<td></td>
</tr>
<tr>
<td>Unnamed Westbank</td>
<td></td>
<td></td>
<td>USGS 1939</td>
<td></td>
</tr>
</tbody>
</table>

the edge of city development for the time period in question. The results of my research indicated that city cemetery placement is a good indicator of the urban growth of New Orleans. What follows is a brief synopsis.

French Colonial circa 1731 (Figure 6.5): New Orleans’ first designated cemetery was located beyond what was then the town limits (present-day Dauphine Street). Using current geography, it is located in the rear of the French Quarter bounded by St. Peter, Rampart, Toulouse, and Burgundy streets. The St. Peter Street or Vieux Carré cemetery severed as the primary burial ground during the French and Spanish colonial periods. By the late 1780s, the cemetery became over-crowded. Church and city officials closed the cemetery in 1788—although burials reportedly continued for another decade or so. Eventually, the city sold the land for redevelopment and community expansion quickly subsumed the old cemetery (Colten 2005; Huber et al. 1974). After 1806, the cemetery no longer appeared on city maps. As a result, the
interments of these colonial residents faded from memory for nearly two centuries until it was rediscovered accidentally during a construction project in 1984 (Owsley et al. 1987; Owsley et al. 1985). Archaeologists recovered 29 males, females, and children of various descents including African, European, and those of mixed ancestry. At the time of discovery, these remains represented one of the earliest samples of a colonial population in the United States. More recent excavations unearthed additional internments, primarily of African descent, densely stacked together, confirming just how overcrowded the cemetery was before it closed (Listi and Manhein 2013).

Spanish Colonial circa 1790s (Figure 6.5): With the St. Peter Street cemetery filled to capacity, the Spanish Cabildo authorized a new cemetery, St. Louis No. 1 in 1789. The new burial ground was outside the city walls, situated between the city commons and the Carondelet Canal. Serving the city as the primary burial grounds for more than thirty years, the cemetery enlarged in size to accommodate the growing number of deceased. Eventually, city officials established yet another new catholic burial ground even further away from the city (St. Louis No. 2) and abolished underground interments within the city limits (Colten 2005; Huber et al. 1974).

Today, the cemetery occupies a single city block; however, its footprint was once larger. In the early nineteenth century, residents expanded beyond the colonial core into the city commons. By the 1840s, many portions of St. Louis No. 1 had been abandoned—paved over to extend the street grid or platted for new development. Soon walls were erected to confine St. Louis No. 1 into the space of an orderly city block. A few years ago, archaeological investigations associated with the redevelopment of adjacent Iberville Housing Projects revealed burials extend an additional city block north and half a city block west of the current cemetery.
Figure 6.5. Location of cemeteries relative to the boundaries of the city, ca. 1731 (above) and 1790s (below).
This extended size closely matches the footprint depicted on historical maps and seen in the St. Louis No. 1 polygon in Figure 6.6.

Historical maps depicted a second cemetery on the grounds containing the Ursuline convent, hospital, and military barracks. This military burial site was located on the extreme edge of the complex near the corner of Royal and Barracks streets. In the 1820s, the government platted the portion of the property containing the hospital and barracks for sale and the Ursuline nuns relocated downriver to a new campus. Reportedly, those interred at the cemetery were moved prior to sale, but this has never been confirmed (Goodwin et al. 1987).

Antebellum Period circa 1820s and 1830s (Figure 6.6): As New Orleans expanded beyond its colonial core, the subdivision of large plantation tracts created new faubourgs such as the Marigny, St. Mary’s, and Lafayette. During the early 1820s, the Girod Street Cemetery (1822) and St. Louis No. 2 (1823) were established to serve the growing population of the city who were predominantly Catholic or Protestant. Francis Ogden’s Plan of the City of New Orleans, date 1829, identifies St. Louis No. 2 as the new catholic burial grounds. Today, the cemetery takes up three city blocks, although four city blocks were initially set aside for use. This included the block located between Canal Street and what is today Bienville Street, which was used to inter burials. However, the land was eventually placed back into commerce as a cotton press in the mid-1800s. Reportedly, human remains were discovered during construction in the 1960s on this block. While Catholicism prevailed during the colonial period, St. Louis No. 1 had a section for lying to rest those not of Catholic faith. The extension of the street grid through portions of St. Louis No. 1 reserved for Protestants and the enslaved necessitated the need for a new burial ground. Thus, the Girod Street Cemetery was established for New Orleans Protestants at the rear of the St. Mary’s Faubourg. The cemetery remained in use for more than a
Figure 6.6. Location of cemeteries relative to the boundaries of the city, ca. 1829 (above) and 1840s (below).
century, although it became dilapidated and overgrown as the downtown area developed around it. In 1957, it was deconsecrated and the burials removed to make way for the construction of the Superdome (Huber et al. 1974). Like many cemeteries, not all the remains are successfully collected and reinterred during relocation. According to the Girod Street Cemetery (16OR115) site record form, physical anthropologists from Louisiana State University collected “fragmented skeletal material representing at least 100 individuals” during construction of a department store in the 1980s.

The next two cemeteries designated in New Orleans were Gates of Mercy (1828) and Lafayette No. 1 (ca. 1832). Both located in what is today the Uptown area, they helped define the limits of urban development during the 1830s. The city of Lafayette arose from the subdivision of the Livaudais concession. Lafayette No.1 served as the municipal cemetery. Eventually the city of New Orleans annexed the city of Lafayette and with it the Lafayette Cemetery No.1. The Gates of Mercy was the city’s first Jewish cemetery; it too was located near the city of Lafayette, closer to the city’s swampy fringes. In 1957, the cemetery was deconsecrated and the remains of interred individuals were relocated to Hebrew’s Rest in Gentilly (Huber et al. 1974). The land was paved over and became home to a municipal facility.

Recent archaeological testing, however, has documented headstones, footstones, coping, and other funerary architecture (Hahn et al. 2016). This recent discovery demonstrates that while the physical remains of individuals were moved in 1957, evidence of the use of the location as a cemetery remain buried in the ground.

Antebellum Period circa 1855 (Figure 6.7): As the city continued to grow at an exponential rate during the nineteenth century, religious and benevolent organizations established additional cemeteries further from town. Most urban growth mimicked the crescent
Figure 6.7. Location of cemeteries relative to the boundaries of the city, ca. 1855 (above) and 1880s (below).
shape of the Mississippi River’s natural levee. The location of new cemeteries followed this crescent-shaped pattern of new development, although they were placed along the extreme rear edges of the city, known as the back-of-town. Uptown, this placement can be observed in the location of the Carrollton (1849), Lafayette No. 2 (ca. 1850s), St. Joseph and Valance (ca. 1850s) cemeteries (Huber et al. 1974). Similar to Lafayette No. 1, they were founded to serve the communities residing in the cities of Carrollton, Lafayette, and Jefferson, respectively.

By 1855, the Walter map illustrated the St. Vincent de Paul Cemetery located downriver in the creole suburbs. Similar to the geographic location of cemeteries upriver, St. Vincent DePaul abutted the undrained swamp, located only one block beyond Marais Street, which translates to swamp in French. Eventually, the cemetery grew to include three city blocks, labeled as Nos. I, II, and III.

By the 1850s, a large cemetery complex was located on high ground along the Metairie ridge at the end of Canal Street. Cypress Grove, also known as Firemen’s Cemetery, was the first to be established along Metairie Ridge around 1840. St. Patrick Cemetery (1841) soon followed serving primarily the growing Irish Catholic population in the city. Canal Street and modern-day City Park Avenue (previously known as Metairie Road) divide the property into three sections: St. Patrick I, II, and III. Next to St. Patrick II is Odd Fellow’s Rest, a triangular-shaped plot at the end of Canal Street. The Independents Order of Odd Fellows dedicated the cemetery in 1849, and within several years had constructed several vaults and tombs. In 1846, the city’s second Hebrew cemetery, Dispersed Judah, was added to the growing mortuary complex. More than a decade after the Firemen’s Charitable and Benevolent Association created Cypress Grove Cemetery, they formed the Greenwood Cemetery in 1852 on the north side of Metairie Ridge. The Charity Hospital Cemetery, formed around 1847, was a potter’s field for
those who died while receiving care. Located south of Canal Street in between St. Patrick I and Cypress Grove, it is easy to distinguish because all the burials were below ground so it stands in stark contrast to the adjacent mausoleums and mortuary architecture limits (Colten 2005; Huber et al. 1974; Upton 2008).

Post-Civil War into the Industrial Period circa 1880s and 1930s (Figure 6.7 and Figure 6.8): During the latter half of the nineteenth-century, the number of cemeteries continued to increase along the Metairie Ridge, even as urban expansion was encroaching closer to the area. In 1872, old Metairie Race Course became the Metairie Cemetery. The old racetrack is a central feature to the cemeteries grand design. Other smaller cemeteries and mausoleums such as St. Johns/Hope Mausoleum (1867), the Gates of Prayer No. 1 (1858), and the Masonic Cemetery (1868) were established (Huber et al. 1974).

Figure 6.8. Location of cemeteries relative to the boundaries of the city, ca. 1930s.
By the early twentieth century, some of nineteenth-century cemeteries had expanded their footprint as space allowed. This included St. Louis No. 3, Carrollton and St. Mary’s Uptown, and Metairie and Firemen’s/Greenwood cemeteries along Metairie Ridge. Taking advantage of higher ground provided by the Gentilly Ridge, a new cemetery complex formed where Gentilly Road meets Elysian Fields Avenue. Cemeteries opposite the Mississippi River from New Orleans included St. Bartholomew (ca. 1850s), St. Mary (ca. 1860s), McDonoghville, Olive Branch, and several cemeteries stretching into Gretna that are unnamed on the historical maps. The founding dates for many of these cemeteries are not as well researched and presumably were formed with the growth of the Westbank settlements during the latter half of the nineteenth and into the early twentieth centuries.

Burial grounds—in particular the underground internments—were viewed as a nuisance and health officials often questioned their lack of sanitary conditions. No place was this more prevalent than at the city’s overcrowded potter’s fields. Several potter’s fields, such as Locust Grove (1865) and Holt (1879), served as the final resting place for thousands of the destitute or those whose body went unclaimed for burial by family or loved ones (Hahn and McCarthy 2012). Once these grounds were full or no longer actively receiving burials, some were used for other purposes such as school grounds or thoroughfares, as was the case with Locust Grove and Charity Hospital No. 2 cemeteries, respectively. Essentially, they became ‘forgotten’ as they now lie underneath the modern city (Owsley et al. 1990).

The combination of geospatial analysis of the historical cartographic and archaeological data identify several cemeteries, and portions of cemeteries, that have been ‘forgotten’ and disappeared from the modern urban landscape. Sometimes through urbanization processes, cemeteries were relocated from their historical location to make way for urban development.
Such was the case with the Girod Street and Gates of Mercy cemeteries. As urban encroachment enveloped the area surrounding older cemeteries, like St. Peter Street and Locust Grove, underground internments were abandoned and built over. In other instances, some cemeteries, like St. Louis No 1 and 2, and Charity Hospital No. 2, were not completely erased, but rather were reduced in size to extend the street grid.

Finally, a few cemeteries appeared on maps whose use has yet to be confirmed. It is possible the cemetery location was incorrectly mapped or was a planned site that was never used. For example, the J.L. Boquera de Woiseri Plan of New Orleans dated 1803, illustrated a small “military burrying ground” just outside the city defenses, near what today would be Esplanade Avenue and Royal Street. This could be the same military cemetery associated with the Ursuline hospital, just miss-plotted, since the distance between the two cemetery locations is approximately 130 meters. Alternatively, there are some burial grounds that have been mentioned in historical records, but elude illustration on historical maps. Such is the case with a supposed cemetery near Bayou St. John and the Carondelet Canal that reportedly received the deceased following the 1833 yellow fever outbreak (Dessens 2016; Upton 2008). Plantations usually had their own gravesites for family members and enslaved laborers; it is likely that some of these still remain underneath the urban landscape.

Plotting Cemeteries in Relation to the Buffer Zones

As discussed above, I was unable to test reasonably the buffering analysis by using the Division’s site polygon dataset. An alternative way to test the buffer analysis was to plot the cemetery polygons in relationship to their corresponding temporal buffer zones. I had already successfully demonstrated that cemetery location was often along the extreme fringe of the
community. Therefore, overlaying these sets of data (cemetery polygons and buffering zones), I found that cemeteries were distributed within the buffering zones when plotted according to each temporal period. Figure 6.9 illustrates an example of the results of this analysis.

Figure 6.9. Location of recently established cemeteries relative to the urban core and the buffer zones ca. 1880s.

There was one notable exception—the cemeteries along Metairie Ridge during the antebellum period. The geographic shift of cemeteries to the Metairie Ridge can be explained by New Orleans’ unique geography and low-lying topography. The ridge provided higher ground, which permitted underground burials at much deeper depths than in other parts of the city. Additionally, theories about disease transmission, and near constant threat of deadly disease outbreaks that was especially prevalent during this time period in the humid port city,
encouraged the shift of cemeteries outward, away from concentrated population areas. Finally, the construction of a new canal and shell road in the 1830s, made the Metairie Ridge area accessible. As one would travel to this cemetery complex, the appearance of these mortuary monuments elevated on the landscape must have looked like a city of the dead rising out of the swampy terrain.

**Searching for Archaeological Evidence of Human Occupation along Bayou St. John**

Bayou St. John is a prominent feature on many historical maps of New Orleans. Even prior to the establishment of New Orleans, Bayou St. John was important to those living in the region. People have settled along its banks, extracted resources from the bayou’s waters and banks, and altered the geography of the bayou for defense and transportation. Many of these past activities would have left material traces that archaeologists should be able to uncover.

Looking for this evidence, archaeologists have conducted many surveys along this waterway, particularly looking for sites dating between A.D. 1000 and 1700. Yet, they have found little evidence of Native American occupation along the bayou. The one exception is Spanish Fort at the mouth of the bayou. Excavations there indicated human settlement of the area extends as far back as 2000 years ago (Boyko, Smith, et al. 2013). Given the importance of the bayou and the historic use of the area, why have so few archaeological deposits been uncovered?

The lack of documented archaeological resources is perplexing since historical records hint at Native American occupation along Bayou St. John during the seventeenth and eighteenth centuries (Kidder 2000). As recounted in Chapter 4, several French settlers made their home along the shores of the bayou ten years before the establishment of New Orleans. Throughout
the eighteenth and early nineteenth centuries, the use of the land around the headwaters of the bayou was mainly for agriculture and for homesteads, such as the Pitot House. Other activities included Tivoli pleasure gardens, and—for a short time—the Spanish Customs House. The area near the mouth of the bayou was home to a military fort, Fort St. John (commonly known as Spanish Fort), and was a popular spot for recreation, fishing camps, and there were some residences. Aside from the bayou’s natural levee immediate adjacent to the waterway, the area between the headwaters and the mouth of the bayou was covered by cypress swamps during this time.

**Human Modifications to Bayou St. John**

There have been many changes to Bayou St. John over the last 300 years. Some changes include human modifications to the bayou, which might have affected the preservation of archaeological sites. Using the New Orleans supersite geodatabase and supplemental historical information, types of modifications and human activity include:

- Cutting a channel at Devil’s Elbow—a sharp bend in the bayou. To assist with navigation, the bayou was straightened out, which created Park Island (also known as Demourelles Island). Figure 6.10 illustrates the original path of the bayou. LiDAR data and HGIS analysis indicate the elevation of the island is higher than the surrounding area, suggesting the spoil from the channel cut was placed on top of the newly created island. If there was occupation at the bend of Devil’s Elbow, archaeological remains could remain intact underneath the dredge spoil.

- Repeated dredging of the bayou during the nineteenth and twentieth centuries, which could have buried archaeological deposits and features or destroyed them.
Figure 6.10. Detail of the *Topographical Map of New Orleans and its Vicinity* by Charles Zimpel, 1834. This map illustrates the original course of Bayou St. John. The arrow points to the bend known as Devil’s Elbow. The yellow overlay is the modern outline of the bayou’s footprint today and indicates the location where a channel was subsequently cut to straighten the path of the bayou. The Historic New Orleans Collection, The L. Kemper and Leila Moore Williams Founder Collection, 1945.4.
• The WPA widened the northern portion of the bayou by excavating its western bank. This action nearly doubled the width of the bayou. Most of the excavated soil was likely dumped along the eastern bank. Today, the eastern side of the bayou has a higher elevation than the western side. The excavation of the western bank of the bayou would have destroyed any archaeological deposits.

• In the early twentieth century, drainage improvements in New Orleans resulted in the dewatering of the backswamp. The east side of the bayou was primed for development and a large amount of fill soil was brought in to elevate the land.

• On the west side of the bayou, the WPA was responsible for the construction of several golf courses, with numerous lagoons. The golf courses were located in City Park north of Interstate 610.

• In 1926, the Orleans Parish Levee Board started a seawall and levee improvement project that created new land along the lakefront and extended the mouth of the bayou. Additionally, levee construction placed a levee right over the remains of Spanish Fort.

• WPA restoration of Spanish Fort resulting in extensive ground disturbance. The excavation impacted earlier evidence of the fort as well as the earlier Native American occupation.

    Within the GIS platform, I examined using many of the historical maps in the New Orleans supersite geodatabase to understand the morphological changes to the Bayou St. John over the last three centuries. Five different USGS topographic maps are placed next to each other in Figure 6.11 to illustrate the changes to the landscape between 1891 and 1999.20 One can

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20 Numerous historical maps help to illustrate the landscape changes to the bayou. However, I have elected to use the USGS maps due to consistency and because these are in the public domain, and therefore, are readily available for publication.
observe the construction of the lagoons in City Park, the expansion of the lakefront, the growth of city development, and the widening of the bayou. Figure 6.12 is a side-by-side comparison of the modifications to the bayou. The map on the left represents the landscape in 1938. The map on the right dates to 1951. The footprint of Bayou St. John as it looks today is outlined in blue.

Analyzing my research via HGIS about a specific area within the New Orleans supersite, I was able to learn many things about past human activity along Bayou St. John and how urbanization processes could have affected earlier archaeological deposits. LiDAR and HGIS analysis suggests that some modification activities increased the elevation in some areas of the bayou. As a result, archaeological deposits would be deeply buried and likely beyond the reach of a shovel test (which typically extends to three feet below ground surface). Dredging and widening the bayou would have destroyed any archaeological evidence within this part of the supersite, especially along the western bank north of Devil’s Elbow.

Archaeological Survey and Methods at Bayou St. John

As discussed in Chapter 3, FEMA archaeologists created a probability model for the greater New Orleans area in response to the rebuilding of New Orleans following Hurricanes Katrina and Rita in 2005. Understanding historical activity associated with Bayou St. John, especially the possibility of colonial-period Native American occupation along the bayou, archaeologists delineated certain areas as having a high likelihood of containing archaeological sites. Figure 6.13 shows the archaeological probability model for the area around Bayou St. John. The color of each polygon indicates the level of archaeological probability: green=high probability for archaeological sites, yellow=moderate probability, and red=low probability. The footprint of Bayou St. John is indicated as the area in gray.
Since its creation, the probability model has guided much of the archaeological research in New Orleans, including the need for survey along Bayou St. John. As a result, FEMA has funded at least ten archaeological surveys adjacent to the bayou over the last thirteen years. These archaeological surveys have employed a variety of methods to identify archaeological
deposits, including shovel testing, trenching, and monitoring of construction activity. Figure 6.13 shows the location of the surveys (outlined in red) overlaid on top of the FEMA probability model. Note that most surveys fell within the high probability zone, in part due to the use of probability maps during the decision-making and planning processes.

Each archaeological survey resulted in the production of an archaeological report. Reviewing each report, I created a table of important information from each survey such as archaeological sites identified, survey methods, the depths of archaeological deposits, soil type,
Figure 6.13. FEMA archaeological probability zone model along Bayou St. John. The red outlines areas where there has been archaeological survey. Note the higher number of surveys in the green high probability zones.
and soil stratigraphy. In ArcGIS, I added this data to other historical and environmental data. The results of the surveys yielded interesting information about both the soils of the area and the nature of past human activity. For example, in City Park, areas of the golf course contain deep deposits of sand that did not match the typical soils indicated by the USDA Soil Survey (U.S. Department of Agriculture 1989). Environmental data and subsequent research indicated that this sand was likely associated with the Pine Island Trend, a remnant barrier island that lies underneath the more recent deltaic landform of New Orleans. Other archaeological surveys on the west side of the bayou suggest that in the 1930s, developers brought in two to three feet of fill to elevate the land before construction (Boyko, Fogg, et al. 2013; Boyko, Smith, et al. 2013). Some of this fill extends over the Pine Island Trend, which would have been attractive higher ground for past human settlement. This means that original ground surface lies underneath two to three feet of fill and that any archaeological site predating 1930 will be buried. If an archaeologist typically can only excavate a shovel test two to three feet deep, then the shovel test might not be going deep enough to locate a buried archaeological site.

The results of the archaeological surveys, coupled with the understanding of the human modifications to Bayou St. John, suggest the FEMA model needs refinement. A new archaeological-survey approach might need to involve deep coring or trenching to understand the soil horizons and to remove fill and overburden in order to reach the depth where archaeological deposits might be buried.

Results of Examining Bayou St. John via HGIS

HGIS analysis of the Bayou St. Johns area reveals why so few early archaeological deposits been documented. First, archaeologists have focused a lot of their testing efforts in the
wrong places. Human modification of the bayou including the removal of land on western bank would have destroyed evidence of previous occupations if they existed. The eastern bank, much of which was labeled low probability, has not been tested as extensively due to its low probability status and because access has been an issue. Finally, standard archaeological survey methods may not be suitable for parts of the Bayou St. John area.

Project results illustrated the need to update the 2005 FEMA probability model. When FEMA created the probability model, archaeologists had conducted few surveys along the bayou. Prior to 2005, archaeological testing had been restricted to the headwaters and mouth of the bayou. Since 2005, FEMA-funded archaeological survey projects, have contributed to our understanding of human occupation and use along Bayou St. John, even if the knowledge was a lack of material evidence. This contribution included deepening our understanding of the extent of the Pine Island Trend, explaining the modifications involved with City Park and the bayou footprint, as well as the absence of archaeological sites.

In the original archaeological probability model, there was an emphasis on the west side of the bayou in City Park. This project illustrated that north of Park Island, the WPA excavated and removed a large portion of the land adjacent to the bayou. Furthermore, archaeological testing indicated that an enormous amount of earth was moved to create the lagoons and sand was pumped into the area for golf course construction. As a result of my research, the archaeological probability for City Park should change from mainly high, to mostly low, except for a few certain areas.

If one were to redo the probability model of the area around Bayou St. John, I would make the following suggestions as illustrated in Figure 6.14 and Table 6.2. The color of each polygon indicates the level of archaeological sensitivity: green=high potential for archaeological
Figure 6.14. Revised areas of archaeological sensitivity and interest along Bayou St. John. See corresponding table for the numerical descriptions of each area.
Table 6.2. Descriptions about the areas in Figure 6.14.

<table>
<thead>
<tr>
<th>ID</th>
<th>History/Activity</th>
<th>Potential Resources</th>
<th>Previous Archeological Probability</th>
<th>Revised Archeological Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Originally cypress swamp. The area was felled for timber and had several drainage canals running through it. The area was drained in the early 20th century, and became part of the City Park extension. During the 1930s, the WPA constructed a golf course that involved extensive earth moving. A large portion of the west bank of the bayou was removed when the bayou was expanded.</td>
<td>Limited intact resources, likely disturbed.</td>
<td>High, Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>1</td>
<td>Part of a bend in the bayou known as Devil's Elbow. During the mid-1800, a channel was cut to straighten the bayou to improve the path for navigation. Dredging created the island. LiDAR elevation maps suggest the dredge spoil was piled on to the island. The area could have been the location of a Civil War fortification.</td>
<td>Colonial and Civil-War era deposits. If pre-1850s archaeological deposits existed, they would be deeply buried.</td>
<td>High, Low</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>Where the Carondelet Canal connected to the bayou. Location of the Bienville Drainage Machine.</td>
<td>Limited due to canal and drainage machine construction. Extensive culvert construction occurred in the 1930s.</td>
<td>High, Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>Area of the earliest French settlement and continued residential use. Includes the road connecting the bayou to the city, Tivoli Gardens, the Pitot House, and Spanish Customs House, and a street car barn and turn-around.</td>
<td>Colonial and 19th-century residential activity.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>Area of the earliest French settlement and continued residential use.</td>
<td>Colonial and 19th-century residential activity.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>Originally cypress swamp. The area was felled for timber. Developed during after 1860s. This area includes Camp Nichols established after the Civil war as the “Old Soldiers Home.”</td>
<td>Residential activity. Possible Native American sites.</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>6</td>
<td>Originally cypress swamp. The area was felled for timber. Added to City Park in the late 19th century. Was turned into a golf course with a large lagoon in the shape of Lake Pontchartrain.</td>
<td>Limited.</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Table 6.2. Descriptions about the areas in Figure 6.14.

<table>
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<th>Revised Archeological Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Location of Spanish Fort. The fort, also known as Fort St. Jean, was a colonial and early American fort. In the 19th century, the location became a hotel, then an amusement park. By the early 20th century, the area faded from popular use. The area was also home to Native Americans, we were the first to settle at the site possibly as far back as 2000 years ago.</td>
<td>Native American sites, military use associated with the fort, and recreational use of the area.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>8</td>
<td>The mouth of the bayou opposite Spanish Fort. This area was used for a variety of historical activity including recreation and residential.</td>
<td>Fishing camps and residences. Possible Native American sites.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>9</td>
<td>Little archaeological testing has been conducted in this area. The east side of the bayou still reflects the bayou’s natural shape and has not been altered like the west side. A shell road ran along this side of the bayou. Several fishing camps were located along the eastern bank.</td>
<td>Fishing camps and residences. Shell road and possible Native American sites.</td>
<td>High, Low</td>
<td>High</td>
</tr>
<tr>
<td>10</td>
<td>This area included early colonial settlement, portions of the Allard Plantation property, the Crescent City Rifle Club, and later the headquarters of City Park. Includes the Country Club that burnt down in 1903.</td>
<td>Residential activity and recreation associated with City Park.</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>11</td>
<td>Area set back from the bayou, behind the area with a high potential for colonial settlement. Indicated as cypress swamp until the 1830s, when parcels laid out.</td>
<td>Possible area for agriculture activity and later neighborhood development. Potential Resources: Possible area for agriculture activity and later neighborhood development.</td>
<td>High, Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>12</td>
<td>The location along Metairie Bayou. Archaeological survey has suggested this area has limited resource potential.</td>
<td>Limited.</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>13</td>
<td>Originally cypress swamp. The area was felled for timber. The Marginy Canal and the Southern Railroad once ran through the area, roughly located where Interstate 610 is today. Activity in the area included 20th-century construction and the former location of a garbage incinerator. There has been previous archaeological survey in portions of the area.</td>
<td>Limited intact resources, likely disturbed.</td>
<td>High, Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
sites, yellow=moderate potential, and red=low potential. When engaging with the data in a GIS platform, one can click on the different areas. A window will pop up offering a brief synopsis about history of the area, and what types of resources might be present (e.g., native settlement, canal, fort, etc.). I have included this information in Table 6.2. On the east side of the bayou, I expanded the area of high probability. Depending on the relationship with the Pine Island Trend, archaeological testing may need to go very deep to get beyond the twentieth-century fill material.

By researching the area around Bayou St. John, there are several outcomes to my project. One, combining archaeological, historical, and environmental data and performing GIS analysis helped refine our understanding of human occupation along Bayou St. John. Now there is a better idea where an archaeological site might be located. Two, the results of this project allow one to assess quickly and more accurately the archaeological potential of a location in an urban setting and can ensure the protection of archaeological sites for the public. Three, the results indicate that the FEMA probability model needs refining now that numerous archaeological surveys have been conducted in the New Orleans area over the past thirteen years. The success of the pilot study area of Bayou St. John can be expanded to encompass the rest of the city.

**Conclusion**

The New Orleans supersite geodatabase is a group of datasets that can be used together to understand past land use and infer the locations of specific archaeological data. A major goal of site location analysis on data I generated in the geodatabase is to provide as much information, in an easily accessible format, regarding the types of archaeological deposits that may be present on a property. The work presented in this chapter illustrates how the New Orleans supersite geodatabase can be utilized by providing some examples illustrating the benefits of combining
data spatially. Using specific themes, I demonstrated the relationship between cemetery location and city growth and how that relationship persisted for more than two centuries. This confirms patterns observed in other American cities where cemeteries where constantly being pushed to the outer limits of historical settlement (Rothschild and Wall 2014; Sloane 1995; Upton 1997, 2008).

Another major contribution is demonstrating how buffering analysis could be used to include marginalized populations. It is an improvement from the common practice of relying on historical maps (and other government-sponsored sources of data), to accurate reflect the urban landscape at a specific point in time due to the easy accessibility of datasets such as the historic Sanborn maps. It is difficult to get away from the reliance on these resources and hard lines on a map (a pitfall using geospatial data be it in paper map or GIS form) and these hard lines are common in planning like zoning codes and overlays. Soft and nebulous lines and boundaries are more suit to the humanities. Although fuzzy lines can be a challenge to incorporate in planning and zoning, they more accurately reflect the messy realities of past city building and urban life.
Chapter 7. Conclusion

Urban archaeology possesses the ability to reveal the city’s heritage and interpret it for present populations. The examination of past urban societies can provide valuable insight into modern urban problems. Furthermore, the urban archaeological record has much to tell us about the growth and collapse of complex societies and urban centers, sustainability and adaptation, and the effects of natural hazards, climate change, and invasive species (Smith 2014). Yet the archaeological records of the world’s historic cities are at risk.

In Chapters 1 and 2, I highlighted the growing threats to historic cities such as increased populations, urbanization, and heritage tourism. Heritage is also at risk because climate change is causing stronger hurricanes, sea level rise, thawing permafrost, and making other natural and human hazards, such as fires, floods, and droughts, more frequent and more devastating to urban populations. Although archaeology is now more commonly included in overall historic preservation discussions, threats to archaeological resources are not making their way into planning and policy discussions as often as they should. The accumulation of these problems has resulted in considerable damage to urban archaeological sites. Partially to address these problems, I proposed the urban archaeological supersite paradigm.

The urban archaeological supersite paradigm conceptualizes a historic city as one large supersite, with all areas containing data representing past urban activities. Building on previous urban archaeological research, I discussed in detail the advantages of the supersite concept in Chapter 2. The paradigm is an improved way to interrelate various archaeological deposits within the city (rather than examining them in isolation), making all archaeologically derived data valuable in understanding the city’s past, and treating urban archaeological heritage like a single system, which improves its management and perceived value in the public’s eye.
Drawing on advancements in GIS scholarship, one aim of this supersite paradigm is developing ways to manage the city as a single archaeological resource and creating updated strategies for integrating disparate urban data using HGIS with the goal of preserving urban archaeological heritage. The conceptual framework of a supersite in combination within geospatial data can be used to interpret the history of the city more holistically, revealing how different areas of the city are interrelated through space and time.

As outlined in Chapter 3, I operationalized the supersite paradigm via HGIS as a means to locate past areas of human activity with potential material remains. After reviewing how archaeologists have used GIS analysis to predict where archaeological deposits could be located, I determined many of these models are ill suited for the urban environment. Rather, in historic cities, historical GIS, which combine archival data—especially historical maps, archaeological, geographical, and other environmental datasets—offer the best chance at reconstructing the palimpsest of the urban past.

New Orleans is my case study for the urban archaeological supersite paradigm. In order to contextualize my data research, selection, and creation, I needed to frame the various histories of the city. This provided the proper context to evaluate various forms of qualitative and quantitative data that would eventually comprise part of the New Orleans supersite geodatabase. The historical overview presented in Chapter 4 was also useful in asking research questions of the geodatabase and interpreting the results of my analysis.

In Chapter 5, I detailed the methods used to create, organize, and analyze various datasets that comprised the New Orleans supersite geodatabase. These datasets consisted of georeferenced historical maps, vectors or polygon data representing features digitized from
Chapter 6 described three different GIS analyses I performed on the New Orleans supersite datasets. I also demonstrated the contributions of my research results to the field of HGIS and urban archaeology. These are highlighted in more detail below.

**Addressing Heritage Management**

The urban archaeological supersite paradigm not only enriches the understanding of the urban system, it is also an important way to insert heritage preservation into urban planning to reduce the risk to archaeological resources. One of the greatest challenges is integrating archaeology into long-range urban planning initiatives. Thinking about an archaeological supersite during planning can also make urban archaeology a less reactive activity. Early identification and coordination affords every opportunity to avoid or minimize any negative effects during the design and planning phase rather than having to salvage archaeological deposits prior to destruction. If archaeologists can incorporate archaeological preservation early in the planning process, we can appreciate and preserve the past while living in a modern city.

The supersite paradigm is rooted in the Historic Urban Landscape Approach, which promulgates ways to integrate the protection and incorporation of the city’s heritage with the needs of modern urban societies. As William (2015) extolled, archaeology is well suited to provide information about heritage for various stakeholders and communities and can inform planning and civic partners about past adaptation to urban life. Another goal is to understand settlement patterns and the distribution of resources for heritage management and archaeological decision-making. Drawing from recommendations for implementing the Historic Urban
Landscape Approach, my work identifies areas of archaeological sensitivity within the historic city so that stewards of urban archaeological heritage can take steps to avoid or minimize inadvertent damage to archaeological deposits prior to developmental activities.

GIS has become commonplace in addressing urban issues. Archaeology must be included as part of this urban GIS data-management system. Archaeological contributions should be more than just a shape file of known archaeological sites added to a city’s urban planning layers. Visually having something marked on a map heightens one’s awareness of it. However, many American cities have limited inventories of archaeological resources. How can planners and heritage professionals evaluate the impacts to and manage something that is not even marked or visually represented, be it in paper or digital form? Without explaining that there is an incomplete inventory, essentially hidden and undocumented ‘sites’ are not considered during planning, management, and implementation. The supersite paradigm is a way to address the lack of citywide archaeological surveys and low archaeology ‘site’ inventories. Instead, the paradigm recognizes that sites are everywhere in the historic city. Furthermore, the supersite paradigm is a means to help make sense of communities’ histories and culture, and it has potential to provide answers to ways cities may have responded to problems and issues in the past. These results could make people more vested in protecting the city’s heritage.

**Other Research Contributions**

My original research questions stemmed from the need to address the rising threats to urban archaeological heritage. The initial impetus for the supersite paradigm was rooted in the Historic Urban Landscape Approach. The overarching goal was to reduce the risk to urban archaeological heritage, using GIS-based solutions to managing archaeological data in urban
contexts. An additional benefit is an increase in the public’s appreciation of what archaeology can reveal about the urban past. Thus, in some ways, the urban archaeological supersite paradigm has practical uses and research values.

**Applying the Urban Archaeological Supersite Paradigm**

Additionally, there are many other research contributions my work makes to urban historical archaeology and HGIS scholarship. The first contribution is examining the city as a supersite by building the work of previous scholars who have advocated for this approach. I provided a new framework to link historical activities and locations with research themes. Harnessing the power of GIS makes it easy to associate particular uses of that property (research themes) with other locations, and to chart what happened to the area through time, all in a highly visual way. Using New Orleans as my case study, I established what this framework should be, demonstrated the methods needed to organize and create datasets, and carried out research and HGIS analysis to demonstrate its use and future potential.

My research illustrated how combining archaeological, historical, and environmental datasets in new ways, by adding spatial elements, can offer new avenues of inquiry into the urban past. Furthermore, my research is an example of how urban archaeology can further our understanding of the past and play a role in expanding the interdisciplinary aspects of HGIS scholarship as proposed by Lloyd and colleagues (2012). The research results demonstrate the potential uses of historical maps in HGIS and provide a valuable contribution to the historical archaeology and HGIS fields.

As previously stated, linking data via a supersite geodatabase can help those tasked with regulatory and management decisions make meaningful choices that help protect and preserve
the city’s archaeological heritage. As with the Alexandria, Virginia, example outlined in Chapter 2, citywide research designs and the ability to conceptualize and examine historic cities and supersites work best when there is a local archaeological organization focused on researching and protecting archaeological data about the urban past. Furthermore, the supersite paradigm is a mechanism to curate geospatial data when there is not a municipal or local archaeology program in place in the historic city (as is currently the case in New Orleans). Of course, there are still issues to address, such as who researches, creates, and maintains data. Nevertheless, the paradigm is still a possible solution that could be implemented to help scholars link data in the absence of a citywide program.

While this project featured New Orleans, my goal was to create a paradigm that researchers could apply to other historic cities with adequate historical, cartographic information and a rich archaeological heritage. However, I do not imply that all cities’ histories are the same or that urbanities all shared a similar set of urban experiences, quite the contrary. Each city has a unique set of relationships, experiences, actors, and circumstances that collectivity creates a city’s heritage. Instead, the paradigm incorporates a method to draw on each city’s unique historical, archaeological, and environmental records to connect various elements so that more inclusive and multifaceted histories can be written. Moreover, the supersite paradigm can be flexible for future, unexplored themes of urban life.

**HGIS Contributions and Rethinking ‘Site’ Location**

Through my research, I create an innovative approach for locating archaeological data in an urban context that involved generating GIS data, analyzing the data via HGIS, and using buffering analysis to understand archaeological sensitivity. Instead of a traditional
correlative/predictive model, I produce a dynamic geodatabase that can be used to understand past land use and infer the likelihood of intact archeological deposits within a specific area. This moves beyond looking at the location of archaeological deposits compressed into a single map like traditional predictive models, and instead looks at the distribution of archaeological deposits (representing different kinds of human occupation) of New Orleans chronologically.

How is this an improvement from other predictive models that might have incorporated historical maps and documented archaeological sites? To begin with, the supersite paradigm assumes the sites are everywhere instead of dividing the landscape up into areas of high, moderate, and low probability. Rather than focusing on the presence or absence of archaeological deposits, the user’s attention shifts to considering the various human activities and uses of a location and when said activity may have occurred. This provides a more nuanced understanding of a location and can help researchers contextualize the activity in a broader urban landscape more easily.

**Buffering Analysis**

One problem with the ways scholars and others interested in urban history have used historical maps is assuming that if something is not illustrated on a map, it did not exist in the past. While many recognize that this is probably not true, it is hard to compete with the visual appeal of a map. I have previously outlined how the Sanborn Map Company did not map some communities. Either there was a time lag between the time of actual occupation and when an area was mapped or it was assumed some areas were not considered worthy of mapping for insurance purposes. Through original and creative HGIS techniques, I attempted to address this problem with my buffering analysis.
Creating the urban settlement maps presented in the previous chapter, I developed and performed a buffering analysis to account for marginalized groups and peripheral areas that may not appear occupied on historical map. While buffering techniques and approaches are common geospatial analyses in other disciplines, its application to urban historical archaeology in this capacity is a new idea. It is a means to account for absences in historical records, especially maps. And it can account for time lag between urban development and the practice of mapping new communities. This is a major contribution of my research.

**Limitations and Future Directions**

While the results of this project have increased our understanding of the historical development of New Orleans, there are several caveats and limitations to keep in mind. Just like the changing cityscape, the database is not static. Therefore, I stress the need to update the New Orleans supersite geodatabase with new datasets and research. Advances in GIS, new and refined theories about location analysis, spatiotemporal theories, and GIS practice should be considered. Newly discovered historical and archaeological information must be added to refine the GIS data generated from this project. The challenge is finding someone to maintain and update the HGIS geodatabase. With a designated agency or urban research program, there is an easier solution. In historic cities without a citywide program, other solutions are needed, like crowdsourcing among professional archaeologists.

As with any project with finite resources, there is always room for improvement. Currently, there is only limited data about submerged resources and abandoned watercraft incorporated in the HGIS geodatabase. This is because the maritime landscape and underwater archaeology of New Orleans has not received much attention. The lack of attention is surprising
considering the city’s key maritime geography. In 1718, Bienville selected the site of New Orleans because of its location between the Mississippi River and Lake Pontchartrain. Furthermore, the city is surrounded by, and has an intimate relationship with water, and it still functions as a major US port. A complicated system of engineered levees, canals, and pumps keeps the water out of the city. It is very possible that construction of these systems, as well as the modern port facilities, destroyed or buried many earlier maritime features. The port facilities theme contains polygons representing historical features such as wharves, ferry landings, and lighthouses that once extended into major waterways. However, many of these polygons were erased (i.e., clipped) when I cleaned up the urban settlement maps during post-processing using the feature class containing polygons of the major water bodies. The assumption was that many of these maritime features were impacted by the extensive alterations of the riverfront and the creation of the industrial canal. But that assumption has not been tested and could be proven incorrect, just like it has been in many other terrestrial archaeological examples. Additional historical and archaeological research is sorely needed.

If time and funding were available, there is a wealth of other archival data, like census records, city directories, and other geographical datasets, that would contribute a more nuanced understanding of the past. Twentieth-century aerial photography is a great resource for understanding urban landscapes of the more recent past. The earliest known aerial imagery for New Orleans is 1922. The following years have aerial imagery: 1922, 1933, 1940, and almost every year after the end of World War II. The Sanborn fire insurance maps would be a welcome addition that would provide lot-level detail including the location of possible privies and building footprints. Incorporating these additional enhancements within the New Orleans supersite
Concluding Thoughts

The urban archaeological supersite paradigm is both an applied and a scholarly research framework for examining and interpreting the urban past and helping to address urban heritage at risk. It conceptualizes the historic city as a supersite made up of numerous archaeological deposits and past activity areas that can reveal the palimpsest of the city. The supersite paradigm is also a framework to identify, analyze, and interpret the archaeological heritage of the city via HGIS. Using New Orleans as my example, I set out to research, collect, create, and analyze geospatial data and combine this data in new, meaningful ways within a GIS platform. To showcase the usefulness of my research implementing the supersite paradigm using my HGIS research I demonstrate three means to investigate past histories of New Orleans.

This year marks the New Orleans tricentennial; my hope is the results of the New Orleans supersite geodatabase will bring us closer to understanding the distribution of archaeological resources and past land-use in the crescent city. Additionally, my urban archaeological supersite research can serve as a mechanism to ensure the protection of the city’s rich archaeological heritage in the future. Finally, the desire is that the supersite paradigm can be applied to other historical cities to deepen urban archaeological scholarship in the United States and globally.
## Appendix A. Historical Maps in the New Orleans Supersite Geodatabase

<table>
<thead>
<tr>
<th>Map Name</th>
<th>Date</th>
<th>Maker</th>
<th>Archive Location</th>
<th>Accession Numbers</th>
<th>Map short geodatabase title</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carte de la Louisiane et du Cours du Mississippi (sic)</td>
<td>1718 Jun</td>
<td>Deslisle, Guillaume</td>
<td>LSM</td>
<td>1982.077.158</td>
<td>1718_N_America_Deslisle</td>
<td>Not georeferenced</td>
</tr>
<tr>
<td>Plan of the City of New Orleans Projected in March 1721</td>
<td>March 1721</td>
<td>Adrien De Pauger</td>
<td>ANOM / NOPL</td>
<td></td>
<td>1721_NO_March &amp; NO_March_BW</td>
<td>This map is one of the first that accurately illustrates the layout of the city. During the first three years of the colony between 1718 and 1721, the settlement was a scattering of structures along the levee. In 1721, engineers Le Blond de la Tour and Adrien de Pauger laid out the city into a gridded street pattern centered around the Palace d’Armes as depicted in this map. Thus the map post dates 1721 and is thought to be circa 1722. Each city ilot (i.e., city block) measures 300 French feet on each side and contained 12 lots. Ten lots measured 60 French feet facing the street and 120 French feet deep, while the two key lots in the center of the ilot were 150 French feet deep. Each lot is numbered. A map key provided locational information for important structures. The fortifications surrounding the town did not exist.</td>
</tr>
<tr>
<td>Plan de la Nouvelle Orleans</td>
<td>1722</td>
<td>Unknown</td>
<td>LOC</td>
<td></td>
<td>1722_PlanDeLaNouvelleOrleans</td>
<td></td>
</tr>
<tr>
<td>Map Name</td>
<td>Date</td>
<td>Maker</td>
<td>Archive Location</td>
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<td>Notes</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Carte Particuliere du Fleuve [sic] St. Louis dix lieues au dessus et au dessous De La Nouvelle Orleans</td>
<td>[ca. 1723]</td>
<td>unknown</td>
<td>Newberry Library</td>
<td>drawer Ayer MS map 30 Sheet 80</td>
<td>1723_NewberryLibrary</td>
<td>This map illustrated the city of New Orleans as well as the surrounding environs. The fortification pattern surrounding the city is over embellished and does not accurately represent the city’s defense. The areas up and down river of the city are illustrated with various buildings and the landowners of the land grants. Most of these concessions were surveyed in the French long-lot system, which would continue to influence the development of the city and surrounding geography.</td>
</tr>
<tr>
<td>Plan de la Ville de la Nouvelle Orleans</td>
<td>1724</td>
<td>Adrien De Pauger</td>
<td>LSM</td>
<td>1982.077.009</td>
<td>1724_Pauger_copy</td>
<td></td>
</tr>
<tr>
<td>Plan of New Orleans, May 29, 1724 (shows new levee)</td>
<td>May 29, 1724</td>
<td>Adrien de Pauger</td>
<td>ANOM</td>
<td><a href="http://anom.archivesnationales">http://anom.archivesnationales</a>, culture.gouv.fr/sdb/ulysses/carte s/DAFCAOM03_04DFC069_B01_H.jpg</td>
<td>1724_Pauger_original</td>
<td></td>
</tr>
<tr>
<td>Plan de la ville de la Nouvelle Orléans en l'état quelle étoit le 30 may 1725</td>
<td>30 May 1725</td>
<td>Anonymous</td>
<td>BNF (color original lower res)/UNC Research Lab (BW higher res)</td>
<td><a href="http://gallica.bnf.fr/ark:/12148/brv1b67003116">http://gallica.bnf.fr/ark:/12148/brv1b67003116</a></td>
<td>1725_NO_May</td>
<td></td>
</tr>
<tr>
<td>Plan de la Nouvelle Orléans dédié à la Compagnie des Indes par leur très humble serviteur Saucié à la Nouvelle Orléans le 12 may 1728 en Amérique</td>
<td>1727</td>
<td>Saucier, François</td>
<td>ANOM</td>
<td><a href="http://anom.archivesnationales">http://anom.archivesnationales</a>, culture.gouv.fr/sdb/ulysses/carte s/DAFCAOM03_04DFC0076_C01_H.jpg</td>
<td>1727_Saucie &amp; 1727_Saucie_BW</td>
<td></td>
</tr>
<tr>
<td>Broutin Plan of New Orleans (trace of original map)</td>
<td>1728</td>
<td>Ignace Broutin</td>
<td>NOPL</td>
<td>M2</td>
<td>1728_Broutin_trace</td>
<td></td>
</tr>
<tr>
<td>Map of New Orleans and the Surrounding Swamp</td>
<td>1728</td>
<td>Gonichon</td>
<td>HNOC</td>
<td>2010.0155.1-4</td>
<td>1728_Gonichon_swamp</td>
<td></td>
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</tr>
</thead>
<tbody>
<tr>
<td>Plan de la Nouvelle Orleans, telle qu'elle estoit au Mois de decembre 1731</td>
<td>1731</td>
<td>Gonichon</td>
<td>Archives nationales d'outre-mer</td>
<td># 04DFC 89B <a href="http://bd.archivescanadafrance.org/acf-pleade-3-images/img-server/FRCAOM/FRCAOM_04DFC_89B/DAFCAOM03_04DFC0089B01_H.jpg">http://bd.archivescanadafrance.org/acf-pleade-3-images/img-server/FRCAOM/FRCAOM_04DFC_89B/DAFCAOM03_04DFC0089B01_H.jpg</a></td>
<td>1731_Gonichon.jpg</td>
<td>Similar to NouvelleOrleans_1732 and Broutin</td>
</tr>
<tr>
<td>Plan de la N[ouve]lle Orleans</td>
<td>1731</td>
<td>L'herbours</td>
<td>LSM</td>
<td>LSM Aces # 1955.002.079 (FF5 C1 D4)</td>
<td>1731_L'herbours</td>
<td></td>
</tr>
<tr>
<td>Carte de la côte de la Louisiane depuis la Baye St. Joseph, jusqu'à celle de St. Bernard où tous les ports et bons mouillages sont marquez par des ancre; avec la quantité de piés d'eau que l'on y trouve.</td>
<td>1732</td>
<td>Anonymous</td>
<td>LOC</td>
<td>G3862.C8 1732 .C3 Vault DIGITAL ID: g3862c et000660 <a href="http://hdl.loc.gov/loc.gmd/g3862c">http://hdl.loc.gov/loc.gmd/g3862c</a> et000660</td>
<td>1732_Map_of_all_LA</td>
<td></td>
</tr>
<tr>
<td>Plan de la Nouvelle Orleans, Telle Qu'elle Etait Le 1er, Janvier 1732</td>
<td>Jan 1732</td>
<td>Anonymous</td>
<td>HNOC</td>
<td>1980.175</td>
<td>1732_NouvelleOrleans</td>
<td>Similar to Gonichon and Broutin</td>
</tr>
<tr>
<td>Carte du cours du fleuve St. Louis depuis dix lieues audessus de la Nouvelle Orleans jusqu'à son embouchure ou sont marquées les habitations formées, et les terrains concedez [i.e. concédés], auxquels on n'a pas travaille.</td>
<td>1732?</td>
<td>unknown</td>
<td>LOC</td>
<td>G4042.M5 1732 .C3 Vault DIGITAL ID: g4042m lb000914 <a href="http://hdl.loc.gov/loc.gmd/g4042m">http://hdl.loc.gov/loc.gmd/g4042m</a> lb000914</td>
<td>1732_StLouis_NouvelleOrleans</td>
<td>Shows the lower Mississippi River from the vicinity of New Orleans to its mouth, east portion of Lake Pontchartrain, and estuaries. Within the project area the map illustrates plantations along the river and Bayou St. John, Bienville’s land holdings, and topographic features. Included is an ancillary map of &quot;Carte particulière de l'embouchure du fleuve St. Louis&quot; or the mouth of the Mississippi (du fleuve St. Louis).</td>
</tr>
<tr>
<td>Plan de la Nouvelle Orleans, Telle quelle estoit le premier janvier mil sept cent trente deux 20 janvier 1732.</td>
<td>Jan 1732</td>
<td>Signed by Ignace-François Brouthin</td>
<td>Archives nationales d'outre-mer</td>
<td># 04DFC 90A <a href="http://anom.archivesnationales.culture.gouv.fr/sdx/ulysse/cartes/DAFCAOM03_04DFC0090A01_H.jpg">http://anom.archivesnationales.culture.gouv.fr/sdx/ulysse/cartes/DAFCAOM03_04DFC0090A01_H.jpg</a></td>
<td>1732Jan20_5_Brouthin</td>
<td>Ignace-François Brouthin served as Engineer to the King at New Orleans. This map along with two similar maps marks the transfer of the colony to the King from the Company of the Indies in 1730. The map is almost identical to the Anonymous NouvelleOrleans_1732 and is likely drawn from the 1731 Gonichon map, both in this geodatabase.</td>
</tr>
<tr>
<td>Plan de la Nouvelle Orleans ville capitalle de la Louisianne et ses environs</td>
<td>ca. 1747</td>
<td>Dumont de Montigny, Jean François Benjamin</td>
<td>Newberry Library / NOPL</td>
<td>NOPL B144</td>
<td>1747_Dumont_de_Montigny</td>
<td>Not georeferenced</td>
</tr>
</tbody>
</table>
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</thead>
<tbody>
<tr>
<td>Carte particulière du cours du fleuve St. Louis depuis le village sauvage jusqu'au dessous du Detour aux Anglois, des lacs Pontchartrain &amp; Maurepas &amp; des rivières &amp; bayouc qui y aboutissent</td>
<td>1749</td>
<td>François Saucier</td>
<td>LOC</td>
<td>G4042.M5 1749 .S3 Vault DIGITAL ID: g4042m lh000915 <a href="http://hdl.loc.gov/loc.gmd/g404">http://hdl.loc.gov/loc.gmd/g404</a> 2m.lh000915</td>
<td>1749_Fsaucier</td>
<td>François Saucier’s 1749 map depicts the extent of settlement in the Lake Pontchartrain Basin, mainly along the Mississippi River. Within the project area it illustrates the town of New Orleans, settlements dotted adjacent to the Mississippi, a Chaptoulas Native American settlement, a canne brûlé (burnt cane, often a location of abandoned Indian fields), settlements along Gentilly and Bayou St. John, trails and waterways.</td>
</tr>
<tr>
<td>Plan général du Fort Septentrional du Detour des Anglois, tel qu'il est présentement : [Louisiana]</td>
<td>1749</td>
<td>Debatz</td>
<td>LOC</td>
<td>g4014f lh000949</td>
<td>1749_Debatz</td>
<td></td>
</tr>
<tr>
<td>Nouvelle Orleans Capitale de la Louisiane</td>
<td>1758</td>
<td>Pratz</td>
<td>LSM</td>
<td>1997.078.057 (also 00886 and T55.1997.0767)</td>
<td>1758_Pratz</td>
<td></td>
</tr>
<tr>
<td>Plan of New Orleans the Capital of Louisiana; with the Disposition of its Quarters and Canals as they have been traced by Mr. de la Tour in the Year 1720</td>
<td>Nov. 1759</td>
<td>T. Jefferys</td>
<td>LOC</td>
<td>Call Number: G4014.N5 1759 .J4 Am. 5-31 Digital ID: g4014n ar167702 <a href="http://hdl.loc.gov/loc.gmd/g401">http://hdl.loc.gov/loc.gmd/g401</a> 4n.ar167702</td>
<td>Color: 1759_Jefferys B/W: 1759_Jefferys_bw</td>
<td>This map is likely a composite of several early maps of New Orleans. Thomas Jefferys, the cartographer credits his map as taken from Le Blond de La Tour likely creator of the Plan de la Nouvelle Orleans circa 1722. However, the defensive ditch encircling a portion of the town was not constructed until 1729. The street names of Conti and St. Louis are reversed and several of the blocks surrounding these streets are flip-flopped. It is possible that Jefferys also drew on information form the Jacques Nicolas Bellin plan of New Orleans based on some of the similarities, including the incorrectly labeled streets and blocks. This map is copied in Dutch, Grondvlakte van Nieuw Orleans, de Hoofstad van Louisiana, by Issak Tirion in 1769.</td>
</tr>
<tr>
<td>La Luisiana cedida al Rei N. S. por S. M. Christianisima, con la Nueva Orleans, è isla en que se halla esta ciudad. Construida sobre el mapa de Mr. d'Anville.</td>
<td>1762</td>
<td>D. Thomás Lopez</td>
<td>LOC/LS-SP</td>
<td>G4010 1762 .L6 Low 467 Digital ID: g4010 ar167400 <a href="http://hdl.loc.gov/loc.gmd/g401">http://hdl.loc.gov/loc.gmd/g401</a> 0.ar167400</td>
<td>1762_DThomasLopez_NO. 1762_DThomasLopezNO_inset</td>
<td>Madrid, 1762. Scale ca. 1:1,250,000. map 40 x 40 cm. Relief shown pictorially. &quot;Longitud de la isla del Hierro.&quot; Shows Mississippi Valley north to the Canadian border. Includes inset of &quot;Plano de la Nueva Orleans segun el de M. Bellin,&quot; ca. 1:5,370, with index to points of interest.</td>
</tr>
</tbody>
</table>
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</tr>
</thead>
<tbody>
<tr>
<td>Representant l’habitation des soi-disant Jesuites lors de son demembrement en l’année 1763</td>
<td>January 21, 1819</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>M4</td>
<td>1763_1819_Pilie_Jesuites</td>
<td>Represents the Jesuit Plantation in 1763</td>
</tr>
<tr>
<td>A Sketch of the River Mississippi form New Orleans to the Rock of Davion</td>
<td>ca 1765</td>
<td>Phillip Pittman</td>
<td>LSU-CIC (photocopy)</td>
<td>CIC- Request #216</td>
<td>1765_Pittman</td>
<td>Captain Phillip Pittman was a British officer who traveled along the Mississippi River and published &quot;The present state of the European settlements on the Mississippi. Within the project area a Chapitoulas settlement and burnt canes are documented.&quot;</td>
</tr>
<tr>
<td>Course of the river Mississippi, from the Balise to Fort Chartres; taken on an expedition to the Illinois, in the latter end of the year.</td>
<td>1765</td>
<td>By Lieut. Ross of the 34th regiment: Improved from the surveys of that river made by the French.</td>
<td>LOC</td>
<td></td>
<td>1765_Ross</td>
<td>Lt. John Ross’ hand-colored map illustrates the Mississippi River from its mouth up to Fort Charles in Illinois. It was made as part of a British expedition in 1765 to survey the territory along the important waterway. Within the project area, the map shows the city, a Chapitoulas settlement, and burnt canes on the east bank and the King’s Plantation on the west bank.</td>
</tr>
<tr>
<td>Plano de la Ciudad Nueva Orleans</td>
<td>1769 [certified in 1801]</td>
<td>unknown (certified by Carlos Trudeau)</td>
<td>LSU-SP coll</td>
<td>within Charles L. Thompson Collection MSS 998 OS:T map # 8</td>
<td>1769_Plano_de_la_Ciudad_de_Nueva_Orleans</td>
<td>The shows the city as it existed when “his Excellency the Count de Orelly [sic] took possession of it in 1769. It shows the Ursuline complex where the streets do extend through. It is before the construction of the more substantial forts and defensive works completed in 1794. It is similar to Pittman’s city map of the same time period.</td>
</tr>
<tr>
<td>Grondvakte van Nieuw Orleans, de Hoofstad van Louisiana</td>
<td>1769</td>
<td>Issak Tirion</td>
<td>LSU-SP coll</td>
<td>G4014 .N5 1768 T57 MCAGE</td>
<td>1769_Tirion</td>
<td>This map is a Dutch copy of Thomas Jeffery’s Plan of New Orleans the Capital of Louisiana. The cartographer credits his map as taken from Le Blond de La Tour likely creator of the Plan de la Nouvelle Orleans circa 1722. However, the defensive ditch encircling a portion of the town was not constructed until 1729. The street names of Conti and St. Louis are reversed and several of the blocks surrounding these streets are flip-flopped. It is possible that Jefferys also drew on information form the Jacques Nicolas Bellin plan of New Orleans based on some of the similarities, including the incorrectly labeled streets and blocks. This map is copied in Dutch, Grondvakte van Nieuw Orleans, de Hoofstad van Louisiana, by Issak Tirion in 1769.</td>
</tr>
</tbody>
</table>
## Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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<tbody>
<tr>
<td>Map of part of Florida West, from Bay of Pascagoula to the River Amite beyond Lake Maurepas, with Reference to the Granted Lands on the River Amite, etc.</td>
<td>ca. 1770</td>
<td>Anonymous</td>
<td>LSU-SP coll</td>
<td>G3860 1770 .M36</td>
<td>1770_Complete_Big_map</td>
<td>Scale [ca. 1:85,000], 1 map : Negative photocopy ; 77 x 228 cm. Reproduced from manuscript original in Colonial Office, C 700 Florida 41.</td>
</tr>
<tr>
<td>Pittman Map</td>
<td>1770</td>
<td>Phillip Pittman</td>
<td>LOC</td>
<td>F352 P68 G4014 N5</td>
<td>1770_Pittman</td>
<td>Captain Phillip Pittman was a British officer who traveled in the Louisiana Territory mapping the fortifications of Governor Kerlerec. This map is taken from his work The Present State of the European Settlements on the Mississippi [sic] with A Geographical Description of that River, 1779. The map key denotes important buildings and locations in the colonial city. The defensive work surrounding the city is likely exaggerated. The map predates the improvements to the defensive system of the town in 1794.</td>
</tr>
<tr>
<td>Great Conflagration map of 1788</td>
<td>1788</td>
<td>unknown</td>
<td>LOC</td>
<td>G4014 NS 1788 JS 190- 11L</td>
<td>Digital ID: g4014n ra000004 <a href="http://hdl.loc.gov/loc.gmd/g4014n">http://hdl.loc.gov/loc.gmd/g4014n</a> ra000004</td>
<td>1788_GreatConflagrationMap</td>
</tr>
<tr>
<td>Plano volante que manifesta la parte de la villa de Nueva Orleans consumida en el incendio de 8 de diciembre de 1794</td>
<td>Dec 8, 1794</td>
<td>Juan Maria Perchet</td>
<td>Archivo General de Simancos</td>
<td>MPD,16,132</td>
<td>1794_Perchet_color</td>
<td></td>
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### Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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<tr>
<td>Plano de la Ciudad de la N[ueva]a Orleans. Las líneas Rojas demuestran la parte destruída por el incendi[a]o acaecido el día ocho de Diziembre de 1794.</td>
<td>Dec 11th 1794</td>
<td>Juan Maria Perchet</td>
<td>LSU-SP coll</td>
<td>G 4010 1963 H6 in Folder 2 Map # 30</td>
<td>1794_H6</td>
<td>This sketch map reflects the 212 buildings that were damaged or destroyed by a great fire in 1794. Since this is a black and white copy, the líneas rojas (red lines) are the hand drawn buildings in the lower left portion of the map. As a result of this and the 1788 fire (which was more damaging), almost the entire city was rebuilt. Stricter building codes were created to cut down on the future effects and spread of fires. A color copy of this map can be seen in Charting Louisiana published by The Historic New Orleans Collection. In the collection of Jack D. L. Holmes Photographic Copies of 44 Louisiana Maps, taken from the Archivo General des Indias Seville in 1963.</td>
</tr>
<tr>
<td>Plano de la Villa Gravier</td>
<td>1796</td>
<td></td>
<td>LSU-SP coll</td>
<td>within coll Thomas (Charles L.) Collection MSS #98 OS/T map #7</td>
<td>1796_Plan_de_la_Villa_Gravier</td>
<td></td>
</tr>
<tr>
<td>Plan de la Nouvelle Orleans et de sus environs</td>
<td>1798</td>
<td>Nicolas de Finiels</td>
<td>LSU-SP coll</td>
<td>G4010 1963. H6 Folder 1 No.15</td>
<td>1798_deFiniels</td>
<td>Area to the west on the map is poorly georeferenced, the map is stretched, and likely not an accurate mapped. Also a copy of the back of the map with property owners names. In the collection of Jack D. L. Holmes Photographic Copies of 44 Louisiana Maps, taken from the Archivo General des Indias Seville in 1963.</td>
</tr>
<tr>
<td>Plano de la Ciudada de Noueva Orleans</td>
<td>1798, Dec 24</td>
<td>Trudeau, Carlos</td>
<td>LSM</td>
<td>11552.004 11552.005</td>
<td>1798_Trudeau_english_copy 1798_Trudeau_original</td>
<td></td>
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### Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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<tr>
<td>Copy and Translation from the Original Spanish Plan dated 1798, Showing the City of New Orleans, its Fortifications and Environs, April 1875. Subtitle: Plan of the City of New Orleans and the Adjacent Plantations, Compiled in accordance with an Ordinance of the Illustrious Ministry and Royal Charter, 24 December, 1798</td>
<td>24 December 1798</td>
<td>Carlos Trudeau (original); drawn by Alexander Debrunner (1875)</td>
<td>LOC</td>
<td>G4014.N5 1798; T7 1875 DIGITAL ID: g4014n et00685 <a href="http://hdl.loc.gov/loc.gmd/g4014n">http://hdl.loc.gov/loc.gmd/g4014n</a> et00685</td>
<td>1798_Trudeau_reprint_1875</td>
<td>The map is a copy and translation from the original Carlos Trudeau Spanish plan dated 1798, showing the City of New Orleans, its fortifications and environs. (Dated) April 1875. Alexander Debrunner made the 1875 copy and it was printed by H. Wehrmann, No. 90 Exch. Alley, N.O.</td>
</tr>
<tr>
<td>Plan showing land in the city ceded by Gayoso de Lemos to Lafond</td>
<td>August 6, 1799</td>
<td>Anonymous</td>
<td>NOPL</td>
<td>NOPL M27</td>
<td>1799_Forts_West</td>
<td></td>
</tr>
<tr>
<td>Untitled (Map #26) Labeled Archivo Historico Militar NOLA 7263</td>
<td>Circa 1800</td>
<td>Unknown Cartographer. In the collection of Jack D. L. Holmes Photographic Copies of 44 Louisiana Maps, taken from the LSU-SP coll</td>
<td>G 4010 1963 H6 in Folder 4 Map # 26</td>
<td>1800_Arch_Hist_Mil_NOLA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Plan of New Orleans &amp; its Environs</td>
<td>1803</td>
<td>Boqueta de Woiseri, John L.</td>
<td>LSM</td>
<td>T055.1997.0884 (M00558)</td>
<td>1803_Woiseri</td>
<td></td>
</tr>
<tr>
<td>Plan de la Ville Orleans et des Environs Dedie au Citoyen Laussat Prefet Colonial et Commissaire de la Republique Faise</td>
<td>1803</td>
<td>Antoine Joseph Vinache (delineator)</td>
<td>HNOC</td>
<td>1987.65 i-iii</td>
<td>1803_Vinache</td>
<td></td>
</tr>
<tr>
<td>Plan del Local de las Tierras que Rodean la Ciudad de Nueva Orleans</td>
<td>1803</td>
<td>Carlos Trudeau</td>
<td>HNOC</td>
<td>1940.2</td>
<td>B_1803_Trudeau_surrounding_land</td>
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<tr>
<td>Map of New Orleans and vicinity</td>
<td>1804</td>
<td>Vicente Sebastián Pintado and Carlos Trudeau</td>
<td>LOC</td>
<td>G4014.N5G46 1819_P5_Vault DIGITAL ID: g4014n lh000959 <a href="http://hdl.loc.gov/loc.gmd/g4014n.lh000959">http://hdl.loc.gov/loc.gmd/g4014n.lh000959</a></td>
<td>1804_Trudeau</td>
<td>This map is an 1873 copy of the original 1804 map copied by Pintado (in Havana in 1819) and verified by Pilié, the New Orleans Surveyor in 1838. Map reflects information compiled by Pintado in 1795-96 and set down by Trudeau in official records in 1804 (according to the Library of Congress). The map denotes property ownership outside the French Quarter, especially along Bayou Road were land concession were made. Notes on the map are in French and Spanish and the map also indicates the extent of water tributaries and environmental conditions in the back of the city. The five forts constructed under the auspices of the Spanish Government are illustrated. Several copies of this map were made and the map was frequently used in land disputes resulting from the change between French, Spanish, and American authorities and the transfer of land titles.</td>
</tr>
<tr>
<td>Plan figuratif d'une partie du faubourg Sainte Marie, forme pour ... les douts sur l'etablissement. de la Rue Podras [sic]...</td>
<td>August 27, 1804</td>
<td>Trudeau, Carlos</td>
<td>NOPL</td>
<td>MS40</td>
<td>1804_Trudeau_Poydras</td>
<td></td>
</tr>
<tr>
<td>Plan 1806 New Orleans and Bayou St John</td>
<td>1806</td>
<td>Joseph Pilié</td>
<td>LSU-SP coll</td>
<td>Charles L. Thompson Collection MSS #998 OS:T map # 15</td>
<td>1806_NewOrleansandBayouStJohn</td>
<td>Similar to the map made by Pintado two years earlier. This map is signed by Joseph Pilié as well, but is only in French. The map denotes property ownership outside the French Quarter, especially along Bayou Road were land concession were made. But is not as detailed as the Trudeau and Pintado 1804 map.</td>
</tr>
<tr>
<td>Plan de la ville de la Nouvelle Orleans, avec les noms des proprietaires</td>
<td>August 18, 1808</td>
<td>Pilié, Joseph</td>
<td>NOPL</td>
<td>M2</td>
<td>1808_Pilié_No_Plan_w_names</td>
<td></td>
</tr>
<tr>
<td>Plan de division en Terrains d’une parties des Communes</td>
<td>July 24, 1810</td>
<td>Tanesse</td>
<td>NOPL</td>
<td>810/1</td>
<td>1810_Tanesse_FiBourgogne</td>
<td></td>
</tr>
<tr>
<td>Plan of the college D’Orleans</td>
<td>August 14, 1811</td>
<td>Tanesse</td>
<td>NOPL</td>
<td>MS26</td>
<td>1811_Tanesse_Col_Orleans</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>Plan of a part of New Orleans</td>
<td>1814</td>
<td>Barthélémy Lafon</td>
<td>HNOC</td>
<td>1970.2.10</td>
<td>B_1814_Lafon</td>
<td></td>
</tr>
<tr>
<td>Plan of Fort St. Charles, New Orleans</td>
<td>1814</td>
<td>Barthélémy Lafon</td>
<td>HNOC</td>
<td>1970.2.11, ii</td>
<td>B_1814_Lafon_Fort_StCharles</td>
<td></td>
</tr>
<tr>
<td>Plan de Fauburg Marigny, et D'Une Partie de la Ville de la Nouvelle Orleans</td>
<td>Jan 10</td>
<td>James Tanesse</td>
<td>LSM</td>
<td>LSM Aces # T55.1997.0315 a-b (FF5 C1 D2)</td>
<td>1814_Tanesse</td>
<td>Jacques Tanesse’s plan shows the growing city circa 1815. It includes settlement along the west bank across from the city and defensive line down river associated with the Battle of New Orleans. Tanesse assisted in the subdivision of some of the plantations surrounding the French Quarter a few years prior to the map. Surrounding the map are illustrations of various buildings, with name and date of construction for each.</td>
</tr>
<tr>
<td>Plan of the city and suburbs of New Orleans : from an actual survey made in 1815</td>
<td>1815</td>
<td>Tanesse</td>
<td>LOC</td>
<td>G4014.N5 1815, T3 Vault DIGITAL ID: g4014n et000684 <a href="http://hdl.loc.gov/loc.gmd/g4014n">http://hdl.loc.gov/loc.gmd/g4014n</a> et000684</td>
<td>1815_Tanesse</td>
<td></td>
</tr>
<tr>
<td>Map 1814-15 New Orleans</td>
<td>1815</td>
<td>White, Maunsel</td>
<td>LOC</td>
<td>DIGITAL ID: g4011p et002280</td>
<td>1815_MaunselWhite</td>
<td></td>
</tr>
<tr>
<td>Map shewing the landing of the British Army its several Encampments and Fortifications on the Mississippi</td>
<td>1815</td>
<td>Arsene Lacarriere Latour</td>
<td>HNOC</td>
<td>1979.238.7</td>
<td>1815_Latour</td>
<td></td>
</tr>
<tr>
<td>Plan of the City and Its Environs</td>
<td>1816</td>
<td>Barthélémy Lafon</td>
<td>HNOC</td>
<td>1945.3</td>
<td>1816_Lafon_Plan</td>
<td></td>
</tr>
<tr>
<td>Plan of a portion of the front part of the City of New Orleans</td>
<td>1818</td>
<td>Joseph Pilie</td>
<td>LSU-SP coll</td>
<td>within coll Thomas (Charles L.) Collection MSS #998 OS:T map # 13</td>
<td>1818_Plan_Portion_front_of_NO</td>
<td>Map of the front part of New Orleans showing the outline of Fort St. Louis which had just been dismantled at the foot of Canal Street.</td>
</tr>
<tr>
<td>Plan du Rivage et du Port de la Nouvelle Orleans, demontrant aussi l'espace que peut occuper : chaque Navire pour effectuer sur chargement et son deschargement.</td>
<td>October 13, 1818</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>MS158</td>
<td>1818_Pilie_River_Port</td>
<td></td>
</tr>
<tr>
<td>Map proposing drainage canals in 1818</td>
<td>1818</td>
<td>Joseph Pilie</td>
<td>LSU-SP coll</td>
<td>within Charles L. Thompson Collection MSS #998 OS:T map # 11</td>
<td>1818_Proposed_drainage_canals_neg</td>
<td>Title area damages, but it looks like it might have been signed by Joseph Pilie. The map shows the size of the city and the proposed drainage canals circa 1818.</td>
</tr>
<tr>
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</tr>
<tr>
<td>Map proposing drainage canals in 1818</td>
<td>1818</td>
<td>Joseph Pilié</td>
<td>NOPL</td>
<td>MS5</td>
<td>1818_Proposed_drainage_canals</td>
<td>Title area damages, but it looks like it might have been signed by Joseph Pilié. The map shows the size of the city and the proposed drainage canals circa 1818.</td>
</tr>
<tr>
<td>Map of Public lot and ground in the City of New Orleans</td>
<td>1819</td>
<td>Gabriel Winter</td>
<td>LSU-SP coll</td>
<td>within coll Thomas (Charles L.) Collection MSS #998 OS:T map # 14</td>
<td>1819_Gwinter</td>
<td>This map shows the modern streets of Royal, Chartres, and Decatur with the buildings of the Ursuline nuns and the locations of the old military barracks and hospital. A cemetery would have been associated with the hospital although is not illustrated. Prior to this period, Rue de l’hôpital and Rue de Condé did not extend through like they do today (notice the barracks extending into the street). This map shows the division of the squares into lots and some of the purchasers. The subdivision of the lots was encouraged by residents who wished the unsanitary hospital and cemetery moved, in addition to the barracks being moved to Baton Rouge.</td>
</tr>
<tr>
<td>Plan pour servir au prolongement projeté de la rue de l’Esplanade jusqu’au Bayou St. Jean.</td>
<td>April 26, 1822</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>MS18</td>
<td>1822_Pilie_Esplanade</td>
<td></td>
</tr>
<tr>
<td>Plan représentant les Canaux existant et ceux qu’il conviendrait de [creviser?] pour ... la ville, et Les Faubourgs incorpores.</td>
<td>June 17, 1825</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>B13</td>
<td>1825_Pilie_Canaux</td>
<td></td>
</tr>
<tr>
<td>Map of the City of New Orleans and its vicinity...</td>
<td>May 1828</td>
<td>Richard Delafield</td>
<td>LSU</td>
<td>CIC- Request#443</td>
<td>1828_Delafield</td>
<td>Shot with photo stand so might be slightly skewed. Shows route of British Army, 1814-1815. Includes rivers, routes, and fortifications. This is a portion of the map that focused on the project area.</td>
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<tr>
<td>Plan of the City of New Orleans</td>
<td>1829</td>
<td>Francis B. Ogden</td>
<td>HNOC</td>
<td>1971.211-v</td>
<td>1829_Ogden_Plan_NO</td>
<td>Francis B. Ogden dedicated his map to General Andrew Jackson and his forces after the victorious Battle of New Orleans. The map has four maps. The main map is the size of the city developed in 1820s including the suburbs from Faubourg de La Fayette, or Lafayette City, on the west to Faubourg Clouet on the east and includes Faubourg St. Mary, the Vieux Carré, and Faubourg Marigny. Prominent buildings are noted in the key and the shaded line indicates the extent of the 1816 flood. Map two shows the River Mississippi from its entrance to the City of New Orleans. Shows settlements of waterways along the river and lists the distances in miles of various sites to the Gulf of Mexico. Map three is of New Orleans and its Environs, depicting the city and the east bank of the river with plantation owners and waterways noted. Map four is the colonial city (French Quarter) with buildings and lot number and a key to the owners of each lot, taken from the Broutin 1728 map.</td>
</tr>
<tr>
<td>Plan of a portion of the front part of the City of New Orleans</td>
<td>1831</td>
<td>J. Pile</td>
<td>LSU-SP coll</td>
<td>1831_Front_New_Orleans</td>
<td>The map illustrates the improvements made in 1818 along the front part of the French Quarter, including wharves and the market.</td>
<td></td>
</tr>
<tr>
<td>A New Map of Louisiana: New Orleans Inset</td>
<td>1833</td>
<td>Brose, W.</td>
<td>LSM</td>
<td>1833_Brose_NewOrleans_inset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan du canal de jonction du Mississippi au Lac Pontchartrain</td>
<td>1834</td>
<td>Guillaume Tell Poussin</td>
<td>David Rumsey Collection</td>
<td>1834_Poussin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topographic map of New Orleans and Its Vicinity</td>
<td>1834</td>
<td>Zimple</td>
<td>HNOC</td>
<td>1945.13</td>
<td>1834_Zimple</td>
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<tr>
<td>Plan of the City &amp; Suburbs of New Orleans from Actual Survey</td>
<td>1834</td>
<td></td>
<td>LSM</td>
<td>1976.093.004</td>
<td>1834_City_and_Suburbs</td>
<td>Survey General’s Office Louisiana Township Maps of Jefferson Parish. Shows west bank of the Mississippi River with lots lines, owners, and vegetation.</td>
</tr>
<tr>
<td>New Orleans, La. Showing Area Built in 1841.</td>
<td>1841</td>
<td></td>
<td>LSM</td>
<td>LSM Aces # 00194 (FF5 C2 D1)</td>
<td>1841_and_1880_NO</td>
<td>S. Pinistri was a sketch artist in New Orleans during the 1830s. His map describes the city in French and English, suggesting the dual language in use in the city. The map key shows the locations of numerous buildings including, banks, public spaces, markets, churches, and street names. During this time the city was divided into three Municipalities or Districts (first, second, and third municipalities, or the Vieux Carré, Faubourg Marigny, and Faubourg St. Mary) [some information provided from Charting Louisiana published by The Historic New Orleans Collection].</td>
</tr>
<tr>
<td>New Orleans General Guide and Land Intelligence.</td>
<td>1841</td>
<td>S. Pinistri</td>
<td>HNOC</td>
<td>1960.45i,ii</td>
<td>1841_Pinistri</td>
<td>S. Pinistri was a sketch artist in New Orleans during the 1830s. His map describes the city in French and English, suggesting the dual language in use in the city. The map key shows the locations of numerous buildings including, banks, public spaces, markets, churches, and street names. During this time the city was divided into three Municipalities or Districts (first, second, and third municipalities, or the Vieux Carré, Faubourg Marigny, and Faubourg St. Mary) [some information provided from Charting Louisiana published by The Historic New Orleans Collection].</td>
</tr>
<tr>
<td>Copy of plats of survey, T13S R11E, South East District Louisiana East of Mississippi River.</td>
<td>1845</td>
<td>Henry Möllhausen</td>
<td>LOC</td>
<td>G4014.N5 1845 .M6 TIL DIGITAL ID: g4014n et00243 <a href="http://hdl.loc.gov/loc.gmd/g4014n">http://hdl.loc.gov/loc.gmd/g4014n</a> et00243</td>
<td>1845_NormanPlanOfNO</td>
<td>Henry B Möllhausen, as civil engineer, created the Norman plan that was published by Benjamin Moore Norman. The Norman map shows the three municipalities of the city and the City of Lafayette which would eventually be annexed into the city as the Fourth District. Included on the key are the locations of areas of interest including churches, markets, schools, and public buildings.</td>
</tr>
</tbody>
</table>
## Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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<tbody>
<tr>
<td>Plan du Rivage et du Port de la Nouvelle Orleans</td>
<td>June 1, 1846</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>MS198</td>
<td>1846_Pilie_City_Bl_58and59</td>
<td></td>
</tr>
<tr>
<td>Plan of houses and lots situated in the in the Second Municipality in the squares encompassed by Julia, Tchoupitoulas, Cirol, Magazine, and Notre Dame Streets and comprising the No. 17 mentioned in the advertisement.</td>
<td>June 1, 1846</td>
<td>Pilie, Joseph</td>
<td>NOPL</td>
<td>MS214</td>
<td>1846_Pilie_2ndMunicip</td>
<td></td>
</tr>
<tr>
<td>La Tourette's Reference Map of the State of Louisiana from the Original Surveys of the United States Which show the Spanish Grants, Townships, Sections, or mile squares, settlement rights &amp; also the Plantations</td>
<td>1848</td>
<td>John La Tourette</td>
<td>LOC</td>
<td>G4011.G46 1848_L3 DIGITAL ID: g4011gct001894 <a href="http://hdl.loc.gov/loc.gmd/g4011gct001894">http://hdl.loc.gov/loc.gmd/g4011gct001894</a></td>
<td>1848_LaTourette 1848_LaTourette_South</td>
<td>Folded map from the back of the Report of the Sanitary Commission. Map denoting the nuisances of the city in reaction to the yellow fever epidemic of 1853 which killed thousands. Nuisances include slaughter houses, open drainage canals, cemeteries, and other unpleasant areas thought to be a cause of the disease.</td>
</tr>
<tr>
<td>Sanitary Map of the City of New Orleans</td>
<td>1853</td>
<td>E.H. Barton, A.M.M.D.</td>
<td>HNOC</td>
<td>173-72_L.C.3</td>
<td>1853_Barton</td>
<td></td>
</tr>
<tr>
<td>Map of a part of the State of Louisiana exhibiting the route of the New Orleans, Opelousas &amp; Great Western Railroad. By G.W.R. Bayley, Chief Engineer. Eng.</td>
<td>1853</td>
<td>Childs &amp; Hammond.</td>
<td>LOC</td>
<td>G4011.P3 1853_B3 RR 477 Digital ID: g4011prr004770 <a href="http://hdl.loc.gov/loc.gmd/g4011prr004770">http://hdl.loc.gov/loc.gmd/g4011prr004770</a></td>
<td>1853_Bayley</td>
<td>Mississippi delta area shows drainage, sugar crop, parishes, major cities and towns, canals, and railroads with lines named and distances on the main line. This railroad was opened for first 50 miles on March 6, 1854. It was purchased in 1878 by the Morgan's Louisiana and Texas Railroad. [From Library of Congress website]</td>
</tr>
<tr>
<td>Plan of New Orleans and Environs</td>
<td>1855</td>
<td>W. Walter</td>
<td>HNOC</td>
<td>1945.4</td>
<td>B_1855_Walter</td>
<td></td>
</tr>
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<tbody>
<tr>
<td>Norman’s chart of the lower Mississippi River, by A. Persac. Engraved, printed &amp; mounted</td>
<td>1858</td>
<td>J. H. Colton &amp; Co., New York.</td>
<td>LOC</td>
<td>G4042.M5G46 1858.P4 DIGITAL ID: g4042m e00765 <a href="http://hdl.loc.gov/loc.gmd/g4042m">http://hdl.loc.gov/loc.gmd/g4042m</a> e00765</td>
<td>1858_Norman broken in to 2 files: 1858_Norman_BR_to_NO 1858_Norman_Natchez to BR not included</td>
<td>In 1858, Benjamin Moore Norman published The Chart of the Lower Mississippi River. Marie Adrien Persac was the artist who drew the map, who was a well-known illustrator of architecture and landscapes. The map illustrates the extent of growth in the City of New Orleans. Outside the urban footprint, Persac noted the land owners, primary agriculture in a color-coded crop key, and property and county boundaries along the Mississippi River.</td>
</tr>
<tr>
<td>Plantations on the Mississippi River from Natchez to New Orleans</td>
<td>1858</td>
<td>Asiena, Joseph</td>
<td>LSM</td>
<td>T0104.1971 T0104.1971</td>
<td>1858_Plantations 1858_Plantations_BW</td>
<td></td>
</tr>
<tr>
<td>New Orleans to Vicksburg</td>
<td>1863</td>
<td>prepared by order of Maj. Gen. N.P. Banks; Henry L. Abbot, capt. &amp; chief top. eng'rs.</td>
<td>LOC</td>
<td>G4014.N5A1 1863.A2 Digital ID: g4014n cw0229500 <a href="http://hdl.loc.gov/loc.gmd/g4014n">http://hdl.loc.gov/loc.gmd/g4014n</a> cw0229500</td>
<td>1863_GeneralBanks</td>
<td>The map was prepared by order of Maj. Gen. N. P. Banks. The map was made by Henry L. Abbot, captain and chief top. engineer, Jan. 14th 1863, with C. D. Elliot serving and the delineator. It covers the area of Louisiana and Mississippi adjacent to Mississippi River from approximately 15 miles north of Vicksburg to 20 miles west of New Orleans. Most of the map lies outside the project area, the portion within illustrates rail lines and a few buildings along the river. From the Nathaniel P. Banks papers in LC Manuscript Division.</td>
</tr>
<tr>
<td>1864 Camp Parapet, Defences of New Orleans</td>
<td>1864</td>
<td>M. Hauke</td>
<td>NARA</td>
<td>ARC Identifier 305768</td>
<td>1863_CampParapetMap</td>
<td></td>
</tr>
<tr>
<td>Extract from Dept. of Gulf Maps No. 48 and 48</td>
<td>1868</td>
<td>M.D. McAlester</td>
<td>LSU- CIC</td>
<td>request # 667</td>
<td>1868_McAlester_B1</td>
<td>Hand written note on map states “Sent to Head Quarters of Engineers with letter of January 10, 1868.” The map includes Lake Maurepas and Pontchartrain with cultural features and drainages depicted.</td>
</tr>
</tbody>
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## Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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<tr>
<td>Extract from Dept. of Gulf Map No. 5. Illustrating Proposed Connections</td>
<td>1868</td>
<td>M.D. McAlester</td>
<td>LSU- CIC</td>
<td>request # 666</td>
<td>1868_McAlester_C1</td>
<td></td>
</tr>
<tr>
<td>Between Lake Pontchartrain and the Mississippi River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official map of T12 &amp; 13S R11E South Eastern District of Louisiana East</td>
<td>1873</td>
<td>Sulakowski, Valery</td>
<td>NOPL</td>
<td>B107</td>
<td>1873_NOandCarrollton_North</td>
<td></td>
</tr>
<tr>
<td>of the Mississippi River comprising the cities of New Orleans and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1873_NOandCarrollton_South</td>
<td></td>
</tr>
<tr>
<td>Carrollton with all of the lands extending to Lake Pontchartrain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Map of the City of New Orleans</td>
<td>1873</td>
<td></td>
<td>LSM</td>
<td>T0101.1996.0009</td>
<td>1873_Jewell</td>
<td></td>
</tr>
<tr>
<td>Official map of T12 &amp; 13S R11E...New Orleans and Carrollton...</td>
<td>1873</td>
<td>Sulakowski, Valery</td>
<td>NOPL</td>
<td>B108</td>
<td>1873_Offical_Map_NO</td>
<td></td>
</tr>
<tr>
<td>Gray's New Map of Louisiana</td>
<td>1878</td>
<td>Gray, Frank A.</td>
<td>LSM</td>
<td>1997.001.006.01</td>
<td>1878_Gray and 1878_Gray_inset</td>
<td></td>
</tr>
<tr>
<td>Topographical and Drainage Map of New Orleans and Surroundings from</td>
<td>1878</td>
<td>Principal Notes</td>
<td>HNOC</td>
<td>00.34 a,b</td>
<td>1878_Hardee</td>
<td>Obtained by FEMA</td>
</tr>
<tr>
<td>Recent Survey and Investigations. T.S. Hardee, Civil Engineer.</td>
<td></td>
<td>Furnished by U.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sketch showing the actual condition of the work executed by B. Saley,</td>
<td>April 18,</td>
<td>Fremaux, Leon J.</td>
<td>NOPL</td>
<td>MS175</td>
<td>1878_Sp_Fort</td>
<td></td>
</tr>
<tr>
<td>Pres. Of the Carondelet Canal &amp; Navigation Co., since the last 2 years.</td>
<td>1878</td>
<td></td>
<td></td>
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<td></td>
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</table>
| The World's Industrial and Cotton Centennial Exposition, New Orleans, La, USA | 1884   | Southern Lithograph Co.       | LSM                               | 1976.093.005 (0788B.013)          | 1884_Cotton_Exp                             | 1884_Staub  
The map notes railroads and horse car lines in the city around the time of the 1884-85 World Industrial Cotton Exposition. |
| Map of the City of New Orleans                                           | 1884   | Staub, News dealer            | NOPL                              | NOPL P33                               | 1884_Staub                                   |                                                                      |
| 7.5' Topo Quad New Orleans, LA                                           | 1891   | USGS                         | LSU-CIC                           | 1891_USGS_Topo_NewOrleans           |                                                |                                                                      |
| 7.5' Topo Quad Chef Menteur, LA                                          | 1892   | USGS                         | LSU-CIC                           | 1892_USGS_Topo_ChefMenteur          |                                                |                                                                      |
| USGS 7.5' Topo Quad Spanish Fort, LA 1891-1910                          | 1891-1910 | USGS                        | LSU-CIC                           | 1891_1910_USGS_Topo_SpanishFort      |                                                |                                                                      |
| USGS 7.5' Topo Quad St. Bernard, LA 1892-1910                           | 1892-1910 | USGS                        | LSU-CIC                           | 1892_1910_USGS_Topo_StBernard       |                                                |                                                                      |
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<tr>
<td>Louisiana.</td>
<td>1895</td>
<td>Rand McNally and Company.</td>
<td>LOC</td>
<td>G4011.P3 1895 .R3 RR 228</td>
<td>1895_RandMcNallyCo.Louisiana and 1895_RandMcNallyCo.Louisiana_NO_inset</td>
<td>Map of the State of Louisiana in 1895. The map contains an inset of the vicinity of New Orleans with rail lines, towns, and vegetation noted. Indexed map showing drainage, cities and towns, with the railroad network overprinted in red.</td>
</tr>
<tr>
<td>Map Showing the Electric Car Lines of the New-Orleans-Traction-Co., Ltd.</td>
<td>ca. 1895</td>
<td>New Orleans Traction Co.</td>
<td>LSM</td>
<td>LSM Aces # T55.1997.384 (FF5 C2 D2)</td>
<td>1895_Electric_Car_Lines</td>
<td></td>
</tr>
<tr>
<td>Map of the City of New Orleans showing Population Areas (1901)</td>
<td>1901</td>
<td>Sewerage and Water Board of New Orleans ( publisher ), Earl, George G. ( superintendent ), Crotts, W. T. ( engineer )</td>
<td>HNOC</td>
<td>1950.57.12</td>
<td>1901_NO_Population</td>
<td></td>
</tr>
<tr>
<td>Soil Map of Louisiana, New Orleans sheet 1903</td>
<td>1903</td>
<td>Thomas D. Rice and Lewis Griswold</td>
<td>HNOC</td>
<td>1988.145</td>
<td>1903_Soil Map</td>
<td></td>
</tr>
<tr>
<td>Map of New Orleans Showing Street Railway System of the New Orleans Railway Co.</td>
<td>1904</td>
<td>Walle &amp; Co., Ltd.</td>
<td>LSM</td>
<td>T0101.1996.0007</td>
<td>1904_NO_Railway</td>
<td></td>
</tr>
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<td>Major Street Report: The City Planning and Zoning Commission: New Orleans Louisiana Contour Map From the Records of the Sewage and Water Board (1927)</td>
<td>1927</td>
<td>HNOC</td>
<td></td>
<td>78-569 p. 15</td>
<td>1927_SWB_Contour</td>
<td>This is a compilation of 8 maps. Due to the small size of the maps the resolution is poor and data is used to make large general polygons.</td>
</tr>
<tr>
<td>Major Street Report: The City Planning and Zoning Commission: Growth in Areas Served by Sewage Collection System 1906-1926 (1927)</td>
<td>1927</td>
<td>HNOC</td>
<td></td>
<td>78-569 p. 18</td>
<td>1907_SWB_Sewage_1 1910_SWB_Sewage_1 1920_SWB_Sewage_1 1926_SWB_Sewage_1</td>
<td>This is a compilation of 8 maps. Due to the small size of the maps the resolution is poor and data is used to make large general polygons.</td>
</tr>
<tr>
<td>Major Street Report: The City Planning and Zoning Commission: Growth in Areas Served by Water Distribution System 1906-1926 (1927)</td>
<td>1906-927</td>
<td>HNOC</td>
<td></td>
<td>78-569 p. 19</td>
<td>1900_SWB_Water_1 1910_SWB_Water_1 1920_SWB_Water_1 1926_SWB_Water_1</td>
<td>This is a compilation of 8 maps. Due to the small size of the maps the resolution is poor and data is used to make large general polygons.</td>
</tr>
<tr>
<td>Map of New Orleans Showing Drainage System as Completed to Date Dec 31 1927</td>
<td>Alfred F. Theard</td>
<td>LSM</td>
<td>LSM Aces # T55.1997.433 FF5 C2 D3</td>
<td>78-569 p. 41</td>
<td>1927_Theard</td>
<td></td>
</tr>
<tr>
<td>Map Name</td>
<td>Date</td>
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</tr>
<tr>
<td>Map showing location of highways, etc. in vicinity below Algiers.</td>
<td>8-Sep-28</td>
<td>NOPL</td>
<td></td>
<td>928/6</td>
<td>1928_WestBank_Hwy</td>
<td></td>
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<tr>
<td>Map showing distribution of population (1930)</td>
<td>1930</td>
<td>City Planning and Zoning Commission</td>
<td>HNOC</td>
<td>1994.101.1</td>
<td>1930_NO_Population</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad New Orleans Northeast, LA</td>
<td>1932</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1932_USGS_Topo_NewOrleansNortheast_nad1927</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad New Orleans Northwest, LA</td>
<td>1932</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1932_USGS_Topo_NewOrleansNorthwest_nad1927</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad New Orleans Southeast, LA</td>
<td>1932</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1932_USGS_Topo_NewOrleansSoutheast_nad1927</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad New Orleans Southwest, LA</td>
<td>1932</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1932_USGS_Topo_NewOrleansSouthwest_nad1927</td>
<td></td>
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<tr>
<td>Map of Greater New Orleans, Louisiana</td>
<td>ca. 1934</td>
<td>William E. Boesch</td>
<td>LSM</td>
<td></td>
<td>L5M Aces # 1978.099.018 (FF5 C2 D3)</td>
<td>1934_Boesch</td>
</tr>
<tr>
<td>Pocket map of wards, municipal districts, and congressional districts</td>
<td>December 16 1936</td>
<td>City Planning and Zoning Commission</td>
<td>NOPL</td>
<td>P35</td>
<td>1936_PocketMapofNO</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad Chef Menteur, LA</td>
<td>1936</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1936_USGS_Topo_ChefMenteur_nad1927</td>
<td></td>
</tr>
<tr>
<td>USGS 7.5' Topo Quad Spanish Fort, LA 1936</td>
<td>1936</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1936_USGS_Topo_SpanishFort_nad1927</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad Indian Beach, LA</td>
<td>1938</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1938_USGS_Topo_IndianBeach_nad1927</td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad Little Woods, LA</td>
<td>1938</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1938_USGS_Topo_LittleWoods_nad1927</td>
<td></td>
</tr>
<tr>
<td>USGS 7.5' Topo Quad New Orleans West, LA 1938</td>
<td>1938</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1938_USGS_Topo_NewOrleansWest_nad1927</td>
<td></td>
</tr>
<tr>
<td>USGS 7.5' Topo Quad Spanish Fort, LA 1938</td>
<td>1938</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td></td>
<td>1938_USGS_Topo_SpanishFort_nad1927</td>
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<tr>
<td>7.5' Topo Quad Chalmette, LA</td>
<td>1939</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td>1939_USGS_Topo_Chalmette_nad1927</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5' Topo Quad New Orleans East, LA</td>
<td>1939</td>
<td>USGS</td>
<td>LSU-CIC</td>
<td>1939_USGS_Topo_NewOrleansEast_nad1927</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property line map, low rent housing project, Housing Authority of New Orleans</td>
<td>January, 1939</td>
<td>Gandolfo, F. C.</td>
<td>NOPL</td>
<td>R13</td>
<td>1939_HANO_Iberville</td>
<td></td>
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Appendix A. Historical Maps in the New Orleans Supersite Geodatabase.

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## Appendix A. Historical Maps in the New Orleans Supersite Geodatabase

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<td>Plan of U.S. Naval Station [Algiers].</td>
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Appendix B. Copyright Information
**LIST OF MATERIALS**

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<td>1955.19 a-f / Topographical Map of New Orleans and its Vicinity. Embracing a distance of twelve miles up and eight and three quarters miles down the Mississippi River.</td>
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<td>1945.4 / Plan of New Orleans and Environs.</td>
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**AGREEMENT:** I have read the terms and conditions set forth in this "Agreement Governing Terms and Conditions of Use of Materials from The Historic New Orleans Collection" and agree to abide by them. I understand and agree that my violation of this Agreement constitutes grounds for revocation of the rights granted herein by THNOC.

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Date: 10/18/18

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**Head of Reader Services, THNOC:**  
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Dawdy, Shannon Lee and Richard Weyhing

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DeBats, Donald A. and Ian N. Gregory

Dessens, Nathalie

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Dickens, Jr., Roy S. and Timothy J. Crimmins

Dore, Christopher D. and LuAnn Wandsnider
Dufaux, François and Sherry Olson

Ebert, David

Ebert, James I.

Edwards, Jay D.

Eller, Merritt, Susan Barrett Smith, Dena Struchtemeyer, Wayne C. J. Boyko and William P. Athens

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Vita

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