GEORGIA STATE PARKS: A TECHNOLOGICAL APPROACH TO DOCUMENTATION AND CULTURAL RESOURCES

by

DAVID DOBBS

(Under the Direction of Cari L. Goetcheus)

ABSTRACT

Georgia State Parks possess a wide range of cultural and historic resources that require management and monitoring to help preserve them for future generations. Technology can serve as a tool to help directly, or indirectly, facilitate the preservation of these cultural and historic resources. This thesis evaluates the potential effectiveness of 3D terrestrial LiDAR scanning, photogrammetry, Unmanned Aerial Systems, and 3D printing to assist the preservation management and monitoring of Georgia State Park system cultural resources. Analysis of common preservation issues across 5 case study sites in the Georgia State Park system, and technologies used to resolve those issues, will afford a technology with the broadest application possibilities to be identified. As a result of the study, it was found that 3D terrestrial LiDAR scanning represents the technology with the broadest application to manage these cultural resources.

INDEX WORDS: Georgia State Parks, cultural resources, historic resources, 3D terrestrial LiDAR scanning, photogrammetry, UAS, UAV, drones, 3D printing, historic preservation, heritage resources management

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DEDICATION

To my family and friends who have supported me and stood with me along this crazy path that I have taken. I am certain that without you I surely would have gotten lost along the way. I especially want to dedicate this to my loving wife April, to whom I can safely say I would not be where I am now without. She gave me the love and support I needed when I needed it the most, as well as a firm prod to get me moving when I seemed on the verge of miring myself in the process of attaining this degree. April, you help bring out the best in me, I love you.

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CHAPTER 1

INTRODUCTION

"*It has been said that, at its best, preservation engages the past in a conversation with the present over a mutual concern for the future."*

-William Murtagh, first keeper of the National Register of Historic Places.[1]

As a society, we place value on the vestiges of our past, whether they be in the form of monuments, buildings, ruins, artifacts, or earthen works. These cultural resources can be found across the nation; some reside in our towns and cities, while others can be found in national and state parks. The preservation of these cultural resources merits dedicating funds, people, and effort to maintain and monitor so that future generations can experience and learn from them.

Cultural resources exist in a constant struggle against time. Each cultural resource presents its own problems and difficulties that include wear caused primarily by human interaction or weathering damage, and internal structural stresses caused by their construction. This thesis analyzes multiple technologies that can aid this constant battle against destruction, seeks to identify primary challenges facing the cultural resources managed by the Georgia State Park system, and discern which technology has the broadest application to aid in the preservation of these cultural resources. Knowing that

[1] William J. Murtagh, Keeping Time: The History and Theory of Preservation in America (New York: Sterling Publishing Co., Inc., 1988), 168.

decline is the natural state of cultural resources, it is imperative that new and improved methods be devised to combat degradation. While the goal of the Georgia State Park system to preserve and maintain these cultural resources in a state that best reflects their original composition, it does not mean that the implemented methods need to remain locked in a similar echo of the past.

Technology is the modern scientific tool that can best counter the inevitable challenge of decline. Technology is an adaptable tool that is malleable enough to meet the varying challenges that manifest, no matter the type of cultural resource at risk. However, when deciding which technology best fits with the cultural resource in question, we must analyze the history of the cultural resource to know what factors makes it significant, and what should and should not be done while trying to preserve the physical aspects of these cultural resources, and their intangible characteristics. One cannot apply a single technological tool to all cultural resources and expect it to act as a panacea for all the problems that plague them. Ideally, we must approach each type of cultural resource individually and examine what technological tools are best suited for the specific kinds of reoccurring problems that they experience.

A systematic analysis of the potential beneficial relationship between a type of cultural resource and a specific technology or preservation method requires a varied selection of cultural resources against which to test the capabilities and benefits of technologies.

Preservation does not end with simply halting the dilapidation of a cultural resource; repairing and maintaining cultural resources with the aid of uniform monitoring methods is also an important facet of the preservation process. As such, it is important to consider a diverse pool of technologies to address the variety of challenges that present themselves.

The combination of historic resource types measured against technological tools and a varied collection of construction materials that all reside in a similarly maintained environment are needed to develop an effective analysis. The research requirements include: utilizing an environment with similar standards of preservation, uniform access to funds, and a controlled system of cultural resource maintenance. Although several different systems, including historic districts in cities, cultural landscapes, or international world sites, were considered for analysis, this research focuses on cultural resources within a park system.

The National Park system has a unified standard of cultural resources care and maintenance, and the variability of such resources that reside in the parks is well known. Although considered as a possible case study park system candidate for this project, a broad examination that would cover parks across the nation would be required to gather a quality representation of varied cultural resources. The feasibility of such an examination would require both funding and time that are not available to the author. Instead, a state park system, specifically the Georgia State Park system, was chosen because of the smaller size and scope required to complete the analysis. Each state park system offers a unified standard of preservation modeled after the National Park system and offers a variety of cultural resource types contained in a manageable area of study. With these

parameters, an adequate study can be made that may help move preservation efforts forward, setting new bench marks by which technologies can be integrated into management for the betterment of cultural resource preservation.

Research Question

This thesis will specifically address the application of technologies currently being used in historic preservation projects and facilities and how these technologies may best be applied to the cultural resources in the Georgia State Park system. The main research question of this thesis is "What cultural resource management and monitoring technologies could be applied to historical and cultural resources located within Georgia State Parks?"[2]

With a systematic analysis of a variety of cultural resources within different state parks in Georgia, compatible technologies for documentation, monitoring, and repair of cultural resources can be identified, and a determination of which technologies could best be applied across the widest spectrum of cultural resources can be established. This analysis will allow for a focused investment in technology that can be used across the Georgia State Park system and provide the soundest investment of limited funds.

Using this analysis of technology in relation to cultural resources, the Georgia State Park system can identify which technologies provide the strongest management and monitoring techniques for the preservation of their cultural resources. Further, this study can be applied to determining which technologies are the strongest budgetary investment

[2] Unfortunately, due to the restrictions of funds over the years, the Georgia State Park system has been able to take advantage of the technological advancements that have been implemented in other preservation-oriented organizations. Such budgetary issues have not allowed for the kind of investments that would afford parks to remain on par with preservation technologies enjoyed by private organizations

for the Georgia State Park system. Like all organizations that handle preservation issues, Georgia State Parks must work with limited fiscal resources, and the results of this thesis will enable state parks to make informed decisions concerning how best to preserve their cultural resources.

Methods

To answer the research question, first background research will be presented on several topics, including preservation technologies that are currently being used by preservation-oriented companies and organizations. The primary example for modern implementation of technologies in preservation will be those practices and technologies used by the Historic American Buildings Survey (HABS), the Historic American Engineering Record (HAER), and the Historic American Landscapes Survey (HALS). This branch of the National Park Service, in partnership with the Library of Congress and architecture, engineering and landscape architecture professional organizations , are collectively responsible for the documentation and recording of over 43,000 historic structures and sites in the United States and represents a benchmark in the implementation of documentation and recording technologies in conjunction with historic cultural resources.[3] Businesses working in the private sector, such as cultural resource management (CRM) firms and historic architecture firms will be studied to determine what tools and software they are employing in their business practices.

[3] "Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey," Library of Congress, accessed 2/11/2018, http://www.loc.gov/pictures/collection/hh/.

By understanding the breadth of what these preservation minded organizations do, a list of 10 different hardware and software technologies will be identified that represent a selection of technologies that could be used in conjunction with the types of cultural resources that the Georgia State Park system possess.

Another organization that will be researched in detail is the Georgia State Park system and its cultural resources. Key personnel who manage cultural resources will be contacted with the goal of speaking with at least two administrative level employees of the Department of Natural Resources (DNR) to learn about the history of the State Park system in Georgia, their management practices, and the way the different divisions within the park system work together. Detailed background information on the parks themselves will assist in determining the variety of cultural resources that each park possesses and how they are managed. General information about the parks, such as their location, size, and additional tourist related features, will also be analyzed. With this information, a list of preferred sites to serve as potential case study sites for analysis will be identified.

Another major area of analysis is the technologies themselves. The specific purpose of each technology and how they are employed in conjunction with specific types of cultural resources will be considered. Specific software programs and tools will be studied to understand common pairings to perform specific CRM functions. With a list of specific technologies in place, it will then be possible to assess them against the list of state park cultural resources and note when a specific technology could be applied to that cultural resource. A narrowed list of potential case study sites will be identified by comparing which technologies have the greatest applicability across a variety of cultural resource types.

After identifying the case study sites and technologies to assess, the author will visit each case study site to speak with the Site/Park Manager or Interpretive Ranger that is most familiar with the park cultural resources and key preservation issues. Separately, the author will visit the cultural resources photographing any visible CRM issues and noting findings for comparison with the information provided to the author by the park staff.

After the site visits, each case study will be analyzed individually by listing out their issues and determining which technologies would be best suited to dealing with each CRM issue based on how the technology has been used professionally. After comparing each cultural resource's issue against the list of technologies, the author will make recommendations regarding which tools to use and why they would be specifically beneficial in each situation. Examples of the technologies used in previous projects and in similar situations will be used to support the recommendation.

After going through each of the case studies individually, the final assessment will determine which technologies are the most used across the widest variety of cultural resources. This assessment will result in the recommendation for the Georgia State Park system to invest in a specific technology that is the most applicable preservation tool across the state park system.

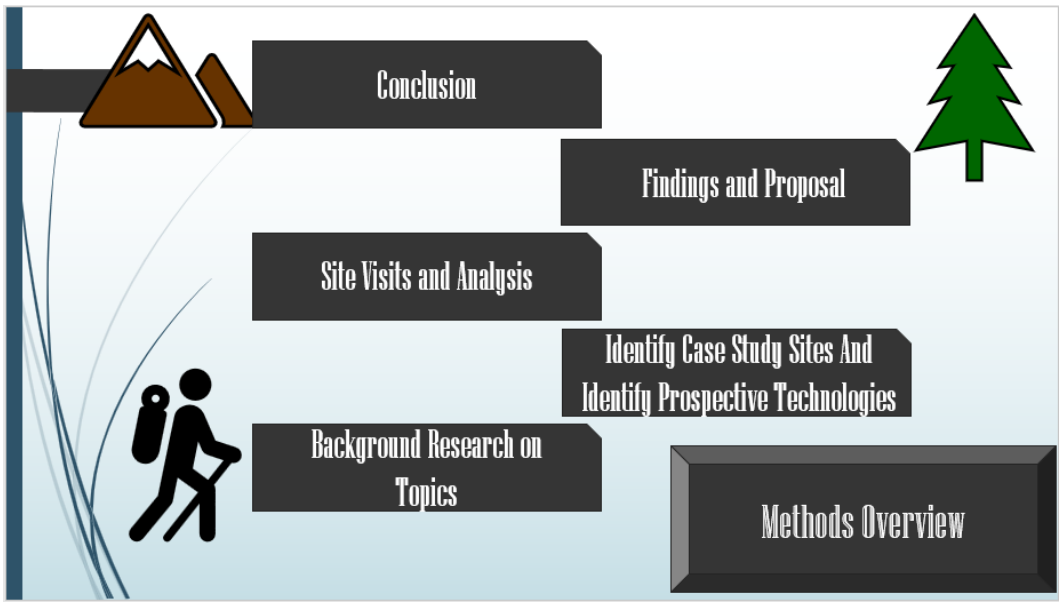

Figure 1.1 Methods Overview (created by Author)

Limitations/ Delimitations

I was limited in my research by lack of travel funds, which kept my focus localized to Georgia. Time was also a constraint, as I had to work within a limited time frame, about 6 months. Finally, I was limited by inexperience with the technologies mentioned in this research. Thus, most information on the technologies is scholarly in origin, meaning that I learned about them by reading about them and speaking with knowledgeable people and not through personal experience.

My delimitations are that I wished to keep the case study size small, no more than five, to give each case study site enough attention to garner useable and productive analysis, while still having enough variety of cultural resources to produce an effective analysis. I also specifically chose to use technology that has been in use for many years, and not cutting-edge technology because newer technology is more rarely used in the field. Thus, a reliable account of new technology is more difficult to acquire and would not allow for as many clear parallels of use with the cultural resources in the Georgia

State Park system. In addition, many technologies that are in use today are simply evolved and updated versions of the original, and thus eliminate much of the need to look at more experimental technologies that are still in their development phases.

Organization of Thesis

The first chapter of this thesis introduces the research topic and question. The chapter contains my methods, how I conducted my background research, the set of criteria used to identify my case study sites, and the organization of this thesis. Chapter 2 presents the background research of the State Park system in Georgia and pertinent information concerning the locations and descriptions of the parks. Chapter 2 also features a description of the management of the parks system: the staff structure, the physical resources, and the interconnectivity of the park divisions. The chapter then goes on to discuss the challenges that the parks face in managing and monitoring their cultural resources, and what methods are currently being used. Finally, this chapter will offer an overview and background look at documentation and monitoring tools used by the state parks currently and the technologies being used in other facilities and organizations, followed by a description of what preservation-oriented facilities and businesses I looked at in order to pull applicable technologies for my research, and the criteria by which I chose them. Chapter 3 discusses my case study sites, detailing by what criteria they were chosen, a description of their location, background information of the park, the variety of cultural resources, their current condition, and known issues cited by park management broken down into reoccurring issues, long standing issues, and major impact issues. Chapter 4 is the analysis of my case studies and identifies which technologies and

software would be most effective for the different cultural resources in each case study site. Chapter 5 is my conclusion wherein I readdress my initial research question, explain what I discovered through the process of this thesis, and review how my discoveries support my recommendation. I will then reflect on how I might have carried out researching this thesis differently. Next, I will propose avenues of future inquiry that were revealed during my research. Finally, I will offer additional observations that did not pertain directly to my research question but may also deserve examination.

To aid in the identification of acronyms used throughout this thesis, please reference Table 1.1 below.

HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscapes Survey
CRM	Cultural Resources Management
DNR	Department of Natural Resources
NPS	The National Park Service
NRHP	National Register of Historic Places
CCC	Civilian Conservation Corps
HPD	The Historic Preservation Division
SHPO	State Historic Preservation Office
ECD	Engineering and Construction Division
PRHS	Parks, Recreation, and Historic Sites Division
CRI	Cultural Resources Inventory
NHPA	National Historic Preservation Act
UAS	Unmanned Aerial Systems
WPA	Works Projects Administration

Table 1.1: Acronym Identification (Created by Author)

CHAPTER 2

BACKGROUND AND CONTEXT

In this chapter, three topics will be discussed: Georgia State Parks, cultural resource management, and an overview of technologies typically applied to Cultural Resource Management (CRM). Several aspects of the Georgia State Park system must be explored to answer my research question: the relationship between the National Park System and state park systems, the breadth of types of cultural resources in the Georgia State Park system, how the Georgia State Park system manages the cultural resources they are charged to care for, and any challenges or issues park managers encounter in their duties.. Finally, the last part of this chapter highlights the variety of technologies that have typically been used in cultural resource management and how they may be applied for historic preservation needs in the Georgia State Park system.

Brief Background on Georgia State Parks

The Development of National and State Park systems

The National Park Service (NPS) was created by the National Park Service Organic Act of 1916; it was signed into law by President Woodrow Wilson on August 25th, 1916.[4] The NPS is a bureau of the U.S. Department of the Interior and is charged with the administration of 21 types of units including national park, national monument,

[4] Robin W. Winks, "The National Park Service Act of 1916: A Contradictory Mandate," Denver University Law Review 74, no. 3 (1997): 576.

national preserve, national reserve, etc.[5].[6] In addition, the NPS is responsible for three programs: National Historic Landmarks, National Natural Landmarks, and the National Register of Historic Places.

The statement of fundamental purpose for the NPS was drafted by Frederic Law Olmsted Jr. and read:

> The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.[7]

The NPS Organic Act of 1916, and the National Park Service agency that it created, represented the first cultural resource protection legislation and organization of their kind in the world, and would serve as an international model by which other countries would base their park service agencies upon. From its inception, The NPS has grown to encompass 84 million acres comprising of 417 sites with at least 19 different designations. These include 129 historical parks or sites, 87 national monuments, 59 national parks, 25 battlefield or military parks, 19 preserves, 18 recreational areas, 10 seashores, 4 parkways, 4 lakeshores, and 2 reserves. [8] The annual number of visitors to the national parks would grow from 1 million in 1920 to 331 million in 2016.[9]

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[5] national seashore, national lakeshore, national historical park, national battlefield park, national military park, national battlefield, national battlefield site, national historic site, national memorial, national wild, scenic, and/or recreational river, national parkway, national scenic and historic trail, national recreation area, national scientific reserve, national capital parks and a miscellany of units grouped simply as "other"
[6] Winks, "A Contradictory Mandate," 576.
[7] Ibid, 585.
[8] As of January 2017 ("Divisions," Georgia Department of Natural Resources, accessed 11/2/2017, https://gadnr.org/divisions.)
[9] "National Park Service Overview," National Park Service U.S. Department of the Interior, accessed 2/20/2018, https://www.nps.gov/aboutus/news/upload/NPS-Overview-12-05-17.pdf.

While the NPS dwarfs the State Park systems in total acreage, the State Park systems receives more than twice the number of visitors. The State Park systems possess over 13 million acres and attract over 748 million visitors a year. The Georgia State Park system by itself receives roughly 14 million visitors a year, and in addition to offering traditional recreational opportunities associated with state parks, Georgia State Parks offer activities such as miniature golf, tennis, volleyball, horseshoes, and children's playgrounds.[10]

The enactment of the National Park Service Organic Act of 1916 created the governmental agency to manage all the national parks in the U.S. and protect the natural and cultural resources within them. The National Park Service Organic Act also put the program for the National Register of Historic Places under the responsibility of the Secretary of the Interior. This program was designed to keep a record of federally owned cultural and historic resources that were designated significant to the United States' collective history. While the Antiquities Act of 1906 and the Historic Sites Act of 1935 provided further guidance for cultural resources, not until after the National Historic Preservation Act of 1966, did the determination of what cultural resources could be added to the National Register of Historic Places (NRHP) changed from cultural and natural resources only on public and Federal lands to include cultural resources located on private land as well. However, cultural resources must meet the standards of the Secretary of the Interior to be considered for nomination to the NRHP. Many legal benefits have been tied into this set of standards, and as such it is highly beneficial to adhere to them and has become the accepted practice in the United States to which most,

[10] Fretwell, Holly Lippke, and Kimberly Frost. "State Parks' Progress Toward Self-Sufficiency." Montana: Property and Environment Research Center (2006): 11.

if not all, preservation minded organizations adhere. The standards by which cultural resources are judged to be worthy of placement on the NRHP originated from the necessity to establish a unified methodology by which cultural resources could be deemed appropriate.

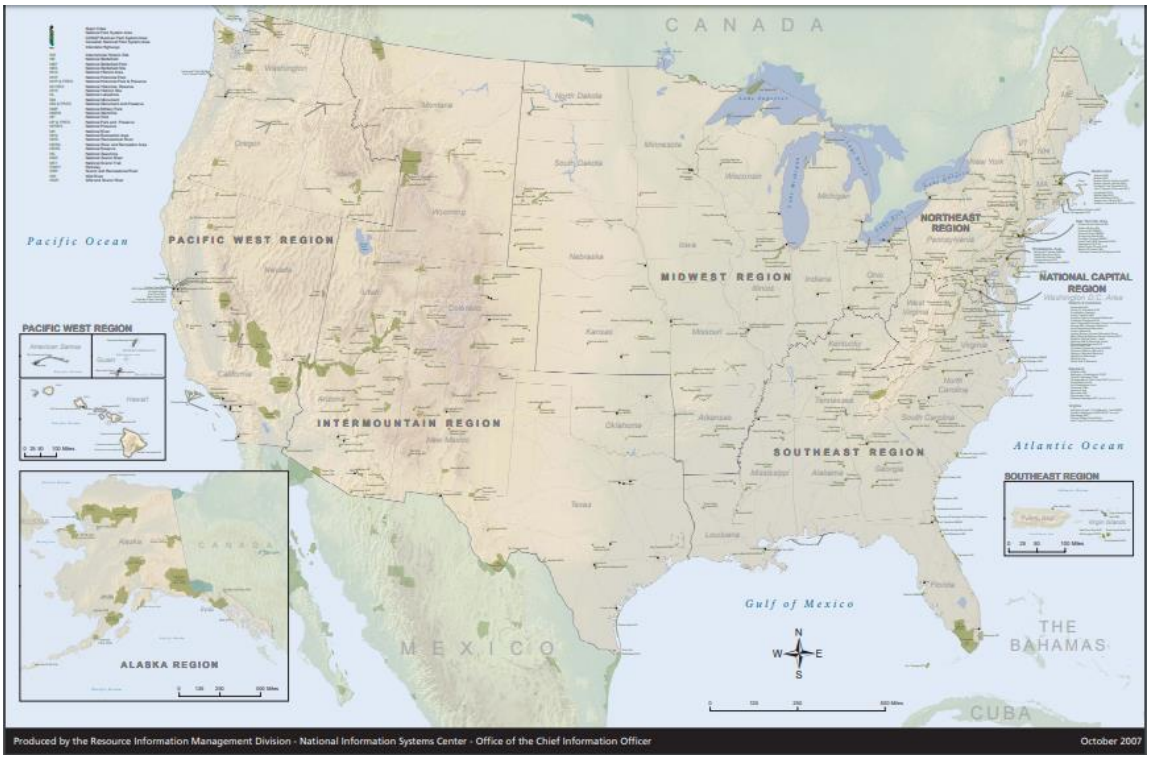

Figure 2.1 Location of National Parks in the United States as of 2007. (https://www.nps.gov/gis/documents/NPSMAP_1107.pdf)

The NHPA expanded the authority of the Secretary of the Interior to recognize sites of local and state significance in American history, architecture, archaeology, engineering, and culture worthy of preservation.[11] The NRHP is the official list of the properties that have been recognized by the standards set down by the Secretary of the Interior. The NRHP is maintained and expanded by the NPS. To guide the selection of

[11] Shrimpton, Rebecca H. "National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation." (2006) i.

cultural resources for the National Register, the NPS developed a set of criteria for evaluation.[12] These criteria were developed to be consistent with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, which are uniform, national standards for preservation activities.[13] When considering if a property is culturally significant, there are four criteria by which a cultural resource is judged: event, person, design/construction, and informational potential.[14]

These four criteria can be used independently or in conjunction with each other, depending on the cultural resource.[15] Once a cultural resource has met at least one of these criteria, the cultural resource is then judged for its level of integrity. Integrity is based upon seven points that are applied equally to each cultural resource, regardless of their criteria of significance. These seven points of integrity are location, design, setting, materials, workmanship, feeling, and association.[16] The higher the integrity of a cultural resource, the stronger the case for the cultural resource to be included on the NRHP. Many of these points of integrity rely heavily on the petitioner's ability to argue their validity through research and documented evidence.

Finally, the Secretary of the Interior provides evaluation criteria to decide which treatment is most appropriate for the cultural resource. A treatment is the action that should be taken to best solve problems, and to manage and preserve the cultural resource. There are four treatment options available for historic cultural resources: preservation, rehabilitation, restoration, and reconstruction. These treatment standards are a series of

[12] Shrimpton, "National Register Bulletin 15," i.
[13] Ibid.
[14] For further details on these criteria look at Shrimpton, Rebecca H. "National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation." (2006)
[15] Ibid, 11.
[16] For further information on these seven points of integrity, please look at Shrimpton, Rebecca H. "National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation." (2006)

concepts about maintaining, repairing, and replacing historic materials as well as designing new additions or making alterations. Each treatment has a set of guidelines that offer general design and technical recommendations to assist in applying the treatment to a specific property. Together, they provide a framework and guidance for decision-making about work or changes to a historic property.[17]

These standards of preservation serve as a bench mark by which other organizations measure their preservation methods. Both national and international preservation organizations have used these standards and treatment methods as a foundation for their own methods, if they have not directly used them as their own. The State Park systems in the United States also implement these standards when addressing their own cultural resources.

Development of the Georgia State Parks

To fully appreciate why the implementation of new technologies is so important to the future of the Georgia State Park System's cultural resources preservation, an understanding of how the State Park system originated and developed over time is required. Through various legislative maneuvers, and land acquisitions, the Georgia State Park system has grown over the years to be the vast collection of properties and cultural resources that we know it as today.

With the emphasis of early state park development across the nation on natural and scenic resources, it makes sense that the heavily forested lands in Georgia became prime locations for this new type of land use. In 1927, the Georgia Senate created

[17] For Further information on these standards of treatment please look at "The Secretary of the Interior's Standards," The National Park Service, accessed 1/27/2018, https://www.nps.gov/tps/standards.htm

resolution number 21, which instructed that the 10 acres within the Indian Spring Reserve in Butts County would be placed under the jurisdiction of the state board of forestry, where the land use would be converted and used as a state park.[18] The land use needed to be converted from forestry to park, because general practices of forested land use in Georgia, was primarily focused on timber harvesting, not conservation. This land use conflict led to the creation of a state park system separate from the Georgia Forestry Division; the Georgia State Park system officially began in 1931 with the reorganization of the State Board of Forestry. Under this State Board of Forestry, five forest parks were formed: Indian Springs, Vogel, Santo Domingo, Alexander H. Stephens, and Pine Mountain (now F. D. Roosevelt). In the reorganization of 1937, a Department of Natural Resources was established with four divisions: Division of Forestry, Division of Wild Life, Division of Mines, Mining and Geology and the Division of State Parks, Historic Sites and Monuments. Over the years, this final division would go through many reorganizations, and eventually become the division currently known as State Parks, Recreation and Historic Sites Division.[19] Act 103 of the 1937 legislation that created DNR defined a park as:

> any land which by reason of natural features, scenic beauty, with or without historical, archaeological, or scientific buildings or objects thereon, possesses distinctive, innate or potential physical, intellectual, creative, social or other recreational or educational value or interest…All parks and recreational areas heretofore or hereafter acquired by the State shall constitute the State Park system, and shall be under the immediate control and management of this division.[20]

[18] Townsend, "Georgia State Parks," 2.
[19] Ibid.
[20] Ibid.

From the time of its creation the Georgia State Park System has expanded through various acts of legislation. Periodic allocations of funds have allowed for the growth of the Georgia State Parks until the late 1970's when budget cuts became more prevalent. Due to repeated budget cuts, negative impacts began to manifest in management and the growth of the Georgia State Park system that would have far reaching effects on the ability of the parks to manage and preserve their cultural resources. For a more thorough exploration of the history of the Georgia State Park system see Appendix A.

Georgia State Parks Today

Today the Georgia State Park system manages 85,046 acres of land in 63 different parks[21] spread out across the state of Georgia in all four physiographic regions of Georgia: The North Georgia Mountains, The Piedmont, The Coastal Plains, and The Coast (Figure 2.2).[22] The 63 parks are divided into two categories: 46 State Parks, and 17 Historic Sites State Parks, and Historic Sites (Figure 2.3).[23].

[21] Georgia Department of Natural Resources. "2017 Guide to Georgia State Parks and Historic Sites." 2017 Guide to Georgia State Parks and Historic Sites, Georgia Department of Natural Resources, Parks, Recreation and Historic Sites Division, 2017, 6.
[22] "Places," Georgia Department of Natural Resources, accessed 11/2/2017, https://gadnr.org/maplocations/.
[23] The distinction between State Parks and Historic Sites is a holdover from when the Historic Sites were considered a separate park system under an older organizational structure. At that time, when the Historic Sites were brought into the State Park system, they retained the title of Historic Sites. For this thesis, those two types of parks are retained.

Figure 2.2 The four physiographic regions of Georgia in which there are state parks- (https://gadnr.org/maplocations/)

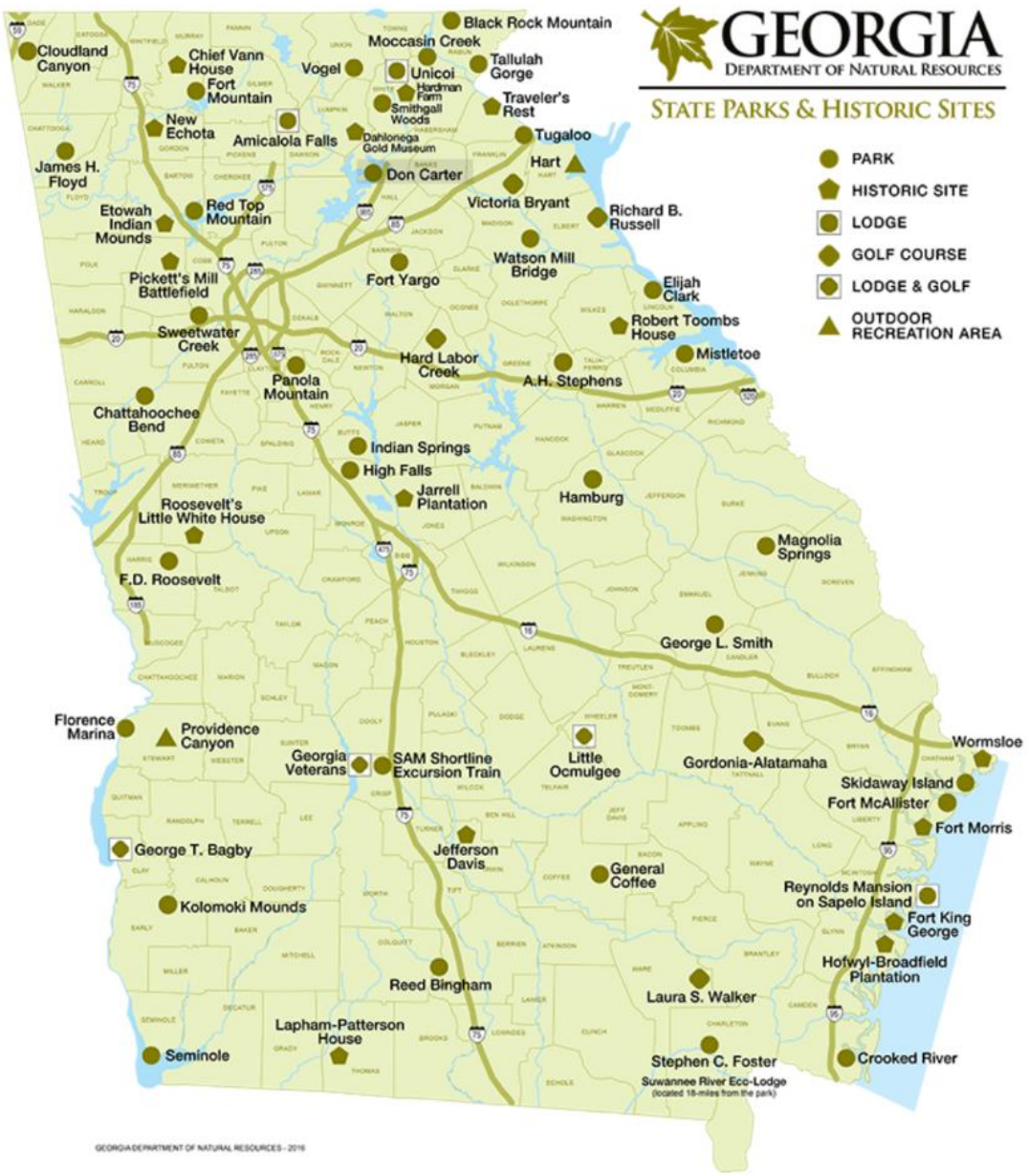

Figure 2.3 Locations and names of the Parks and Historic Sites within the Georgia State Park System- (http://gastateparks.org/Map.)

Financially, the Georgia State Parks receive funds through state budgeted money, donations, and receipts from daily visitors. Most of the daily receipts (93 %) earned by the park are retained by the park system, while the rest (7%) are deposited into a special parks fund for individual park projects. Unfortunately, the operating costs of the parks generally out paces the earned annual revenue. For example, the total operating expenses

for the fiscal year 2002 were $59.1 million and the park-generated revenues totaled $27.4 million, covering just 46% of costs. Both the operating expenses and revenues have increased significantly since 1995 when the total operating expense was $38.7 million, and the park generated revenues were $15 million, which only covered 39% of costs at the time.[24]

The Georgia State Park system works with multiple divisions under the umbrella of the Department of Natural Resources to maintain and operate the parks and Historic Sites across the state. Through the interactions of three specific divisions (Historic Preservation Division, the Engineering and Construction Division, and the Parks, Recreation and Historic Site Division.[25]), most aspects concerning the parks and Historic Sites are managed and operated in a seemingly disjointed, but effective manner. For a complete understanding of how each division within the Department of Natural Resources interact see Figure 2.4.

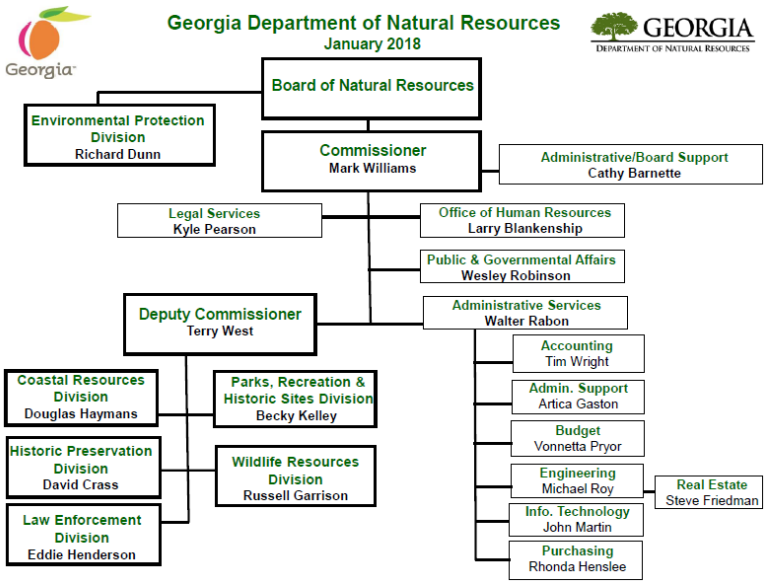

Figure 2.4 D.N.R. Organizational Chart (The Georgia Department of Natural Resources)

[24] Townsend, "Georgia State Parks," 12.
[25] Judd Smith, email correspondence, August 30th, 2017

The Historic Preservation Division (HPD) promotes the preservation and use of historic places in Georgia. Acting as Georgia's State Historic Preservation Office (SHPO), the HPD manages federal and state programs including: archaeology protection and education, environmental review and compliance, grants, historic resource surveys, tax incentives, community planning and technical assistance, and the National Register of Historic Places.[26] Within the State Parks and Historic Sites, the HPD manages all issues related to the National Register, the repair, restoration, and maintenance of historic structures, and investigation and management of archaeological sites residing in the park's domain. The Engineering and Construction Division (ECD) is responsible for DNR project management. The ECD oversees all design development plans, and once finalized sends out requests for bids, receives submittals and chooses contractors for all construction and engineering projects for DNR.[27] The Parks, Recreation, and Historic Sites Division (PRHS) manages all the park and historic site properties daily functions. From the Blue Ridge Mountains to the Colonial Coast, the properties offer an exceptional variety of activities, such as hiking and biking, fishing and boating, picnicking, ranger programs, historic re-enactments and golf for more than 11 million people each year as of 2007. The State Parks and Historic Sites offer 374 cottages, 414 lodge rooms, over 2,486 campsites and seven golf courses to the public.[28] In addition, the PRHS manages the day to day operations of facilities, interpretation, programming, operational revenue decisions, and routine maintenance of the park.[29]

[26] "Divisions," Georgia Department of Natural Resources, accessed 11/2/2017, https://gadnr.org/divisions.
[27] Judd Smith, email.
[28] "Divisions."
[29] Judd Smith, email.

The Georgia State Park system continues to slowly grow and develop new parks. The land for new parks generally comes from two main sources: multiple undeveloped properties that DNR owns or are under a conservation easement and donations where an organization or county approaches DNR with the intent of land donation for the specific purpose of it being turned into a state park. The proposed state park lands are carefully evaluated and judged on the value of their potential interpretive message, its location and potential profit offsets the cost of its construction. These lands are examined with the attitude of, "What part of Georgia's historic story will this park tell?"[30]

Some sites may not meet Georgia State Park system criteria and will be recommended to other organizations or societies to develop and manage. Other prospective sites are turned down simply because of budget issues. Some properties that are owned by DNR are held for many years, as the Georgia State Park system waits for the surrounding area to develop enough to create substantive park traffic and ensure enough revenue to warrant the development of the park. Regardless of the source, if a project site is determined to be adequate to build a new park, it must first receive a full assessment from the HPD and the ECD. If both divisions give positive reports on the merits of the site, new park development will begin.

Cultural Resource Management in Georgia's State Parks and Historic Sites

Many processes and actions, including cultural resource management, in the Georgia State Park systems requires interaction with each of the divisions: HPD, ECD, and PRHS. For example, if a park decides to repair or restore a cultural resource within

[30] Judd Smith, personal interview, September 9th, 2017.

the park, the PRHS will contact both the HPD and ECD to begin the process. The HPD will be on site to ensure that repairs and any physical work done by the ECD follows Secretary of Interior's standards, and the ECD manage the day to day operational activities of the vendors they hire to perform the work. PRHS will ensure that ECD's work can be done without interference from park visitors. PRHS, also designs the interpretation for the cultural resource with input from HPD to ensure the interpretation is accurate.

Cultural Resource Management (CRM) does not change depending on the designation of the Georgia State Park in question. Cultural Resources within Historic Site State Parks are handled the same as cultural resources located within recreational state parks. The Georgia State Park system adheres to the State of Georgia's Standards and Guidelines for State Agency Historic Preservation Programs. Standards set down by this doctrine suggest that a preservation organization (such as the HPD) document a cultural resource in preparation for application to the National Register of Historic Places but does not indicate any future documentation be enacted. Additionally, a preservation agency is instructed to monitor their cultural resources regularly and provide an adequate budget for future maintenance.[31] These instructions are a bit broad and suggest the need for a more complete method of documentation and monitoring. While a lot of the CRM work done within the parks are performed by DNR employees, they will sometimes outsource interpretive design, site master planning, architectural planning, and archaeological survey work outside of the DNR. However, all projects will have at least one DNR staff member attached to a project to ensure all work is done in accordance

[31] Georgia SHPO, "State Standards," accessed 4/9/2018, http://georgiashpo.org/sites/default/files/hpd/pdf/ER_and_compliance/StateStandards.pdf.

with the DNR standards.[32] For an in-depth examination of Cultural Resource Management and the philosophy and practices that support it, please see Appendix B.

The PRHS Division also manages a host of smaller cultural resources across the breadth of their properties. The Georgia State Park system possesses a vast collection of cultural resource artifacts. An inventory system, known as PastPerfect®, was implemented in 2008[33] to manage the site artifacts. The PastPerfect® digital database assists cultural resource managers by maintaining an inventory of their cultural resource artifacts and details on interpretive materials, such as type (panels and exhibits), which vendors created the materials, and when they were installed. The ECD uses the software program to maintain a digital database of all structures on state park and historic site properties. PastPerfect® allows the state parks to integrate with other software programs that track humidity, lighting, temperature, and similar attributes within their artifact exhibition cases to maintain the best conditions for preservation of their artifacts.[34]

When implementing any new technology or process across the Georgia State Park system a careful and involved process of cost benefit analysis occurs. The results of the cost benefit analysis weigh heavily on the decision to implement any new technologies or processes at a system wide level; the chances of implementation increase if the technology is widely applicable. [35]

Communication between HPD, ECD and PRHS is not only a necessity but encouraged by annual focus meetings[36] that are geared to introduce different aspects of

[32] Judd Smith, Interview.
[33] Ibid.
[34] Judd Smith, email.
[35] Ibid.
[36] Provided the budget allows for it.

each division to employees of the other divisions. These meetings are designed to foster a greater understanding of the interactive nature of their relationship. The meetings provide a better understanding of who to consult with when various issues come up within the parks[37]. For example, a meeting focused on interpretation would note that PRHS is responsible for creating the display, but that HPD influences the interpretation content. A focus meeting may discuss a specific aspect of preservation and how it impacts on site interpretation, or the topic could be interaction with the local Native American tribes, and how the HPD is the recognized liaison between a park and the Native American Tribal Council.

Although communication between the divisions within the Georgia State Park system is critical, it is equally important for staff in the Georgia State Park system to interact with staff from parks outside of Georgia, so they might learn other applicable ideas and processes. While there is no single occasion for state parks to communicate with each other, there are numerous regional and national conferences where representatives of different state parks can come together to compare and introduce management practices and preservation methods. The South-East State Park Directors Conference, The State Park Directors Conference, The South-East State Park Programming Conference, and the National Park and Recreation Association Conference are just a sampling of the different opportunities where park representatives can meet with each other. There are also quarterly calls between the heads of the interpretation at numerous state parks inside and outside of Georgia. Through these various methods,

[37] Judd Smith, Interview.

Georgia State Park staff try to stay aware of the changes and implementation practices within the various state parks.[38]

Georgia State Parks also like to maintain a healthy relationship with local universities and museums. The Georgia State Park system will often turn to universities to undertake various projects at their park sites. Archaeological excavations and artifact analysis will often be turned over to universities who act as vendors on a case by case basis. Some relationships are set up between the parks and universities for a greater duration than the span of a single project. For example, the University of West Georgia is responsible for maintaining most of the Georgia State Park's artifact collection that are not currently on active display at any of the park sites. The park system also maintains partnerships with various museums to display several artifacts or items of furniture that a park may wish to loan out for specific curation projects in the region.[39]

Types of Cultural Resources in Georgia's State Parks and Historic Sites

Many of the parks in the Georgia park system have numerous cultural resources that must be managed and maintained. The historic and cultural resources found in the Georgia State Park properties cover a wide range of materials and span a breadth of time periods that provide a rich variety that represents an expansive narrative for the history of Georgia. Cultural resources found within the Georgia Park properties are constructed from materials including: wood (of varying species), handmade brick, machine brick, local stones, earthworks, tabby, wattle and daub, and bronze. The time periods covered in the collection of these cultural resources include: pre-history, the colonial period, the

[38] Judd Smith, Interview.
[39] Ibid.

Antebellum period, the Civil War era, the Reconstruction period, and pre-WWII. This collection of cultural and historic resources depicts the story of Georgia as the state progressed from its Native American roots to the settlement period of colonization. The changes from Antebellum Georgia through the Civil War, and into the Reconstruction era are captured by numerous structures managed at various Georgia State Parks.

Antebellum Brick Structure	Antebellum Wood Structure	Earthen Indian Mound
Earthwork Ditch	Colonial Wood Structure	Earthwork Fort
Tabby Ruins	Reconstruction Wood Structure	Stone Monument
Colonial Wooden Cabin	Brick Lighthouse	Modern Wood structure
Tabby structure	CCC Built Stone Structure	CCC Built Wood Structure
Reconstruction Wood Bridge	Reconstruction Era Dam	CCC Designed Landscapes
Civil War Wooden Ruins	Stone Ruins	Wattle and Daub Structure
Bronze statue	Civil War Brick Ruins	

Table 2.1: Types of cultural resources identified in the Georgia State Park system (Created by Author)

Finally, many examples of construction during the pre-WWII period, epitomized by a number of parks created specifically by the CCC are presented to complete the historic narrative of Georgia. Upon a cursory examination of the parks and Historic Sites within the Georgia State Park system, Table 2.1 lists the types of cultural and historic resources identified. The variety of these cultural resources means that the Georgia Parks staff must follow specific practices to properly protect them and promote them for the enjoyment and experience of the park visitors.

Challenges of Managing Cultural Resources in Georgia's State Parks

The cultural resources within the Georgia State Parks are a constant challenge for the PRHS division to maintain. As with all such cultural resources, they are vulnerable to the effects of time, the elements, and human interaction. The PRHS division conducts routine on-site inspections to assess the current state of the cultural resource and determine if any actions are required. The inspections are done in concert with the ECD division, along with outside vendors. Recommended actions and solutions are prioritized by the operations unit in the PRHS division. If the suggested action is a small enough project, the request can be paid for out of the park budget. However, when the recommended action represents a larger project, the request is added to the annual budget request. All potential projects cannot be paid for by the annual budget, as there are not enough funds available in any one year to handle all requests. As such, many projects continue to go unaddressed for many years. These unaddressed issues may continue to get worse and present an even more difficult and costly challenge in the future.[40]

Another challenge that has seemingly always plagued the Georgia State Park system is budget cuts. Budget cuts in the past decades have hurt many of the programs that initially helped integrate preservation efforts into the parks. With every budget cut that the Georgia State Park system faces, they suffer from repeated issues of short staffing, inconsistent training programs, degradation of cultural resources due to inability to afford proper maintenance, and in extreme cases the closing of entire parks. New programs are being introduced to correct this, such as a training programs provided by the Historic Preservation Division to discuss artifact care, historic building maintenance,

[40] Judd Smith, email.

and engaging site interpretation planning to ensure the focus on cultural resources. The previously mentioned state-wide focus meetings are being implemented to address common problems, issues, and cultural resource management questions.[41]

Finally, one of the more difficult challenges that the Georgia State Park system faces is the fact that the park system is technologically behind other cultural resource organizations by roughly 10 years or more.[42] This stagnation in technological progress within the Georgia State Park system effects not only how the parks manage their cultural resources, but also how they manage their data archiving. Dated technology also makes it incrementally more difficult to keep up with social media interaction, new interpretation methods, project proposal representation, and new technologies that are geared towards making the parks more marketable to visitors and investors. Put simply, the lag in technology makes it more difficult for the Georgia State Park system to remain viable in today's economic environment.

This technological gap is primarily created by lack of funding, as well as constraints placed upon the park system by operational contracts that determine when the Georgia State Park system can upgrade. [43] When the Georgia State Park system does wish to upgrade their state-wide system technologically, they will test a new technology or practice in a few different parks over a couple of years and then the park system will decide whether or not to implement the technology across the state-wide system based upon the performance evidence of the tested technology. The PastPerfect® software was subject to this process before its implementation.

[41] Judd Smith, email.
[42] Judd Smith, Interview.
[43] Ibid.

It is important to keep in mind the nature of the cultural resources that are managed by the Georgia State Park system. To select which sites represent the best selection of cultural resources, the number of similar types of cultural resources found across the parks and Historic Sites needs to be analyzed. By determining which types of cultural resources are represented the most across the whole of the Georgia State Park system, and further, which sites possess the greatest number of these types of cultural resources can narrow the pool of sites to choose from to present an optimal case study site list.

The budgetary concerns that the Georgia State Park system grapples with is an important consideration when contemplating what technologies to examine for their potential application within the Georgia State Park system. Determining what technologies can help address the management and monitoring issues facing the cultural resources within the parks and Historic Sites and provide alternative benefits that will make the technology economically advantageous for the Georgia State Park system as whole.

Applicable Technologies for Cultural Resources Management

The practice of Cultural Resources Management has never shied away from appropriating innovative technology to perform management tasks at a new and better capacity. Cultural resources inventories are now being entered into interconnected databases that allow for their data to be more accessible and easily manipulated from a host of different technologies, such as tablets, cell phones, and laptops. Documentation is no longer relegated to sketches, hand drafting, or film-based photography. Digital

photographs, 3D terrestrial LiDAR scanning, and AutoCAD®-rendered site plans are just a few of the technological tools being used. GPS-ready cell phones are being used to precisely mark site locations and provide GPS coordinates for photographs of cultural resources. Management practices can now implement a host of software programs to facilitate data archiving, monitoring updates, or non-traditional interpretation options. The field has evolved as the technology has evolved and is not showing any sign of slowing down.

The next section will focus on the general pros and challenges that specific preservation technologies present, and what opportunities they represent for the Georgia State Park system. A general assessment of the current technologies/practices being used by the Georgia State Park system is provided, followed by a determination of whether these technologies/practices are adequately filling the park's CRM needs. Then an assessment of technologies that are currently being used by leaders in the field of CRM documentation across the US will be presented, noting their strengths and weaknesses.

Pros and Cons of Technology

Technology is a label that applies to a variety of tools and computer software, from the simple use of a shovel to survey a potential archaeological site to advanced interactions with a software program that maintains a climate control system while archiving individual data on a collection of artifacts. The greatest advantage of technology is its adaptability and unlimited potential. The greatest challenge is the speed at which it can progress, and the continuous need for training and updating software and hardware. Additionally, with each evolution of a technology comes a price hike that

slows the implementation of the new phase of technology. These are the issues that must be addressed and planned for when dealing with the incorporation of a new technology. With these considerations comes a world of opportunity and potential. Another advantage of technology rests in the hidden financial benefits that they can provide. New technology can provide the impetus for incredible growth, and the solutions to problems that may have remained a constant thorn in the side of organizations.

Current State of Technology applied to Cultural Resources Management at Georgia State Parks

The Georgia State Park system has an unfortunate technological deficit when compared to other organizations who deal with the preservation of historic cultural resources. This state of technological lethargy is due in large part to budgetary issues that keep the adoption of new technology to a limited acquisition ability. Through this research, although not comprehensive, it has been surmised that the Georgia State Park system is technologically behind other preservation organizations, but they do possess some technology that they actively use in their management and preservation efforts. While slow to fully implement at all Georgia State Parks, computers are an integral part to the management of parks. From database upkeep to communication with other parks and divisional management, computers are used in every park to facilitate business.

The act of maintaining an archive of data on the maintenance and condition of cultural resources and artifacts is presently carried out by a few different systems. Some parks record their data in excel spread sheets, and others still maintain their records in a hand-written index and archive box system. These records can consist of photographs,

written reports, and index cards with dated updates and information concerning artifacts and other cultural resources. Often, a great deal of the recorded data on cultural resources are not kept on site, but instead submitted to the Historic Preservation Division. It is important to note that the use of these current technologies, software, and methods, should in no way be abandoned completely with the implementation of a newer technology. The use of Excel, for example, provides a strong foundation in which spreadsheet data can be integrated into new technologies to create a unity between new and old documentation and archival information.

Climate control is also a vital technology for a great deal of park sites that have a museum with site specific artifacts. The fragile nature of many of the artifacts kept at state park museums require carefully monitored humidity levels to ensure they do not suffer from mold damage. Careful lighting is also essential. Special light bulbs are required to prevent the fading of some artifacts or create overly heated environments within a display case.

A large portion of technology used on site at different Georgia State Parks is provided by contractors for specific one-time occasions. This sort of technological outsourcing has the advantage of avoiding the upfront investment of acquiring a new technology, but it has the drawback of limiting the availability of that technology, and may end up costing more over time, depending on how often that technology may be required for use.

While these technologies and practices may be serviceable and provide basic solutions to some of the problems that face the cultural resources in the Georgia State Park system, they are not a permanent solution to the ever-increasing progression of

technological competition found at other sites, or the continual deterioration that faces these cultural resources over time. There are many technologies in use today by organizations that work in the field of preservation, and these technologies are becoming more common and easy to use as well as more affordable and user friendly. The increasing affordability of technologies creates an opportunity for investment by the Georgia State Park system to advance their own technological tool set without breaking the budget.

Technologies Currently Applied to Cultural Resources by CRM Agencies, Organizations and Private Firms

Analyzing well-established organizations that deal with similar cultural resources and have accomplished successful preservation projects for numerous clients is prudent when deciding what technologies may have the most varied applicability for cultural resources in the Georgia State Park system. By looking to these outside organizations, an analysis of their most commonly used technologies can be ascertained and extrapolated into a viable list of technologies to be tested and implemented in the Georgia State Park system.

The primary organization that deals heavily with preservation technologies for documentation is the HABS/HAER/HALS division of the National Park Service (NPS). The Historic American Buildings Survey (HABS) is the federal government's oldest preservation program. HABS's companion programs, The Historic American Engineering Record (HAER) and the Historic American Landscapes Survey (HALS), are all administered by the Heritage Documentation Program (HDP) of the NPS. The

documentation produced by these programs represents the largest archive of historic, architectural, engineering, and landscape documents in the United States. Housed in the Library of Congress, these programs have produced records on more than 43,000 Historic Sites.[44]

> "HDP conducts a nationwide documentation program in partnership with state and local governments, private industry, professional societies, universities, preservation groups, and other Federal agencies. The program assigns highest priority to sites that are in danger of demolition or loss by neglect, and to National Park Service properties… documentation enters the Collection through mitigation activities under appropriate sections of the National Historic Preservation Act of 1966, submissions in prize competitions, and donations". [45]

Put simply, the HABS/HAER/HALS program is one of the most well-respected and prolific programs that documents and preserves Historic Sites in the United States. The technologies used in their projects are primary candidates for Georgia State Parks to use for the documentation of cultural resources.

A secondary organization that is worth looking at to gauge what technology is being implemented in the preservation field is the private firm Direct Dimensions based out of Maryland. This private firm works heavily in 3D scanning, 3D model making, and 3D printing repair and replacement.[46] They have a solid national track record and a high recommendation from a project leading architect within the afore mentioned HABS program. This firm originated with military engineering contracts in 1995, and quickly moved onto cultural preservation contracts and medical prosthetics.[47]

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[44] "Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey," Library of Congress, accessed 2/11/2018, http://www.loc.gov/pictures/collection/hh/.
[45] "Heritage Documentation Programs."
[46] "About DDI," Direct Dimensions, accessed 1/27/2018, http://www.dirdim.com/comp_about.htm.
[47] Ibid.

A thorough and informative picture of the technologies used by HABS/HAER/HALS was provided by speaking with Divisional Project Leader Dana Lockett. This discussion outlined four technologies that are heavily used in the process of carrying out their documentation projects and the other applications that those technologies can provide. Mr. Lockett suggested the examination of 3D printing via investigating the projects and work carried out by Direct Dimensions. Through the information obtained in this conversation, and the examination of projects in which those technologies were used, five technologies were determined to be the most applicable to the widest variety of possible cultural resources that may be encountered in the Georgia State Park system: photogrammetry, 3D terrestrial LiDAR scanning for documentation, 3D terrestrial LiDAR scanning for measurement, Unmanned Aerial Systems (UAS), and 3D printing.

These five technologies have primary applications, but also secondary uses when combined with other software or if the data collected from their use is applied in entirely different fields. It is important to encompass all that each of these technologies can provide when assessing their viability within the Georgia State Park system.

Technologies Most Applicable to CRI, Documentation, Assessment, Monitoring, and Management

Photogrammetry

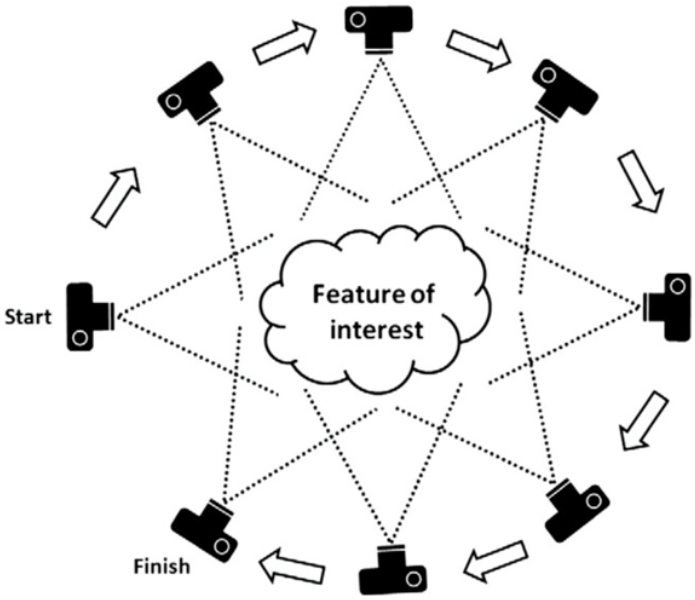

Figure 2.5: Example of Photogrammetry (https://www.gislounge.com/making-3d-models-photogrammetry/)

Photogrammetry is a long-standing technology that relies on the combination of multiple images brought together to provide a whole perspective image that allows for accurate measurements and analysis of a recorded object.[48] These compiled images were derived from drawings initially; later, photographs were used to produce a complete image. Eventually, with the advent of digital photography, these images could be scanned into an algorithm-based software program to create more accurate 3D models to which precise metadata could be attached.

[48] Dana Lockett, Phone Conversation, December 7th, 2017.

> "Quantitative photogrammetry is primarily derived from pairs of photographs. If two photographs image a common area of view, in much the same way as binocular vision operates for mammals and other animals, the perception of depth is possible. Also known as stereophotogrammetry, the use of stereo photographs is the basis for most photogrammetric recording and mapping, as it allows both position and height to be measured."[49]

With the progress of digital images and digital scanning software, more images can be matched together in a software program and form a cleaner, more accurate image. Photogrammetry can be used to capture and document large objects, small features, and wide expanses of terrain when the image is taken from an aerial view.[50] This technology, like any technology, has both advantages and drawbacks. Photogrammetry is best used with a high-resolution camera, but any camera can serve the purpose if the photographs being taken obtain a 65% overlap of the object being recorded. Image detail error can be corrected to within 6 decimals of accuracy.[51] 3D models created through this form of photogrammetry scanning create a point cloud that has a higher mesh rate than those created by 3D terrestrial LiDAR scanning, this is more than likely due to the higher resolution of photographs used to create the point cloud.[52] The process of photogrammetry is quicker than 3D terrestrial LiDAR scanning on smaller objects and provides a higher degree of detail on smaller features. The cost is lower than a 3D terrestrial LiDAR scanner because it does not require a specialized camera to scan, but simply requires a well-calibrated and fixed position camera to get higher quality

[49] Harvey, Euan, and Mark Shortis. "A system for stereo-video measurement of sub-tidal organisms." Marine Technology Society Journal 29, no. 4 (1995): 2.
[50] Dana Lockett, Conversation.
[51] Ibid.
[52] A point cloud is a set of data points generally set within an X, Y, and Z coordinate system; where X represents longitudinal values, Y are latitude values, and Z is the depth value from the point of scanning. The mesh is the polygonal shape that the data set points are being organized into so that a 3D model can be generated in a modeling software such as AutoCAD®.

images.[53] The more important feature in photogrammetry is the requirement for specialized software to process the digital images and turn the data into useable 3D models. These 3D models can be used to establish a documentation record of the object being recorded and provide highly accurate data from which derive measurements.

As previously mentioned, this technology has some challenges. Photogrammetry is not good at capturing very thin elements, or shiny elements, as they bounce light in odd ways and distort the image bring photographed and create large errors in the modeling software.[54] This makes photogrammetry a good choice for most buildings, but not very good for landscapes due to the field of vision that may be available, and issues created by depth perception. Lighting is a key issue when using photogrammetry because you cannot use flash photography with this method because of the previously mentioned lighting issue. Cloudy days are best for external documentation. Photogrammetry also relies heavily on line of sight to properly capture an image, and so the camera must be moved to capture the entirety of an object. A fixed tripod or carefully planned camera positions, can be used to capture the entirety of an object. And the equipment will need to be constantly recalibrated to insure the parameters in the recorded data remain constant when entered into the modeling software.[55] Interior rooms also pose potential problems because of their corners. Corners present an issue when it comes to capturing a clean image that allows for the necessary 65% overlap required to create a high-resolution image.[56] One last draw back comes with the integration of photogrammetry with unmanned aerial systems (UAS) technology. At present, small UAS use a GoPro®-style

[53] Dana Lockett, Conversation.
[54] Ibid.
[55] Ibid.
[56] Ibid.

camera and the lens in these cameras are not suited to photogrammetry. The rolling lens that a GoPro® uses creates calibration issues with the modeling software. A very large UAS is required to use a camera with a compatible lens. While the movement of such a UAS can cause some calibration issues, 5-7mm accuracy can be achieved.[57]

While the cost of using this technology is not cheap, it is growing increasingly affordable as this type of technology is being used frequently in the public sphere. Also, the initial investment into such a technology can be made up for by using the data acquired by this technology to supplement site interpretation materials. 3D models created from these scans can be used in social media applications as well as promotional material for the parks. The images created by the models are excellent for their use in documenting cultural resources and provide highly accurate measurements that can be used to monitor any deterioration or damage to cultural resources or provide accurate measured images by which to plan construction and repair projects.

[57] Dana Lockett, Conversation.

3D Terrestrial LiDAR Scanning

Figure 2.6 Example of 3D Terrestrial LiDAR Scanning equipment and capability (http://transconimagingsolutions.com/)

. 3D terrestrial LiDAR scanning is another technology that is heavily used by HABS/HAER/HALS and Direct Dimensions Inc (DDI). This technology can be used for both documentation and highly accurate measurements. "Laser Scanning is the process of shining a structured laser line over the surface of an object in order to collect 3-dimensional data. The surface data is captured by a camera sensor mounted in the laser scanner which records accurate dense 3D points in space."[58] 3D terrestrial LiDAR scanning has been in use since 2002. The old machines were huge and had limited vision, but by 2006 the machine could spin 360° and could almost capture a complete 180° spectrum from the top of an object to the bottom.[59] 3D terrestrial LiDAR scanning is mostly used in long and medium range projects. One such project was done in 2006 to capture and record the Statue of Liberty. According to Mr. Dana Lockett, 3D terrestrial LiDAR scanning is used 99% of the time in projects because of its broad range of

[58] "Laser Scanning," Direct Dimensions, accessed 1/27/2018, http://www.dirdim.com/serv_laserscanning.htm.
[59] Dana Lockett, Conversation.

application. Like photogrammetry, the 3D terrestrial LiDAR scanner must have direct line of sight, so obstructions must be removed prior to scanning. If these obstructions cannot be removed, then the scanner must be moved to minimally 3 different spots in order to completely capture the image. Another difficulty is keeping a record of the metadata of how the scanner was used each second of the scan. Any errors in the metadata can create too many variables in the modeling software. Errors in the data makes the models highly inaccurate or outright unusable.[60]

The 3D terrestrial LiDAR scanner is also not very good at capturing small details, such as ornamentation, open or closed windows, and similarly small features. In these instance hand-drafted images are added to the data to create complete models. Occasionally, when working with these small features, photogrammetry is used instead, and the highly accurate data is merged with the point cloud mesh to complete the image.[61]

3D terrestrial LiDAR scanning should be used in conjunction with hand drawn plans and drafts. This multi-faceted approach allows for the scanner to anchor their scans off significant features of the object being recorded, allowing for cleaner alignment in the modeling software and more accurate models. This approach also allows for reproduction of results if a new scan is done to compare one scan to another. The degree of accuracy can achieve a 7mm mean of error.[62]

A 3D terrestrial LiDAR scan model can be used for the same functions as a photogrammetry model and is able to be converted back to a 2D image, if desired. No

[60] Dana Lockett, Conversation.
[61] Ibid.
[62] Ibid.

matter the final product, 3D terrestrial LiDAR scanning is a common technology used for highly accurate documentation and record keeping, allowing for reproducible results provided accurate metadata protocols are observed. This highly detailed level of accuracy allows for excellent comparisons of an object over time to determine changes to the structure or object.[63]

3D terrestrial LiDAR scanning is also in heavy use for the recording of accurate measurements of a structure or landscape. To attain the high degree of accuracy for detailed measurements, the machine must be robust in their scans and use a real-time compensator to ensure the laser scan keeps level.[64] The larger 3D terrestrial LiDAR scanners can range in cost from $50,000 to $100,000. However, smaller units that can be used for interiors run $16,000. This is a technology that is constantly being improved upon and produced in greater quantities, so the price will decrease over time.[65]

Another attribute in the 3D terrestrial LiDAR scanner's favor is its ability to work in conjunction with numerous other technologies. Some scanners can be equipped with a filtering algorithm that can remove small particles from the data, including rain drops, or other elements caused by weather. Also, if a 3D terrestrial LiDAR scanner is used in conjunction with a GPS total station, an even more accurate scan can be achieved, and the metadata is easier to reproduce and has fewer variables. No matter the configuration or other technologies that are incorporated with the 3D terrestrial LiDAR scanner, the technology can be used on almost any cultural resource project. Small, specialized

[63] Dana Lockett, Conversation.
[64] Ibid.
[65] Ibid.

organizations have been known to use as many as 20 different types of 3D scanners for different tasks.[66]

Unmanned Aerial Systems (UAS)

Figure 2.7 Example of an UAS (https://www.pcmag.com/roundup/337251/the-best-drones)

The use of unmanned aerial systems (UAS) as a technology is becoming increasingly prevalent by both the private sector and governmental entities. UAS have the potential to be integrated with both 3D terrestrial LiDAR scanning and photogrammetry, but the previously mentioned issues should be addressed. UAS are excellent at simple digital recording and documentation. They also have the benefit of recording areas and features of an object they may not be accessible to people due to height, tight quarters, or both. UAS are also highly affordable in comparison to other technologies that are currently in use. Depending on the size and capabilities desired, the price tag of a unit can vary. This technology that is also continuing to become less expensive as they are mass produced for a civilian populace. In Georgia State Parks, UAS use must be approved by DNR management and those that pilot these UAS must meet FAA regulations and be

[66] Dana Lockett, Conversation.

licensed pilots. With those two caveats in mind, a UAS can serve numerous functions for a state park. They can document and record complete images of cultural resources. They can be used to map and scan entire park properties either using aerial photogrammetry, aerial LiDAR, or simple digital recording. These videos can be used for social media advertising, park interpretation videos, budgetary meetings, or any number of presentations where having full range image of a park and its cultural resources would be of value.

3D Printing

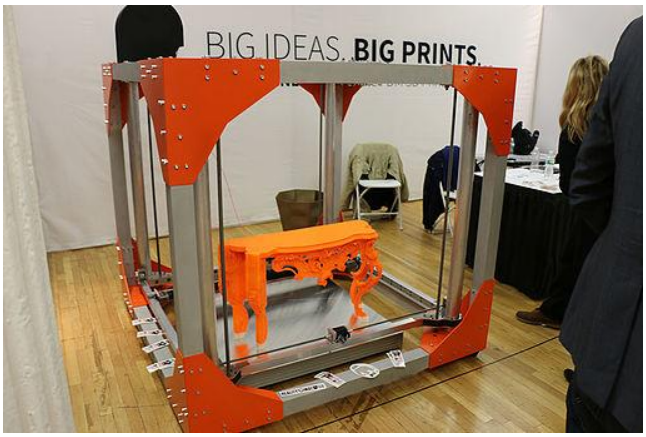

Figure 2.8 Example of a 3D Printer (https://nursingeducationnetwork.net/2017/11/05/3d-printing-in-healthcare/)

The final technology presented as being useful in cultural preservation management and monitoring is that provided by 3D printing. 3D printing, when used in conjunction with detailed AutoCAD® (or similar software programs) rendering derived from digital scans, can reproduce any number of features in materials such as bronze, plastic, rubber, foam, crystal, or wood.[67] A clean model scan can allow for a 3D replication of the scanned model at varying scales. A model can be used for

[67] "Replication," Direction Dimensions, accessed 1/27/2018, http://www.dirdim.com/serv_replication.htm.

manufacturing a reproduction to completely restore any object that has been damaged by weather, neglect, or natural disaster. 3D printing has a quick turnaround time and can be used to repair or replace lost ornamentation, structural pieces, or even produce replacements for lost fixtures or statues provided an accurate 3D model can be provided. In these later instances, a foam model is created and used to create a cast in whatever material is required[68], such as the bronze of many of the statues located in Georgia State Parks. In addition, this technology has marketing potential if a 3D model of a highly recognized feature of a park, like a statue, building, or bust, is provided. The model can be scaled down and then used to produce multiple products for sale in the park gift shops. These 3D printers also have the potential to print replicas of furniture to aid in the interpretation of some cultural resources. The initial cost of such a printer can run as high as $50,000 for a printer capable of printing furniture[69], but after the initial investment, the recoup of cost potential is very high when one considers the commercial application within the gift shops, or the money saved on materials when repairing or replacing certain features within a cultural resource. The most important aspect of using such reproductions within the context of these historic and cultural resources is the necessity of disclosing their fabricated nature in the interpretation for said cultural resource.

Taken all together, these five technologies have been proven to be of valuable use by well-respected and established programs and organizations. Their prolific use and verifiable and reproducible results demonstrate how they are the most applicable and cost-efficient technologies to investigate for use within the Georgia State Park system.

[68] "Replication."
[69] Ibid.

Technology Summary

When considering the potential technologies that may be applied to the cultural resources within the Georgia State Park system, it is essential to not only consider what positive attributes that each technology possesses, but also what challenges each technology may face. If the type of cultural resources found in the Georgia State Parks and Historic Sites does not represent a cultural resource that a technology is optimally designed to work with, should it be considered? It is important to consider if the amount of cultural resources that a specific technology can document outnumbers the cultural resources that it is not suited for. Additionally, it is important to consider how each of these technologies has been implemented for documentation purposes by professional organizations, and how much they rely on that technology over others in certain documentation scenarios. Learning to play to a technology's strengths when selecting in what situations to use it is important in deciding what types of cultural resources should be taken into consideration for potential application, and which ones are obviously not designed to work optimally with particular types of cultural resources.

Summary

Overall, the history of the Georgia State Park system is a pattern of waves of growth and stagnation. Periods of legislation spurred growth are often brought up short by funding issues that result in the loss of staff, increase in cultural resource maintenance issues, and inconsistencies in training and the enacting of management methods. While the Georgia State Park system models its cultural resource management methods upon the standards set down by the National Historic Preservation Act of 1966, the parks face

numerous issues while attempting to keep up with their management plans because of the constant trouble of funding issues. Technology represents a potential avenue by which the Georgia State Park system may better address their CRM issues, but the looming issue of inadequate funding hampers the pursuit of this potential avenue for improvement. So, it is important to find a technology that provides the most applicability across the numerous variety of cultural resources that reside in the Georgia State Parks and Historic Sites, but that also provides enough additional benefits to help offset the cost of the technology so that the Georgia State Park system can implement selected technology without struggling financially.

In the following chapter, a selection of case study sites will be presented. Appropriate focus will be given to the history of each site and the cultural resources in each property. Additionally, attention to the types of challenges and issues that face the cultural resources on each site, as well as the current management procedures that the staff of each site are currently instituting will be explored.

CHAPTER 3

CASE STUDY SITES AND PREFERRED TECHNOLOGIES

This chapter introduces the concept of using case study sites for research, defines criteria used to choose appropriate case study sites, describes the process used to identify potential sites, reveals those chosen sites, defines criteria for choosing applicable technologies for park use, methods used to determine applicable technologies and narrowing down potential case study sites, and describes interview questions for park staff to understand cultural resource management challenges at the identified case study sites. All previous information is then woven into case study descriptions addressing the history, site cultural resources, current conditions, issues, prospective technology inquiry, and site summary for each of the five case study sites.

Case Studies as Research Methods

Case studies represent a reliable and proven practice in numerous fields, such as medicine, law, engineering, business, planning, and architecture.[70] They represent a primary form of education, innovation and testing for any professional venue that they are being implemented in. They also serve as a collective record of the advancement and development of knowledge in any field to which they are applied.[71] Often used as a

[70] Francis, Mark, *A case study method for landscape architecture (*Washington*:* Landscape Architecture Foundation, 1999), 5.
[71] Ibid.

research practice, case studies serve to make anecdotal and generalized information concerning projects and methods concrete. By establishing a fixed model of research, case studies provide the ability to produce results that can be replicated and then disseminated for a broader scope of research.[72]

In essence, a case study is "a well-documented and systematic examination of the process, decision making and outcomes of a project that is undertaken for the purpose of informing future practice, policy, theory and/or education."[73] Case studies can be a source of practical information for potential solutions to various challenges and an effective way to teach by example.[74] For the purpose of this thesis, case studies provide a foundation of inquiry and information that can be replicated at different parks and Historic Sites in order to identify patterns in methods, and reoccurring issues and challenges that the staff and cultural resources of each property face on a regular basis.

Case Study Site Selection Criteria

Choosing the final case study sites required a two-part process. The first part focused on defining criteria by which the case study sites would be chosen. The first criterion is that the sites should be physically located within the State Park system of Georgia ensuring that each cultural resource was subject to the same management practices and subject to the same administrative restrictions. The second criterion is that the chosen sites contain cultural resources of a similar age range (minimally 50 years to thousands of years old), and similar cultural resource types (architecture, archeology,

[72] Francis, *A Case Study Method*, 9.
[73] Ibid.
[74] Ibid.

cultural landscape, etc.) and materials (wood, brick, tabby, etc.). There are a total of 63 parks within the Georgia State Park system, 17 of which are Historic Sites; consequently, there was an expansive pool of cultural resource sites from which to choose. The third criterion is that the potential case study sites should possess a wide variety of material cultural resources, exhibiting variations in both types of cultural resources and materials used to construct those cultural resources. The fourth criterion is that the cultural resources at each potential site should represent a pool of possible issues and challenges that could be treated and assisted by the application of multiple technologies from the previously defined technology list. The fifth criterion is that the park possesses a cultural resource on its defined property. Since many of the state parks were dedicated to recreational purposes only, this eliminated 25 parks from the selection pool.

Case Study Site Selection Process

Implementation of the criteria first required a list of all the state parks with cultural and historic resources, noting specific categories of cultural resources, age, and materials, and type (living structure, earthwork feature, landscape feature, fortification, etc.). The cultural resources ranged in time period, cultural resource type, diversity of technological application, and building material, as well as current state of preservation. Creating a spreadsheet, where parks are listed in the far-left column, and resource types in a row across the top, the presence or absence of each resource type was noted. See Figure 3.1 for an abbreviated example of this complete spreadsheet.

State Parks	Antebellum Brick Structure	Antebellum Wood Structure	Earthen Indian Mound	Total
Chief Vann House	x	x		2
Dahlonegha Gold Museum	x			1
Etowah Indian Mounds			x	1
Fort King George				0
Fort Morris				0
Hardman Farm			x	1
Hofwyl-Broadfield Plantation		x		1
Jarrell Plantation		x		1
Jefferson Davis Memorial				0
Lapham-Patterson House				0

Figure 3.1 Abbreviated Case Study Site Spreadsheet (Created by Author)

The total number of cultural resource types in each park were simply added together to identify which parks had the widest variety of cultural resources. A logical break was found between the top eight sites and those from nine and below. Thirty of the potential case study sites only possessed one or two different types of cultural resource, while the top eight possessed anywhere from 3 to 5 different types of cultural resources that reflected differences in time period, building material, cultural resource type, and number of potential issues for technological application. Determining those top eight case study sites was the first step towards choosing the final case study sites.

The second part of the selection process was to define criteria to determine the most applicable technologies for cultural resource management. Two criteria were used to determine the most applicable technologies: 1. those technologies that can be used for more than one aspect of cultural resource management (documenting, monitoring, measuring, etc.), and 2. those technologies that can be applied to a variety of cultural resource types (architecture, archaeology, landscapes, etc.).

This selection process consisted of looking at the technologies that were noted in Chapter Two to have a well-established track record of professional use and provide additional benefits to the other needs and challenges of the parks. Next, the technologies were separated into categories that denote what each technology may be used for

regarding cultural resource management. For example, 3D terrestrial LiDAR scanning can be listed under documentation, monitoring, and measurement as the specific purpose it can be employed for may vary by specific type of cultural resource. Specific software programs and tools are included in the technology categories to clearly illustrate a necessary dependency between the hardware and software for the tools to function properly. A spreadsheet was again created with cultural resource types (Antebellum brick structure, Earthen Indian mound, Colonial wood structure, etc.,) across the top, and potential CRM technologies in the far-left column with appropriate boxes marked that had both elements. A total number was tallied for each row to determine the five technologies most applicable to cultural resource management. See Figure 3.2 for an abbreviated example of this spreadsheet.

Technology Categories	Antebellum Brick Structure	Antebellum Wood Structure	Earthen Indian Mound	Totals
Documentation Photgrammetry	X	X		2
Monitoring Photogrammetry	X	X		2
Documentation Drone	X	X	X	3
Meassuring Drone	X	X		2
Documentation 3D laser Scanning	X	X		2
Monitoring 3D Laser Scanning	X	X		2
Meassuring 3D Laser Scanning	X	X	X	3
Repair 3D Printing	X	X		2
Documentation GPR	X	X	X	3
Monitoring GPR	X	X		2
Documentation GIS			X	1
Documentation Magnetometer			X	1
Documentation Dendrocronology		X		1
Documentation: Lidar	X	X		2

Figure 3.2: Abbreviated example of the Technology Spreadsheet (Created by Author)

Once these five technologies were identified, each was assessed for their strengths, weaknesses, and the additional benefits that using each technology could provide towards the overall needs of each case study site and its cultural resources.

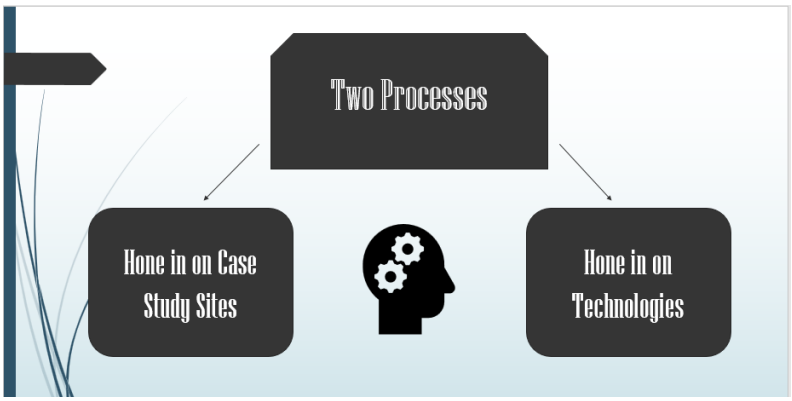

Figure 3.3 Two Processes to Proceed with Methods (Created by Author)

Upon reflection of the practical information discussed in Chapter 2 concerning the application of these five technologies, photogrammetry and 3D terrestrial LiDAR scanning were determined to effectively provide the same services, with minor distinctions in capabilities and the ability to be used in an interconnected manner. Hence, these two technologies were combined into one category called "scanning". Also, as scanning with either photogrammetry or 3D terrestrial LiDAR scanning provides similar data that can be used for documentation and measurement purposes simultaneously, there was no longer a reason to define the two as separate technologies. With these decisions, the final list of most applicable technologies included scanning (focused on documentation and measurement,) UAS, and 3D printing.

The last step of the case study selection process was again to create a spreadsheet to cross reference the 8 park sites against the 3 technologies. The result was a quantitative assessment of which state parks' cultural resources had the highest rate of applicability with the chosen technologies. Five sites possessed the greatest variety of cultural resources in number, representation of time period, material and even a moderate variability in geographic location across Georgia; those sites were: the Chief Vann House

State Historic Site, Fort King George State Historic Site, Etowah Indian Mounds State Historic Site, Jarrell Plantation State Historic Site, and F. D. Roosevelt State Park.

Interview Questions for Park Staff

With the case study sites finalized, the last task was to formulate a series of questions for park staff interviews visiting each site. The questions were designed to obtain baseline information about each site, to discern what cultural resource management issues each site faced, to determine the level of staff familiarity with the cultural resource technologies, and to determine how the technologies might be used on their site. Both general and site-specific questions were asked. Each site visit consisted of the park staff interview as well as an escorted tour of the site to see some of the cultural resource and management issues facing each site. Refer to Appendix C, for the complete list of interview questions.

Case Study Site Descriptions

For the remainder of this chapter each of the five case study sites is presented overviewing the history of the site, a list of cultural resources on the site, and current site information including name of park staff interviewed, visitor information, what part of the budget goes towards the monitoring and maintenance of cultural resources, what monitoring tools and methods are currently used on site, what documentation and data recording methods and tools are used, and site interpretation. The site descriptions will occur in the following order: Chief Vann House State Historic Site, Fort King George

State Historic Site, Etowah Indian Mounds State Historic Site, Jarrell Plantation State Historic Site, and F.D. Roosevelt State Park.

After the introductory information, there is a section dedicated to the cultural resource management issues of each site. This section will indicate the most reoccurring issues, the longest standing issues, what is the primary cultural resource issues at the site, and what mitigation steps the staff are taking to help prevent and manage the issues.

The next section reveals how the staff felt about the possible implementation of proposed cultural resource management technologies at their site, noting the benefits, if any, they felt could be provided by technologies such as 3D terrestrial LiDAR and photogrammetry scanning, use of unmanned aerial systems (UAS), or 3D printing. Finally, the results are summarized by describing what was discovered at each site and how those observations might provide insight on the breadth of issues each site faces, and how those findings may apply to the entirety of the Georgia State Park system.

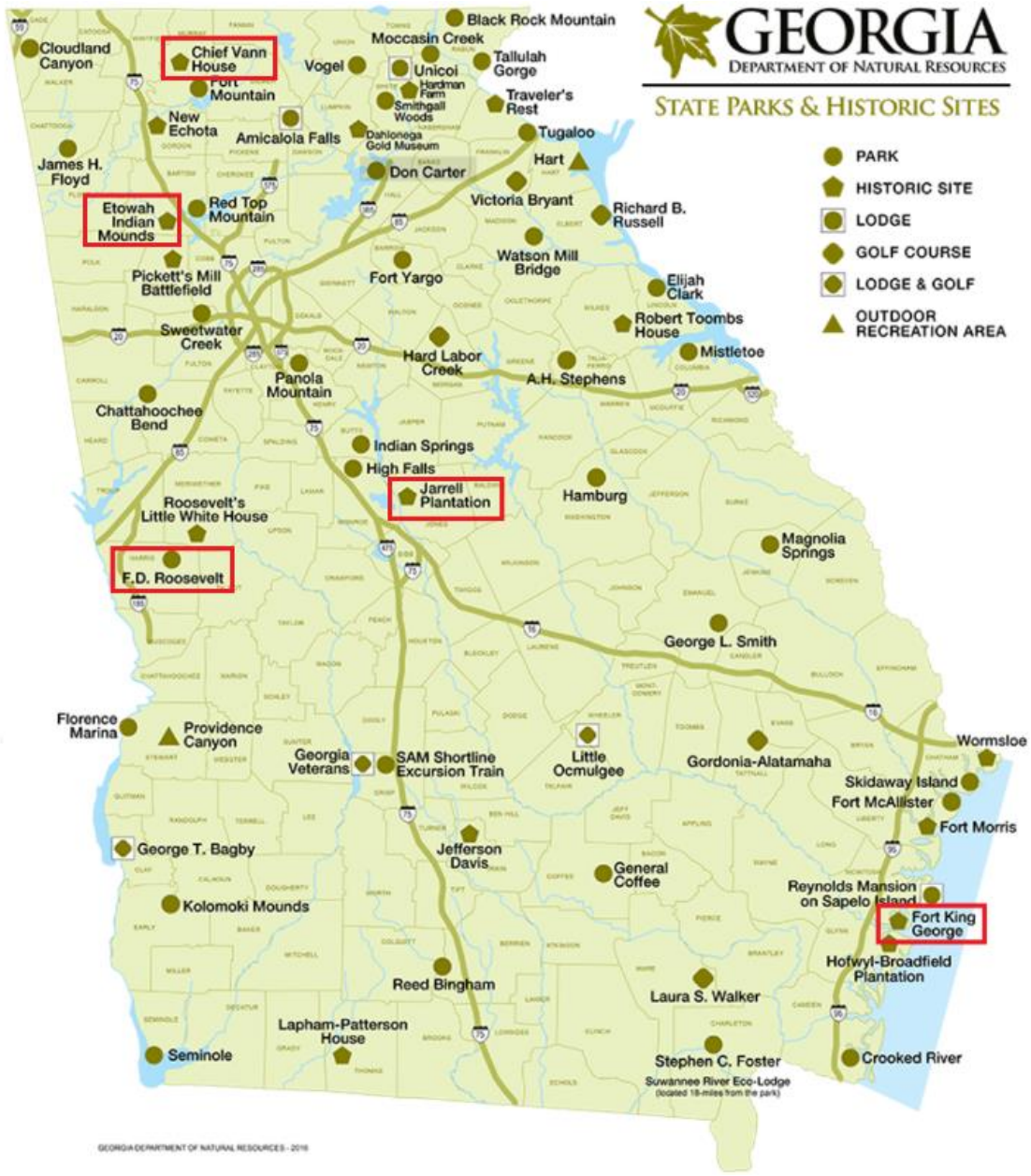

Figure 3.4 Geographical Locations of Case Study Sites in relation to all of the State Parks of Georgia (http://gastateparks.org/Map)-.emphasis added by author

Chief Vann House State Historic Site

Figure 3.5: Chief Vann House-Front Exterior of the north elevation. The structure is a 2-story brick federal style building. Note the 3-bay design, the 9 over 9 double hung windows, the central entry on the first floor with fan and sidelights, as well as a 2nd story porch with pediment (Author's photo.)

Setting/ Geographic Location

The Chief Vann House State Historic Park is located in Murray county on the outskirts of the city of Chatsworth in northwest Georgia, near the intersection of state highways GA-225 and GA-52. The park is a piedmont site, which is characterized by rolling hills and clear open spaces. The house rests on a knoll surrounded by additional historic wood structures that are not original to the site but represent structures that were known to be on the property near the main house. The entire property consists of around

137 acres, but only a fraction of that acreage makes up the portion of the property where the cultural resources are located.[75]

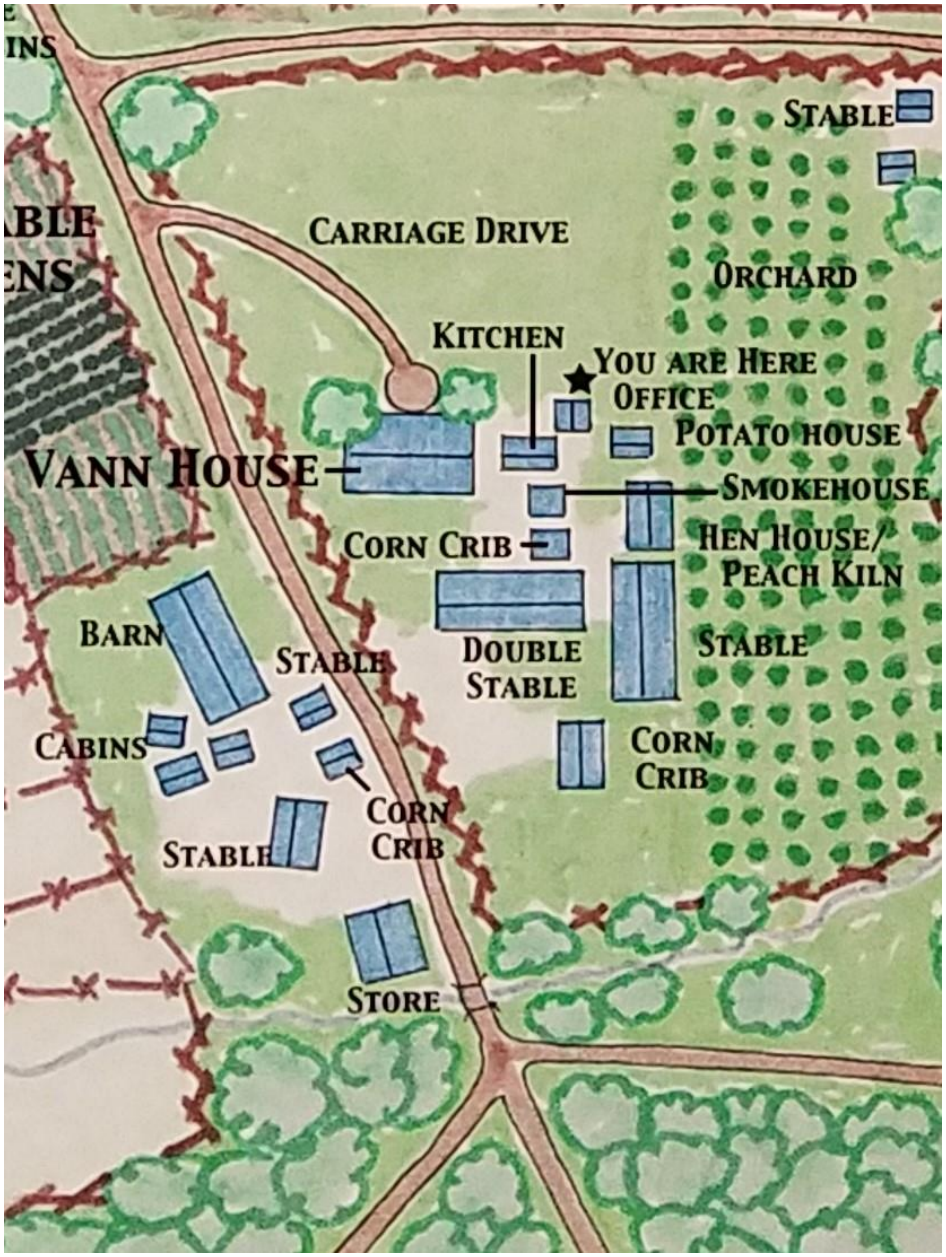

Figure 3.6 An 1830's historic site map of Vann Family property. This portion of the map provides a rough approximation of the location of the Vann House in relation to the additional exterior structures of the historic site as it is today.

[75] "Chief Vann House State Historic Site," Georgia Department of Natural Resources State Parks and Historic Sites, accessed 1/27/2018, http://gastateparks.org/ChiefVannHouse.

History

The Chief Vann House State Historic Site's main historic attraction is a Federal period manor house that was built between 1804 and 1806 by James Vann II.[76] The Vann family, a white family with Scottish heritage, married into the Cherokee nation when James Clement Vann married the daughter of the Cherokee Chief John Ross of the Spring Place settlement, Ruth Gamn.[77] James Vann II would travel to Scotland, a land his father had visited in his youth, and there he learned about grand Scottish homes. He brought that knowledge back with him in order to build a grand Cherokee mansion from which he could solidify his family's leadership role in the Cherokee Nation. The Chief Vann house was the center of a grand plantation, ranging close to 1,000 acres in size,[78] that was run by the Vann family for close to thirty years. The house's exterior walls and first and second floor interior walls were constructed of locally made brick. Hand-wrought nails and hinges made by the plantation's own blacksmith were used in its construction. Only the walls of the third floor are made of plaster and wood. The house has two full stories with a half third story, the ceilings of both the first and second floor are 12 feet in height with the third floor being only 6 feet tall.

[76] Lloyd, Lela Latch, If the Chief Vann House Could Speak (Texas: Quality Printing Company,1980), 19.
[77] Ibid, 4.
[78] "Chief Vann House State Historic Site,"

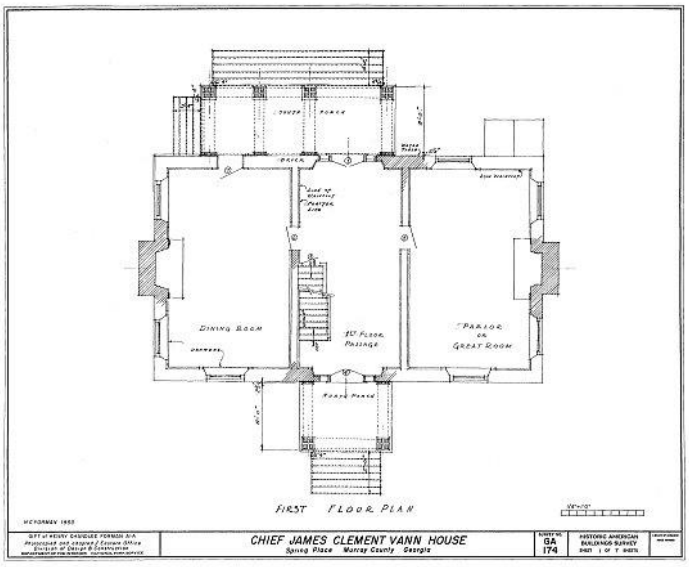

Figure 3.7 Chief Vann House First Floor architectural plan. Illustrating the front and rear porches, a central hall and stair with the dining room on the west side and the drawing room on the east side. –(HABS)

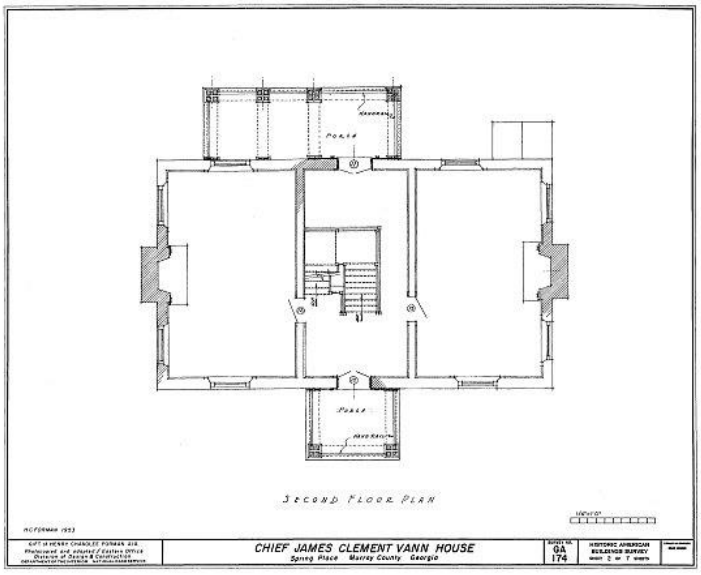

Figure 3.8 Chief Vann House second floor architectural floor plan illustrating a small balcony on the north elevation, a central hallway and stairwell with the master bedroom on the west side and guest bedroom on the east side. (HABS).

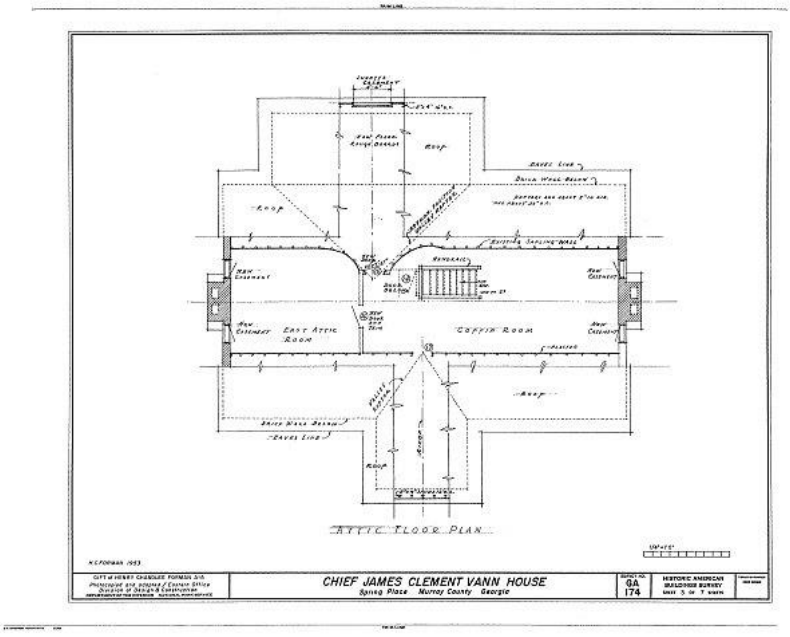

Figure 3.9 Chief Vann House third floor architectural floor plan that illustrates the boys room at the north end of the house and the girls room to the south. Also featured are the later additions of attic space to the east and west of the central rooms. (HABS).

The first and second floors have three rooms. On both levels there is a room on either side of a hallway and central stair. On the first level, the dining room is to the west, while the east room is the drawing room (Figure 3.4). On the second floor, the west room is the master bedroom and the east room is the guest bedroom (Figure 3.5). The third floor is divided into two rooms, called coffin rooms for their shape. The room that the stairway leads into on the third floor is believed to have served as the boys' room. The second room on the third floor is believed to have been the girl's room. This room could be shut off from the boy's room, giving the girls more privacy (Figure 3.6).

The Vann House also features a basement with two separate store rooms beneath the main floor, originally accessed from an exterior entrance but currently accessible through an entrance beneath the central stair that was a later addition to the house.[79]

[79] Lloyd, If the Chief Vann House Could Speak, 19-20.

There are varying accounts of alternative uses for these two basement rooms. For example, they may have been used to punish slaves. However, these stories are not founded in anything more than anecdotal hearsay.

In the 1830's, due to development pressure by settlers, almost the entire Cherokee nation was forced out of their territory on the infamous Trail of Tears. The Vann family lost their home and were forced to relocate to the Cherokee territory in Oklahoma.[80] Over the ensuing years, the house would have roughly 17 owners, and in 1952, then owner J.E. Bradford sold the home to the state of Georgia. After a restoration project that began in 1958, the home and surrounding land became a historic site under the administration of the PRHS division of DNR.[81]

Types of Resources

The site contains 4 historic buildings and 2 historic structures. The Chief Vann House is the only original building to the site, however there are other historic structures that have been added to the site over time. Currently there are 2 corn cribs, 2 one room cabins, and 1 two story kitchen that are all historic structures brought from other sites to both preserve them and to provide historical context for the historic site surrounding the Vann House. There are also the remains of a spring house on the site, which is not original to the Vann family, but was built by a later owner of the property. All exterior structures, aside from the 2-story kitchen, are made of wood logs, some with clay

[80] "Chief Vann House," Georgia Department of Natural Resources State Parks and Historic Sites, accessed 1/27/2018, http://gastateparks.org/ChiefVannHouse.
[81] Tim Howard, Interview on site, November 24th, 2017.

chinking and interior clapboards, and some without, in traditional vernacular styles of construction. The kitchen has a brick foundation with clay chinked wood log walls.

Current Site Information

Park Staff Interviewed

The Chief Vann House State Historic Site interviewee was Tim Howard, the park historian. Tim has worked for the Parks, Recreation and Historic Sites division of DNR for nearly 40 years, all of which have been served either as a volunteer or official employee at the Chief Vann House.

Park Visitation

The site has roughly 10,000 visitors a year. The major draw for visitors is due to its strong ties to the Cherokee Nation, and the site's association with the 1780-1840-time period.[82]

Budget

When asked what percentage of the annual park budget goes toward the maintenance and monitoring of the cultural resources on site, an estimation of 10% was given, 25% if you include the utilities. This is perhaps a result of the Historic Site's budget being held to the same standard as a recreational park.[83] This can create problems as a historic site and a recreational park have very different needs. For example, a recreational park may need to have a large percentage of their budget directed towards the maintenance of the recreational activities and attractions, and the staff to man those

[82] Tim Howard, Interview.
[83] Ibid.

features, a historic site does not have these requirements and instead needs more funding towards specialized staff to maintain and repair their cultural resources in accordance with the standards set down by the NHPA.

Monitoring Tools/Methods

Currently the main tools and methods used by the park employees at the site to monitor the cultural resources are daily passive observation and the use of a dehumidifier tied into a hydrometer to monitor the humidity levels of the house. Beyond those tools and methods, a yearly deep clean is scheduled where all the furniture is taken out and treated. During this time a list of damages to the structures, artifacts, and furniture is compiled. Beyond this, there is not an institutionalized methodology to survey the site for issues.[84]

Documentation/Records

A record of the damages and repairs done on site are kept in an archival system that has evolved over time. It originally began as a hand-written card index system that has been transitioned to an excel spreadsheet. The original card index is still maintained on site, and the process to transpose that data to the excel spreadsheet is still ongoing. This method of documentation has been reinforced through photographic documentation and retaining any pertinent news article clippings that pertain to the site's history. A careful photographic record is kept of furniture loaned to the site by their local friends group.[85]

[84] Tim Howard, Interview.
[85] Ibid.

Site Interpretation

The focus of interpretation is the Chief Vann house. The focus on the house is primarily because the other cultural resources on site are not original to the site, but instead have been added to the site over time to compliment what may have been on site and appropriate during the time period to which the Chief Vann House is being interpreted.[86]

Management and Maintenance Issues

Reoccurring issues

One of the primary reoccurring issues that affects the cultural resources are damages caused by visitors to the park. The most noticeable result of visitor movement through the house is the physical wear to the central stairway in the Vann House. The cantilevered second tier of the stair was at one time freely hanging over the 1st floor but is now supported by a wooden post because of a noticeable instability of the stairwell landing. The wooden post was added to prevent future damage or collapse. As seen in Figure 3.10.

[86] Tim Howard, Interview.

Figure 3.10: Chief Vann House- Cantilevered Stair featuring the wooden post added to support the landing to prevent further damaging stress to the structure and possible collapse. Also visible is the later addition of the basement entrance beneath the stair. (Author's Photo).

Other reoccurring issues are caused by natural weathering to the exterior structures, as well as damage caused by squirrels chewing up the wooden materials. The biggest issue cited by the employees is the difficulty in lining up the specialized labor required to properly work on the historic structures.[87]

[87] Tim Howard, Interview.

Long Standing Issues

The common long-standing issues that continue to go untreated due to lack of funding are needed repair work on the Chief Vann House porch and a smattering of wood repair work needed on the cabins and other exterior structures.[88] One such example cane be seen in (Figure 3.11 and Figure 3.12) where an internal support beam was removed which caused undue stress on the external wooden logs of the cabin. The shattering and separation of the wooden log from the corner joint is a result of this structural stress.

Figure 3.11: C.V.H. exterior cabin. Visible here is a structural issue where a supporting beam inside of the cabin was removed without proper consideration and as a result the wooden log twisted under the pressure cracking and separating from the corner joints causing additional damage around the door frame. (Author's Photo)

[88] Tim Howard, Interview.

Figure 3.12 C.V.H. exterior cabin, Visible here is the point where the wooden log cracked from the pressure of the lost internal structural support and separated from the corner joint. (Author's Photo)

Major Issue

A major issue facing the park is that the site has not had a site manager to act as the intermediary between the park and the region manager for the past year. Though repair budgetary requests have been submitted, the lack of communication between the park and the region administrator has prevented the repair work to be carried out properly.[89]

[89] Tim Howard, Interview.

Constant issue mitigation

Wear and tear from the visitors is the only constant variable that the employees feel that cannot be mitigated. because guided tours are a major component of the site's appeal and revenue stream. Guided tours act to prevent a great deal of visitor damage due to the supervision of the guides while touring the site.[90]

Prospective Technology Inquiry

Prior to questioning the park staff about specific technologies and their possible applications, inquiries were first made as to their personal knowledge on the subject. In instances where the park staff expressed a lack of personal knowledge, a brief informational explanation was given about each technology and their current CRM applications to obtain a more informed response to specific questions.

Scanning

When asked about the prospect of using 3D terrestrial LiDAR scanning in conjunction with software programs to create models of the various structures on site, and in turn use those models to monitor the structures over time, park staff were concerned about the training that would be required to manage and use 3D model sets. Even with those concerns, park staff felt that having a detailed and concrete form of evidence to help articulate a needed repair could be very useful to raise money for such repairs or to better prepare a detailed budget request for those repairs.[91]

[90] Tim Howard, Interview.
[91] Ibid.

Unmanned Aerial Systems

The idea of implementing UAS technology had a greater appeal to the employees at the site as they felt that it would be a great use in documenting damage to parts of the Vann House that they could not easily access, as well as add to their documentation of the cultural resources over time. Specifically, they noted that UAS would be of a great benefit in determining if the lightning rods were still properly connected as their placement made it extremely difficult to inspect.[92]

3D Printing

Finally, the idea of using 3D printing to repair or replace missing or damaged features held some interest to the staff members, but a strong concern was raised that any piece created to replace, or repair would need to be made in such a way as to stand out, allowing the interpretation to notate their reproduction status, so that there would be honesty in the presentation of the site and its cultural resources.[93]

Site Summary

The Chief Vann House is the primary cultural resource at the park, with several out buildings acting as supplemental cultural resources as they are not original to the site. The most significant CRM issues perceived by the staff is wear and tear caused by the visitors, and wear and tear caused by weather. The most prevalent material associated with the site is wood. The main form of current monitoring for this site is passive

[92] Tim Howard, Interview.
[93] Ibid.

observation with a yearly deep clean assessment. The use of UAS technology appeared to present the most well received possible application at the historic site by the park staff.

Fort King George State Historic Site

Figure 3.13: Fort King George- Pictured here is the Cedar Blockhouse which is the main cultural resource of the historic site. Also visible in the image is a tipped over and damaged guard house that was damaged during Hurricane Matthew (Author's Photo)

Setting/Geographic Location

The Fort King George State Historic Site is located roughly 60 miles south of the city of Savannah near the city of Darien in McIntosh county. Settled in the coastal region of Georgia along State Highway 99, the historic site rests against Black Island Creek and is bordered by flat marshland and live oaks.

History

The Fort King George State Historic Site is a reconstructed British fort featuring reproductions of historic structures that research has indicated were in place during the time of the fort's colonial occupation. In July of 1721, Colonel John Barnwell occupied Guale Indian land between Savannah and the Altamaha rivers. The site was the location where his troops and slaves constructed Fort King George with the eventual aim of establishing a British settlement in the region.[94] The following years brought death by disease, malnutrition, and a destructive fire at the fort in 1726. A total of 140 soldiers died, and none were from combat wounds. By 1727 the fort was abandoned, but not before establishing a British settlement in the region.[95] In 1736 General James Oglethorpe brought over 177 Scottish Highlanders by the site to settle the town of Darien. During this time these Scottish settlers established a thriving timber industry and built a tidal powered sawmill on the site.[96] By 1819 a steam powered sawmill was built on the site, bringing the industrial revolution to Georgia. By the early 1900's all timber resources had been harvested and the larger mill was dismantled and concerted into a small circular sawmill which operated until 1923 when it was forced to close.[97] The site was left to dilapidation until the late 1960's when it was acquired by the Georgia Historical Association. In 1972 the site was taken over by the Parks, Recreation, and Historic Sites division of DNR. In 1988, the Central Blockhouse was reconstructed and

[94] Georgia Department of Natural Resources. "Fort King George State Historic Site: The oldest English Fort on Georgia's Coast." Fort King George Informational Pamphlet, Georgia Department of Natural Resources, Parks, Recreation and Historic Sites Division, 2014.
[95] Ibid.
[96] Ibid.
[97] Ibid.

remained the center of the sites activates until 1990 when construction on additional reconstructions were complete. [98]

Figure 3.14-Fort King George- From the bottom center you can see the Blockhouse, above that and to the right is the officer's barracks, above that is the soldier's barracks. The right earthwork wall features the gun batteries, the top left presents two shacks and the black smith, the left corner shows the baking and brewing house. Next to those are shacks and a one room cabin. At each of the corners is a guard house. (https://www.shutterstock.com/video/clip-29661637-stock-footage-fort-king-george.html?src=rel/17397655:8)

Types of Resources

While all structural cultural resources on site are reconstructed, they are constructed to be as accurate to the site's time period as possible. On site, there are several features, including a cypress blockhouse, officer's barracks, enlisted soldier's barracks, blacksmith's house, four guard houses, indigenous huts, baking and brewing house, swivel guns, cannon battery with earthen walls, tabby ruins dating to the 1840's, 3 sawmill ruins dating from the 1720's-1920's, 3 archaeological survey sites, several shell middens, and a soldier's cemetery. When asked if more tabby ruins could possibly be

[98] Valerie Ikhwan, Interview on site, December 2nd, 2017.

around, park staff suggested that there could be more, but they are not on site.[99] It should also be noted that the site contains Native American and Spanish artifacts as well as those of British/colonial origins.

Current Site Information

Park Staff Interviewed

The Fort King George State Historic Site Interviewee was the Site Manager, Valerie Ikhwan. Valerie has been the site manager for The Fort King George State Historic Site for 3 ½ years, and with the Georgia State Park system for 6 ½ years.

Park Visitation

The site receives on average 20,000 to 25,000 visitors a year. The number of visitors is probably due to the site's proximity to I-95 and its placement in one of the most developed areas immediately south of Savannah. Another reason for the high number is the consistent school field trips that come to the site.[100] The cultural resources are the main draw for these visitors, as they play a strong part in the education of the local school systems and because of the cultural history of the area. [101]

Budget

When asked what portion of the annual park budget goes towards the maintenance and monitoring of the cultural resources on the site an estimation of 30% was tied to

[99] Valerie Ikhwan, Interview.
[100] Ibid.
[101] Ibid.

those purposes. However, in the instance of a large restoration project being scheduled into the budget, that number could go as high as 45%.[102]

Monitoring Tools/Methods

When asked what methods have been used to monitor their cultural resources and if they seem to be adequate to the task, the park staff suggested that the methods currently in use are inadequate. Currently the site management relies heavily on full time staff and volunteers to be on the lookout for any issues that may arise with the cultural resources, but this method is more reactionary than proactive. There is no instituted policy under DNR. for monitoring documentation, and as such management relies heavily on photographs taken on an undefined schedule.[103] Management encourages daily passive surveying of the cultural resources by the staff, and attempts are made to keep to a quarterly inspection of the site, but there are no regularly scheduled inspections performed in cooperation with the Historic Preservation division.[104]

Documentation/Records

An archival record is kept on site of archaeological surveys, construction projects, bids, plans, and final project costs. Large projects and their corresponding details are also kept on file, as well as any events that have a major impact on the site, such as hurricanes or fires. However, this level of record keeping is felt to be inadequate by the management as it does not include a regular record keeping effort of the cultural resources on site.[105]

[102] Valerie Ikhwan, Interview.
[103] Ibid.
[104] Ibid.
[105] Ibid.

The records that are kept can consist of physical descriptions, reports, budget summaries, and some photographs. There is little consistency in the record keeping, which is another issue that management feels could be improved.[106] Valerie has personally instituted some practices to monitor reoccurring issues and preventative monitoring methods to prevent future issues from manifesting. These methods include comprehensive photography documentation prior to heavy storms and attempting to maintain quarterly inspections of the site.[107]

Site Interpretation

The main interpretation of the site is fixed on the time period of 1721 to 1736, during the British military occupation. However, there is flexibility in interpretation when it comes to the big yearly events that center more around a colonial 1776-time period. While other elements of the site are centered around the remains of the saw mill which is based primarily in Darien history.[108]

Management and Maintenance Issues

Reoccurring Issues

When asked what some of the most reoccurring issues are facing the cultural resources on site, the first issue brought up was storm damage. At the time of this interview, two hurricanes (Matthew and Irma) had recently come through the area and had caused sizable damage: knocking over some guard houses, removing cedar shingles

[106] Valerie Ikhwan, Interview.
[107] Ibid.
[108] Ibid.

from all the structures, and flood damage to the earthwork walls. Human damage is also a concern, however, as the cultural resources are reconstructions, no effort is put into keeping visitors away, merely watching them for obvious attempts to damage the cultural resources through vandalism. Funding issues are also a reoccurring concern expressed by the management. Obtaining funds through the proper channels can be difficult and can add time to the process allowing repair issues to grow more serious. Termite and mole damage are also a reoccurring issue, but their damage is not substantial and represents only a small portion of site's issues. Another issue is the danger of destructive vegetation, such as vines and other invasive plants growing into the cultural resources. Due to the proximity of the site to the marsh and Black Island Creek, chemicals are not an option, so more labor-intensive methods are required.[109]

Long Standing Issues

One issue that has been a long-standing problem for the site is roof repair. The cedar shingles on the structures suffer water damage and can be blown away in storms. Full roof repair can cost upwards of $200,000. This sort of issue falls into the 2 year, 5 year, and 10 year budget plan for the park. Two years of park funds are set aside and go to minor repair issues. Five years of park funds are saved to go to moderate repair issues. Ten years of park funds are saved to go to repair issues such as the previously mentioned roof repair.

[109] Valerie Ikhwan, Interview.

Major Issue

Cultural resources are difficult to maintain when a 10-year repair issue remains ignored, but without outside funds, these problems remain and create additional repair problems elsewhere.[110]

Figure 3.15 Fort King George- This image illustrates the loss of cedar shingles on the Blockhouse roof. The continued absence of these shingles leads to more water damage inside the cultural resource. (Author's Photo)

Constant Issue Mitigation

Many repair issues are caused by natural environmental factors, given the location of the site on the Georgia coast. Some of these issues are predictable and a budgetary time frame can be created to handle their repair when they present themselves. The spontaneous damage caused by major storms, and hurricanes are what cause the biggest budgetary issues. With the increase of such storms caused by climate change, it is expected that these issues will be even more prominent and push the site's budget beyond what it can easily handle.[111]

[110] Valerie Ikhwan, Interview.
[111] Ibid.

Prospective Technology Inquiry

Prior to questioning the park staff about specific technologies and their possible applications, inquiries were first made as to their personal knowledge on the subject. In instances where the park staff expressed a lack of personal knowledge, a brief informational explanation was given about each technology and their current CRM applications to obtain a more informed response to specific questions.

Scanning

When the idea of using 3D models created through the application of 3D terrestrial LiDAR scanning in conjunction with specialized software programs was brought up to Valerie it was met with a mostly positive reaction with one caveat of concern. Valerie indicated that when more data represents the key to success, then any tool that can provide quantifiable data to show how cultural resources are changing in measurable and reproducible ways, then it is easier to justify a need for additional funding. The benefits of producing such data would also have additional applications when combined with interpretation efforts and educational material offered on the site. The one concern that was expressed by Valerie was that this technology would require specialized staff to implement.[112]

Unmanned Aerial Systems

UAS usage was not viewed as a useful technology for implementation at the Fort King Georgie State Historic Site. The park staff felt that much of the site had already

[112] Valerie Ikhwan, Interview.

been recorded by Coastal Resources using UAS. This is not to say that other sites could not use a UAS for documentation purposes, but that The Fort King George State Historic Site already had access to UAS via Coastal Resources. All cultural resources in the site are also easily accessible and the ability of UAS to capture features of their cultural resources was not viewed as a pressing need. One use that was proposed and thought to be of a possible benefit to the park was immediate documentation and coverage of the site after a storm to record storm damage.[113]

3D Printing

3D printing was also not perceived to be a particularly useful technology in the context of the site. The integrity of the materials used to construct the cultural resources are a major facet of what makes them significant, and to replace them with a 3D printed replica would go against this principle of integrity at the site. However, there could be a use for 3D printing for artifacts kept in the museum to help create a more complete picture of the site's history for educational purposes. [114] Another facet where 3D printing could be successfully implemented at Fort King George State Historic Site is in conjunction with their living history program. A large part of that program consists of "how to" examples and visitor participation. 3D printed objects could be very helpful in this kind of venue by providing artifacts that the visitors could interact with and not worry about damaging.[115]

[113] Valerie Ikhwan, Interview.
[114] Ibid.
[115] Ibid.

Site Summary

The Cypress Blockhouse is the most recognized and main cultural resource on the site. There are other supplemental cultural resources that are tied into the site's interpretation that range in time period and authenticity. The most reoccurring issue is storm damage. The widest spread issue challenging the cultural resources is also weather damage. The most prevalent material is cypress wood. The main form of monitoring is casual daily observation, and quarterly inspections. The technology that was perceived to offer the greatest benefit to the site was 3D terrestrial LiDAR scanning in conjunction with specialized software to manipulate the scanned data for multipurpose uses.

Etowah Indian Mounds State Historic Site

Figure 3.16: Etowah Indian Mounds- Mound A is featured in the front right of the image and Mound B is visible in the back left. (Author's Photo)

Setting/Geographic Location

The Etowah Indian Mounds State Historic Site is located in Northwest Georgia in Bartow County just south of the city of Cartersville. This historic site is a 53-acre archaeological site that is located in the piedmont region of Georgia. Surrounded by flat fields of farm land on all side except where the Etowah River borders it to the south. The site is very flat except where the Indian Mounds break the surface, and a view from atop one of the mounds provides a clear view of much of the surrounding area except where the tree line obstructs the southern view.

History

The Etowah Indian Mounds State Historic Site is located on the North bank of the Etowah River. It is the largest Native American settlement in the Etowah Valley. The Mounds were used from around 900 AD to 1550 AD. These mounds were used as dwelling platforms for the chief/priest of the native tribe, elite mortuary grounds, and temple areas.[116] In 1540, the site was visited by a Spanish explorer and nearly a 1,000 of his men. Shortly thereafter, the town's population decreased dramatically as tribe members died from disease brought by these European explorers. After fleeing their towns, the survivors joined with other surrounding groups and eventually became known as the Creeks.[117] In the year 1832, Col. Lewis Tumlin was awarded the land in a land lottery. From 1838 to 1953, the Tumlin family owned and worked the land as farmland until they sold a portion of their farm to the State for conservation as protected land. In 1964, the 68-acre site was recognized as a Registered National Historic Landmark, which is still maintained by Georgia DNR.[118]

Types of Resources

The cultural resources on this site consist of 3 major mounds (A, B, and C) and three smaller mounds (D, E, and F). Each of the major mounds rise above the flat terrain in a circular mound that comes to a flat plateau at the top. Mound A rises to an impressive height of 63 feet, with mounds B and C decreasing in height incrementally.

[116] Georgia Department of Natural Resources. "Etowah Indian Mounds." Etowah Indian Mounds Informational Pamphlet, Georgia Department of Natural Resources, Parks, Recreation and Historic Sites Division, 2015.
[117] Ibid.
[118] Ibid.

Mounds D, E, and F are not easily discernable from the ground level and are difficult to see without knowing where to look. There is an earth work defense ditch, 3 borrow pits, and a reconstructed waddle and daub hut.

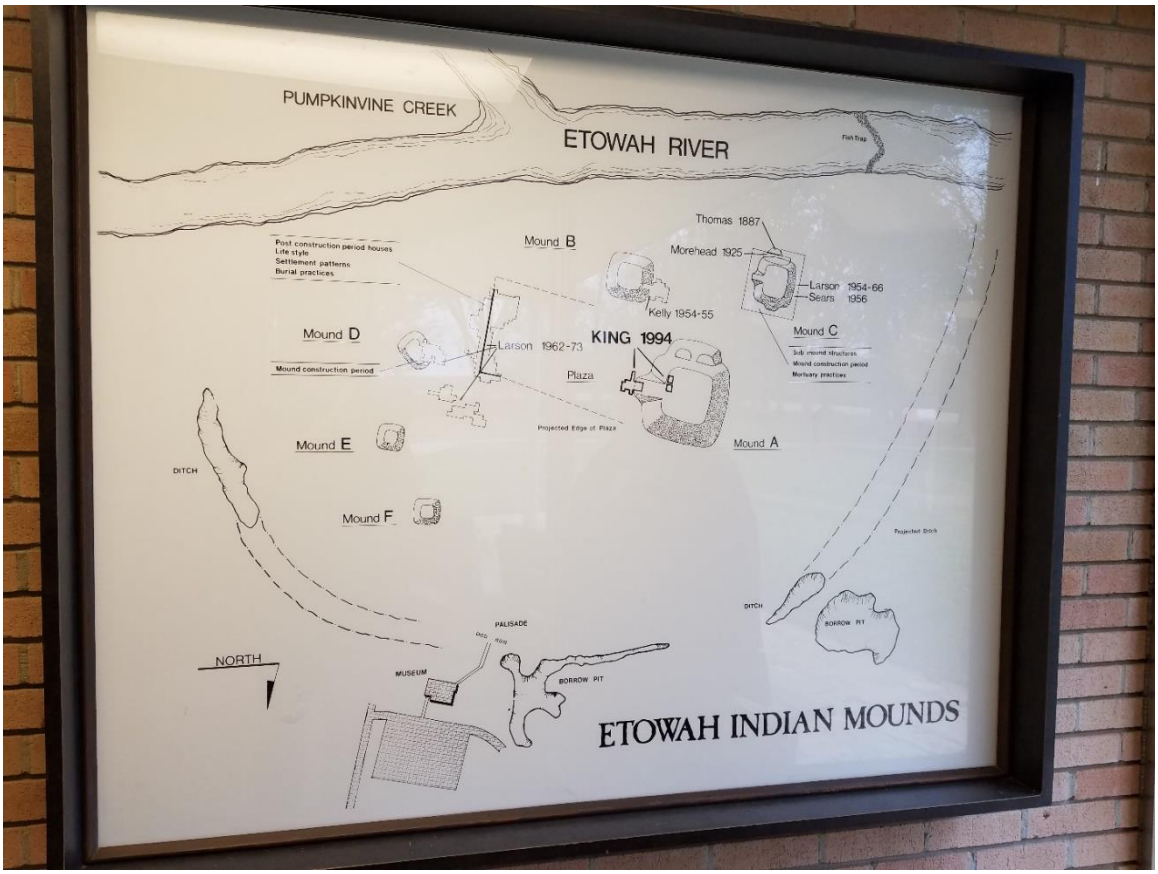

Figure 3.17 Etowah Indian Mounds- Here is a site map that provides the locations for each of the Mounds and their relation to each other, as well as the location of the additional cultural resources on the property. (Author's Photo)

Current Site Information

Park Staff Interviewed

The Etowah Indian Mounds State Historic Site Interviewee was the Curator, and Interpretive Ranger, Keith Dwayne Bailey. Keith has worked for the Georgia State Park system for 14 years, 5 of those years at the Etowah Indian Mounds.

Site Visitation

Keith suggested that the site see roughly 100 visitors on an average day, and 20,000 to 30,000 visitors annually. [119] Keith believes that most visitors come to see the mounds out of curiosity or educational purposes. A large portion of the park's visitors come as part of school field trips. A major impairment for some visitors is that the mounds are not ADA accessible, and this limits the interaction some visitors can have with the cultural resources. [120]

Budget

The maintenance and monitoring of the cultural resources requires very little from the annual park budget as very little work is done on site for the cultural resources. Due to their construction material, these earthen cultural resources do not require a lot of constant upkeep.[121]

Monitoring Tools/Methods

When asked what methods are used to monitor and manage their cultural resources, Keith indicated that the staff monitor traps for burrowing vermin, such as ground hogs and moles, that can cause structural damage to parts of the earthworks, but they do not have a lot of resources to devote to constant trap monitoring. The cases that hold the artifact cultural resources inside the museum have their humidity and temperature monitored regularly. The external cultural resources are passively observed

[119] Keith Dwayne Bailey, Interview on site, December 6th, 2017.
[120] Ibid.
[121] Ibid.

daily but currently have no implemented protocol for inspection.[122] Keith indicated that previously there was a regularly mandated survey of the artifacts kept inside the museum that was performed by the Historic Preservation Division, but that they do not do this anymore. There is an annual checklist to note the condition and presence of the museum artifacts that is sent to the HPD, but not much interaction occurs because of that. Another yearly inventory is done to identify and account for all artifacts made of animal parts.[123] The only preventative methods that are implemented to monitor and maintain the cultural resources consist of using pesticides on the invasive vegetation, maintaining the park gates, and reminding people that picking up and walking off with found artifacts is illegal. At one time there were signs in place to reinforce this precaution, but in 2006 these signs were removed.[124]

Documentation/Records

Archived records for the site are minimal and are not kept on site but are submitted to HPD in typed reports, generally provided via e-mail. These records consist of serious issues that manifest on the site, such as damage to the cultural resources. Also, relocation and storage of artifacts is recorded in typed reports and submitted to the HPD.[125]

[122] Keith Dwayne Bailey, Interview.
[123] Ibid.
[124] Ibid.
[125] Ibid.

Site Interpretation

Interpretation materials are rarely changed, and when they are, the changes are not substantial. The Historic Preservation Division is responsible for setting the interpretation standards for the site once every 10 years.[126] When asked if there would be any more archaeological surveys to discover if there are any more features associated with the site, Keith indicated that there were plans to do so, but that the sites that show the most potential are on private land and negotiations must be completed before anything can be done.[127]

Management and Maintenance Issues

Reoccurring Issues

The most common issues that face the external cultural resources are caused by erosion and mechanical damage. Erosion is caused by animals such as deer and ground hogs, and human traffic. Mechanical damage is caused by mowers, and farmers getting hay from the field that they lease out. There is also an issue that comes from human contamination, visitors bring in various items to the site and leave them there. The types of items left can range from quartz stones, religious offerings, and even human ashes. The mounds used to have trees on top of them, but they were removed in 2006 and never replaced to keep the mounds stable. Mowing and chemicals are used to keep the vegetation from growing to unmanageable levels on the cultural resources. The site also has an arrangement with the Department of Corrections to help maintain and clean the site. Special attention by the park staff is required to ensure that the workers do not

[126] Keith Dwayne Bailey, Interview.
[127] Ibid.

damage the cultural resources. The internal cultural resources are only at risk from mold and light damage, which can cause fading.[128]

Figure 3.18: Etowah- Museum display cases featuring artifacts and informational interpretation. (Author's Photo)

Long Standing Issues

A specific type of lighting can be used to keep tapestries on display from fading. However, at present the museum does not possess these types of lights and instead uses florescent bulbs set on low to prevent this sort of damage. By keeping the florescent bulbs on low the park staff can help prevent fading, but it creates an issue for visitors who have a hard time seeing the artifacts on display. The procurement of new artifact cases with a protective film would be a valuable addition to the museum as they would allow for brighter lights to better illuminate the artifacts for the visitors, but still protect the artifacts from damage. [129]

[128] Keith Dwayne Bailey, Interview.
[129] Ibid.

Major Issues

The primary issue that requires the most maintenance of the cultural resources is erosion in high traffic areas, especially in front of the signs near and on top of the mounds. This constant traffic leads to extreme dipping in the ground. This requires regular and costly earth replacement and seeding.

Constant Issue Mitigation

In an attempt to prevent constant erosion caused by human traffic from occurring, tours are spread out over time and location.[130] When asked how well the stairs to the tops of the mounds were maintained and what efforts were made to mitigate their damage over time, staff indicated that the stairs were left to on site repairs, but without volunteers the park staff relies heavily on work carried out by work crews from the Department of Corrections.[131]

Prospective Technology Inquiry

Prior to questioning the park staff about specific technologies and their possible applications, inquiries were first made as to their personal knowledge on the subject. In instances where the park staff expressed a lack of personal knowledge, a brief informational explanation was given about each technology and their current CRM applications to obtain a more informed response to specific questions.

[130] Keith Dwayne Bailey, Interview.
[131] Ibid.

Scanning

The prospect of using 3D scanning and modeling software to create workable models of the site was met with limited enthusiasm. The most serviceable application of laser scanning for the site may be the use of aerial LiDAR. An effort to map the site with aerial LiDAR could be used to monitor for erosion of the mounds and other earthwork cultural resources over time. Changes caused by erosion of the mounds or the surrounding trails would be the only useful application that Keith could foresee.[132]

Unmanned Aerial Systems

The sort of mapping previously suggested would require the use of UAS technology in conjunction with LiDAR. The application of UAS technology was viewed as only being useful in a limited scope. Keith did not seem very receptive to the idea of using UAS documentation to produce useable material for promotional or educational purposes.[133]

3D Printing

Keith did find the idea of using 3D printing to reproduce artifacts found on site very appealing. It seems that some artifacts found on site are sent to the HPD and are never returned to the site. Creating reproductions of these artifacts could ensure the preservation of these artifacts but also give visitors access to them to provide a complete historic picture for interpretive and educational purposes.[134]

[132] Keith Dwayne Bailey, Interview.
[133] Ibid.
[134] Ibid.

Site Summary

The main cultural resource for this site are the Native American mounds A through F. Additional earthwork cultural resources are featured on site, in addition to artifacts housed within the museum. The most reoccurring issue facing the site is erosion caused by human and animal activity. The most damaging factor to the site is human activity causing erosion. The most prevalent building material of the cultural resources on site is earth. The main forms of monitoring are casual observation of the exterior cultural resources and yearly inspections and documentation of the artifacts housed in the museum. The park staff identified 3D printing as the proposed technology that may provide the most benefit to the historic site, specifically the artifacts housed in the museum or newly discovered on the site.

Jarrell Plantation State Historic Site

Figure 3.19: Jarrell Plantation- View from the main office as visitors begin to approach the cultural resources in the historic site. (Author's Photo)

Setting/Geographic Location

The Jarrell Plantation State Historic Site is located southeast of the city of Juliette in Jones County. This roughly 200-acre property borders the Piedmont National Wildlife Refuge and is only a few minutes away from federal highway 23. The property is made of rolling hills and plentiful tree coverage that creates a winding path for visitors to traverse as they move through the cultural resources placed throughout the property.

History

The Jarrell Plantation State Historic Site is a family's historic farm that has survived for over 150 years. In 1847, John Fitz Jarrell built a heart pine house that was typical of most plantation style houses constructed at that time. The house consisted of a main room that served as the bedroom and parlor. With a small stair leading up from the main room to an attic space. The house featured a front and back porch, part of the front porch was closed off to create an additional bedroom, and the back porch was closed off to create two more rooms, one was made into the dining room and the other an additional bedroom. By 1863, John Fitz Jarrell had increased his plantation to 600 acres and had 42 slaves working it. After the Civil War, John Fitz Jarrell had increased his property to almost 1,000 acres and had it farmed by former slaves. As John Fitz Jarrell aged, his workers began to leave, and the slave quarters deteriorated and disappeared[135]. After John's death, his son, Dick Jarrell returned to the property and built his own house in 1895. Dick would save the farm by diversifying it to produce more than cotton.[136] Dick Jarrell built several buildings on the site such as a saw mill, a grist mill, a cane press, and other functional service buildings that helped transition the family and the plantation from an agricultural focus to an industrial focus. The Jarrell family owned and operated the plantation for many years, and in 1974, after the last members of the family had retired, they donated the land and original structures to the state of Georgia, where upon the site was put under the management of the PRHD.[137]

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[135] A possible avenue of inquiry that could be explored is if the PRHS division should explore locating the site of these former slave quarters and make some effort to reconstruct a few examples and include this part of the site's history in their interpretation. Similar to actions carried out at Wormsloe State Historic Site.
[136] "Jarrell Plantation," Georgia Department of Natural Resources State Parks and Historic Sites, accessed 1/27/2018, http://gastateparks.org/JarrellPlantation.
[137] Georgia Department of Natural Resources. "Jarrell Plantation," Jarrell Plantation Informational Pamphlet, Georgia Department of Natural Resources, Parks, Recreation and Historic Sites Division, 2015.

Types of Resources

Jarrell Plantation has a large amount of cultural resources on site, varying in size and complexity, but all are original to the site and localized to the time period in which the plantation was in use. In total the site has 2 chicken houses, 2 privies, a barn, 2 smokehouses, Dick Jarrell's house (1895), The 'New' Dick Jarrell house (1920), a well shelter, a syrup mill, John Fitz Jarrell's house (1847), a cow shed, a Gin house (which also has a sawmill and grist mill inside), a Belt shelter, 2 steam engine houses, a boiler house, an evaporator house, planer and cane mill sheds, an implement shed, a blacksmith shop and workhouse, and a wheat house.

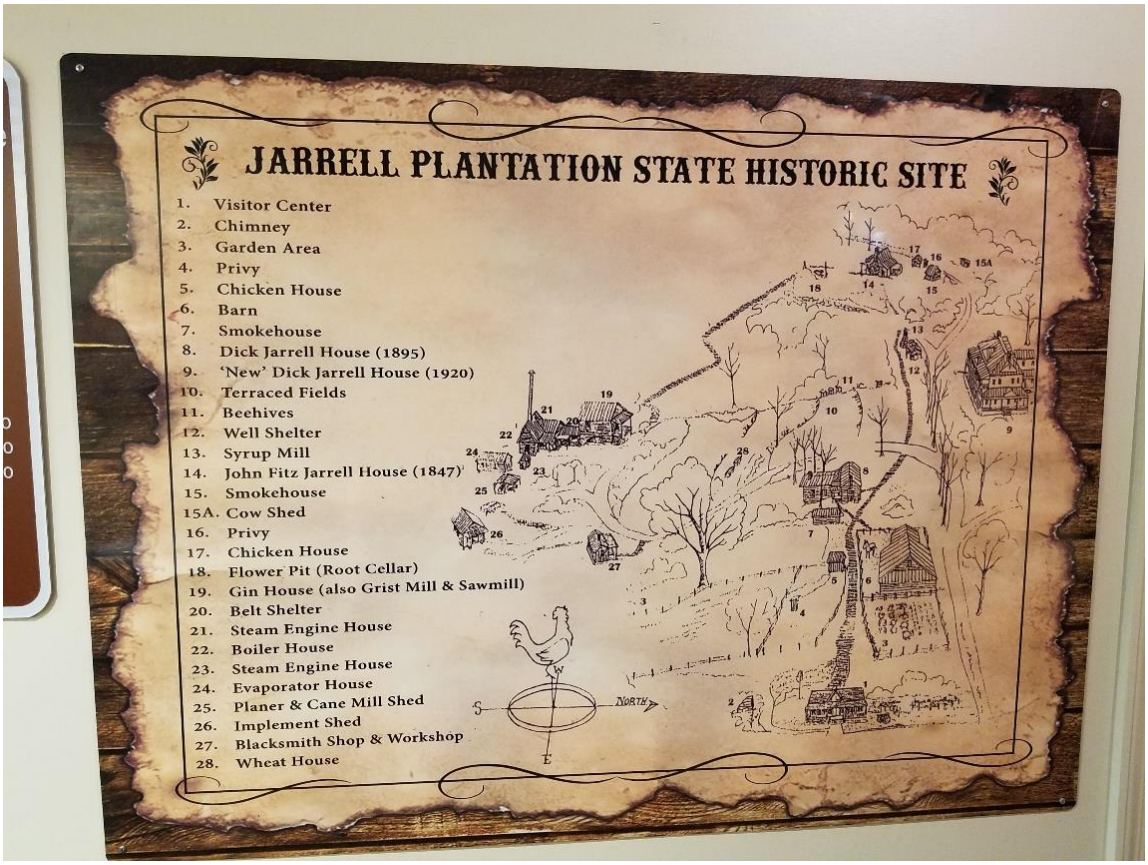

Figure 3.20: Jarrell Plantation- Resource Map listing all the cultural resources on the property and where they are located in proximity to each other. (Author's Photo)

Current Site Information

Park Staff Interviewed

The Jarrell Plantation State Historic Site Interviewee was Christine Orr, the Interpretive Ranger for the historic site. Christine has worked for the Georgia State Park system for 3 years, and at the Jarrell Plantation State Historic Site for 1 ½ years.

Site Visitation

Christine suggested that the site has had a fluctuating visitor average in the past few years but has had an increase in visitation in the last year. Currently the site sees around 6,000 visitors a year, but at its peak in the early 90's the site would see an average of 20,000 visitors a year.[138] Christine suggested that many of the visitors come to see the cultural resources and to learn about the time period that these structures represent. Christine suggested that some visitors come expecting "Terra" from the move *Gone With The Wind* but are disappointed by the reality that the plantation depicts.[139]

Budget

When asked to estimate how much of the annual budget goes towards the monitoring and maintenance of the cultural resources on site, she estimated that 60% to 70% of the budget was dedicated to repairs and maintenance of the site and upkeep of its multitude of artifacts located throughout the property. Interpretation is funded in large

[138] Christine Orr, Interview on site, December 13th, 2017.
[139] Ibid.

part by their local friends group, but repair and site maintenance come from the yearly park budget.[140]

Monitoring Tools/Methods

Currently the park staff uses two methods to monitor the cultural resources on site. One, performing site checks, where staff inspect the cultural resources for damage or potential problems. This practice is not consistent or done at any regularly scheduled interval. The second is to document and inventory the park's artifacts with the Historic Preservation Division every few months.[141] Beyond these methods of inspection, all park staff perform passive inspections of the property and its cultural resources when they go about their business on site.

Documentation/Records

The historic site does not retain any archival record of data concerning the cultural resources on site, however, The Historic Preservation Division does maintain an archival record of the work done on the site's cultural resources and a collection of photographs taken at the site over the years.[142]

Site Interpretation

When inquired if there was a museum on the site it was indicated that there was currently a small museum in the main office, but the park staff hoped for an expansion to

[140] Christine Orr, Interview.
[141] Ibid.
[142] Ibid.

the museum to help facilitate better interpretation and education for the site's visitors. However, since most of the site's artifacts were kept outside in the multiple structures on the plantation, that the demand for a larger museum had not been viewed as a high priority.[143]

Another aspect of the site involves the use of living history programs. These take place during special events that are planned by the park management. The limited use of this living history program serves two purposes. First, the availability of volunteers to enact these living histories is limited so the special nature of these events allows for more time to schedule enough volunteers. Second, it helps focus their social media efforts to bring in more visitors on the days when they have the staff available to enact these living history performances. The lack of available volunteers to maintain a regular schedule of living history programs has really hurt visitor turn out as they are very popular with the visitors.[144]

Management and Maintenance Issues

Reoccurring Issues

The major cause of deterioration of the cultural resources comes from weather damage, visitor damage from vandalism and theft, and animal damage from goats and squirrels chewing on the wooden structures. Efforts have been made to prevent visitor damage as gates have been placed in the doorways of the structures to control where visitors can go, and how much access they have to the site.

[143] Christine Orr, Interview.
[144] Ibid.

The damage caused by goats originate from the group of goats that are kept on site as part of the living history program.[145]

Long Standing Issues

The longest standing issues that need repair work are all centered on wood repair and carpentry work. The number of wooden structures on site makes it a perpetual issue that remains a constant drain on the site's annual park budget.

Major Issue

While touring the site it was noted that a great deal of the carpentry and repair work performed on the structures was not done well and did not meet the NHPA standards. Repair work on numerous cultural resources showed sign of inappropriate materials being used, or inadequate levels of work that showed where proper construction techniques were not used. For example, when replacing the clapboard on a wooden structure, the vendors did not apply the new wood so that it was flush with the rest of the clapboard on the structure, but obviously overlapped and represented a sloppy patch job, see (Figure 3.21).

[145] Christine Orr, Interview.

Figure 3.21: Jarrell Plantation- inferior repair work is obviously apparent in this image. The clapboards were not cut so that they would be flush with the rest of the clapboards on the structure and as a result present a visibly poor repair job. (Author's Photo)

Constant Issue Mitigation

Efforts have been made to prevent visitor damage as gates have been placed in the doorways of the structures to control where visitors can go, and how much access they have to the site. (Figure 3.22)

Figure 3.22: Jarrell Plantation- This is a Separation Gate placed in the doorways of each structure to control visitor traffic. (Author's Photo)

Prospective Technology Inquiry

Prior to questioning the park staff about specific technologies and their possible applications, inquiries were first made as to their personal knowledge on the subject. In instances where the park staff expressed a lack of personal knowledge, a brief informational explanation was given about each technology and their current CRM applications to obtain a more informed response to specific questions.

Scanning

Christine was very interested using 3D scanning in conjunction with specific software to create workable 3D models from which to gain accurate measurements and documentation. She felt that it would be very useful to detect when and where cultural resources where deteriorating. She also felt it would give verifiable evidence to encourage work on specific cultural resources.[146] The idea of non-traditional interpretation was very appealing, and the use of any technology to create new and interesting forms of interpretation or educational tools would be a great benefit to the site and encourage more visitation. Provided there are park staff trained in their use, there does not seem to be any reason not to explore these technological alternatives. [147]

Unmanned Aerial Systems

The idea of using a UAS was appealing to Christine for the purposes of documenting the cultural resources that are not easily accessible and to map the area completely. She also believed that the data recorded using a UAS would be very useful in

[146] Christine Orr, Interview.
[147] Ibid.

creating social media content that could then be turned around to help encourage visitors to come to the site, bolstering the annual revenue.[148]

3D Printing

The idea of using 3D printing had a limited appeal for use in the site. Christine felt that if it were used to recreate or repair any feature or artifact from the site that the interpretation clearly expressed how the cultural resource appeared before its repair. The structures on site are also very simple in construction, so any 3D repair to those structures would harm the authenticity of the structures. However, the potential use for the artifacts on site would be very advantageous.[149]

Site Summary

The primary cultural resources for this site were the 3 Jarrell homes since they were the central hub upon which all other supplemental structures built on site were constructed to support. The most reoccurring issue facing the site is the constant need for carpentry repair work. The most destructive factor is weathering damage. The most prevalent material used to construct these cultural resources is wood. The main form of monitoring is daily passive inspection, and routine inspection of artifacts housed within the cultural resources. The technology identified by the park staff as presenting the most potential for benefit to the site was the use of 3D scanning and software programs designed to provide multipurpose uses.

[148] Christine Orr, Interview.
[149] Ibid.

F.D. Roosevelt State Park

Figure 3.23: F.D. Roosevelt. – This is the Main office of the park and it represents the type of CCC construction that can be found on numerous cultural resources throughout the park. (Author's Photo)

Setting/Geographic Location

The F.D. Roosevelt State Park is located near the western border of central Georgia in Harris county. This 9,049-acre state park is situated between the cities of Pine Mountain and Warm Springs immediately off Georgia state highway 354. The park is a network of trails and paths interwoven amongst dense pine forests and gently rolling creeks with concentrated pockets of recreational activity hubs all designed to help the visitor embrace the natural beauty of the landscape.

History

In 1924, Franklin D. Roosevelt visited the warm springs near the town of Warm Springs in order to help treat the symptoms of his poliomyelitis. He enjoyed the area so much, and the warm spring's positive effects on his symptoms that in 1932, before being elected President of the United States, he built a small residence nearby that would come to be known as 'The Little White House.' After he was elected President, he spearheaded the creation of the Civilian Conservation Corps. In 1935 the CCC began work on what would one day be the F.D. Roosevelt State Park. F.D.R. was highly involved in the design and creation of this park. Originally it was designed and laid out like a National Park, but as the park neared its completion, F.D.R. gifted the park to the state of Georgia. As a result, F.D. Roosevelt State Park is the largest state park in Georgia and has one of the largest collection of CCC constructed cultural resources in Georgia.[150]

Types of Resources

There are 121 structures in the F.D Roosevelt State Park. Many of these structures are cabins, administrative and recreational buildings. These structures are constructed from local stones from a nearby quarry. The larger administrative buildings use terracotta shingles for their rooves and the cabins use asphalt shingles. The one-story cabins were placed in groups all around the park and possessed a two-room floor plan that was repeated in each cabin. The Administrative and recreational buildings were generally large two-story structures located at the main entrances to the park or near significant recreational activity attractions. 90% of these structures were built by the CCC or the

[150] Desmond Timmons and Amy Wait, Interview on Site, December 22nd, 2017.

Works Projects Administration (W.P.A.). In total the F.D. Roosevelt State Park has the following cultural resources: The F.D.R. Memorial Bridge, the CCC swimming pool, all the CCC constructed cabins on in the park, the main office, Dowdell Knob, the CCC Amphitheatre, the gravity flow water system, the group camp grounds, and the CCC built lakes and dams. Although it is suggested by the park staff that Lake Franklin may not be around much longer.[151]

Figure 3.24 F.D. Roosevelt State Park- This is a CCC constructed cabin. It is constructed from local stones, and asphalt shingles. A chimney is visible on each end of the cabin for each of the rooms within the cabin. (Author's Photo.)

Current Site Information

Park Staff Interviewed

The F.D. Roosevelt State Park interviewees were Park Manager Desmond Timmons and Interpretive Ranger Amy Wait. Desmond has been with the Georgia State Park system for 6 years, all of which have been spent at F.D. Roosevelt State Park. Amy

[151] Desmond Timmons and Amy Wait, Interview.

has been with the Georgia State Park system for 6 years as well, with 5 of those years spent working at F.D. Roosevelt. State Park.[152]

Site Visitation

Desmond estimated that the park receives anywhere between 400,000 and 500,000 visitors a year. He then went on to consider all the people who drive through the park simply to take in the scenic views along the drive and added 100,000 more visitors to that total.[153]

Budget

When asked to estimate how much of the annual park budget is spent on the maintenance and monitoring of the cultural resources within the park, Desmond estimated roughly 75%. It was explained that the sheer number, size, and age of the materials, coupled with active use by the visitors meant that there was a high demand for repair and maintenance and a large staff to manage that level of upkeep.[154]

Monitoring Tools/Methods

The methods being used by the park staff to monitor their cultural resources is primarily accomplished through daily passive checks of the 'high visibility' areas, or the areas that see the most active use. They do a quarterly site checklist walkthrough but rely heavily on daily eyeball checks of the high traffic areas. He felt that the lower trafficked areas could use a better system to keep them well maintained.[155]

[152] Desmond Timmons and Amy Wait, Interview.
[153] Ibid.
[154] Ibid.
[155] Ibid.

Documentation/Records

Archival data keeping is a decidedly weak aspect of the management practices at the park. Park staff record and save spending invoices, information on vendors who work on cultural resources, and a record of check out sheets that Desmond uses to keep up with the maintenance of cultural resources. Beyond that, there is no record keeping of photographs of cultural resources, or physical descriptions kept on site. Park staff felt that one weakness that impacts the management of the site, is that there is no set of base line information about the park and its cultural resources retained on site. This makes the transition of staff very difficult, especially when a new manager takes over a site.[156]

Site Interpretation

Interpretation is mainly dictated by HPD, but this is viewed as only a part of how the cultural resources are presented to the public. The view taken by the management is that a lot of visitors are brought to the park because of the recreational aspects, but that their experience is enhanced and made more lasting by the cultural resources. As Desmond put it, "Anyone can go to a park to canoe, camp, or ride bikes on the trails, but the history that is tied into the cultural resources creates an experience that encourages a family tradition of visitation."[157]

[156] Desmond Timmons and Amy Wait, Interview.
[157] Ibid.

Management and Maintenance Issues

Reoccurring Issues

The two largest contributing factors to damaging the cultural resources in the park are visitor caused damage through vandalism or wear and tear, and weather damage. Visitors are constantly carving into the wood of the CCC cabins and other structures, and the constant use of fireplaces in the cabins and camp ground cause constant wear. Water damage from average weather causes wear and tear over time, as well as immediate damage caused by severe storms.

Longest Standing Issues

One of the longest standing issues that the park deals with is the CCC pool. The cost of maintenance for the pool cannot be made up during its 3 months of use each year. As such it is a drain on the park budget. Another long-standing issue facing the cultural resources in the park is the damage caused by a strong storm to one of the large group camp sites a few years ago, leaving it unusable and costing the park the potential revenue that could be gained from its use.

Major Issue

Because of the level of damage and the inability to find the money to repair it in the annual park budget, parts of the park, including the previously mentioned large group camp ground, have gone unused for years. These cultural resources are a drain on the potential income of the park.[158] The biggest problem with some of these issues is that the

[158] Desmond Timmons and Amy Wait, Interview.

insurance companies do not take into account the change in cost to repair a cultural resource back when it was built, and what is costs now.[159]

Constant Issue Mitigation

One advantage of having so many CCC structures on site is that a large majority of the park budget goes towards preventative maintenance instead of towards repair, which is more expensive. The CCC structures were well made, and made to last, so preventative maintenance goes a long way to prolong and protect these cultural resources and saves funds for other issues that arise.[160] The primary methods that the park uses to try to curb visitor damage are education and preventative signage. If those do not work, then being able to give citations works as an expensive educational tool as well.[161]

Prospective Technology Inquiry

Prior to questioning the park staff about specific technologies and their possible applications, inquiries were first made as to their personal knowledge on the subject. In instances where the park staff expressed a lack of personal knowledge, a brief informational explanation was given about each technology and their current CRM applications to obtain a more informed response to specific questions.

Both Amy and Desmond indicated that the park already had a rich tradition of using technology within the park. They have instituted a program where visitors can use their cell phones to take pictures of their experiences in the park in a variant of a

[159] Desmond Timmons and Amy Wait, Interview.
[160] Ibid.
[161] Ibid.

scavenger hunt inside the park. Geocaching is also very popular and has been encouraged in the park to bring in more visitors. Sonar is used in the lakes to monitor for safety issues, and to assess potential problems caused after big storms, like the recent hurricanes Matthew and Irma. They actively use GPS tracking to monitor the migration and location of flora and fauna inside the park. GPS is also used to track loss and damage to structures, as each structure in the park is marked via GPS coordinates.[162]

Scanning

A lot of potential was seen in the use of 3D scanning with specific software to create manipulative models of the cultural resources in the park. They felt that having manipulative models would be effective in monitoring change over time in the structures to help prevent potential structural issues that may arise. They also felt that the data could be used to create interpretive material that could be used to draw in more visitors. The idea of incorporating such data into an interactive program for their guests also had appeal. [163]

Unmanned Aerial Systems

UAS use within the park had a similar appeal, as they felt documentation material from a UAS could be used for marketing and educational purposes. They also felt it would be very advantageous to use it for mapping the site. Another possible use for the

[162] Desmond Timmons and Amy Wait, Interview.
[163] Ibid.

UAS would be to help track down lost visitors within the park, serving a safety concern as well.[164]

3D Printing

3D printing was thought to be entirely without use at F.D Roosevelt State Park. The park staff felt that the types of cultural resources on site just do not lend themselves to the services that 3D printing can provide.

Site Summary

The primary cultural resources for this site are the structures and facilities constructed by the CCC, primarily the administrative buildings, the cabins, and the pool. The most reoccurring issue facing the site are visitor caused damage and wear and tear caused by constant weathering. The most destructive factor is weathering damage. The most prevalent material used to construct these cultural resources is stone. The main form of monitoring is daily passive inspection of high traffic areas and a quarterly site check of the cultural resources. The technology identified by the park staff as presenting the most potential for benefit to the site was the use of 3D scanning and software programs designed to provide multipurpose uses.

Case Studies Summary and Preferred Technologies

When considered as a whole, the greatest threats to the cultural resources at all these sites are those posed by human traffic and interaction, and the slow degradation

[164] Desmond Timmons and Amy Wait, Interview.

caused by weathering. While each site indicates that other factors can contribute to the dilapidation of their cultural resources, these two factors account for most of their challenges. The potential technologies that could be applied for use within the Georgia State Park system cannot directly solve these issues, however, it is possible that the application of these technologies from a different approach could help in preventing these issues from creating more trouble for the parks and their cultural resources. An obvious issue that faces every case study site is a lack of consistent monitoring and documentation methods. The potential for applying these technologies toward creating a reliable and uniformly instituted documentation and monitoring method can help identify potential issues before they have become a drain on the park's annual budget. In addition, their alternative uses can provide other benefits to the park that can increase visitor enjoyment and bring in more revenue, which will in turn alleviate some of the financial burdens that each site suffers in concerns to their funding. With more funding available, more issues can be repaired in a timely manner.

Wood of various species is the main construction material employed at these sites and from which most of the cultural resources are constructed. While not every site feature is of wooden construction, (Ex: Etowah), there is still a presence of the material that is fundamental to the operation of the site or access to the cultural resources. Finally, one of the greatest weaknesses noted at each site is their documenting and monitoring methods. Park staff relies heavily on casual daily observation to catch potential issues, or to record established problems. Some sites possess only the sparsest of routine inspections, all sites suffer from a weak prescribed methodology by which they can provide a regular site inspection that would lay out a standard of monitoring their cultural

resources to provide better maintenance and preventative care. For a brief comparative examination of these case study sites please see Table 3.1.

Case Study Sites	Location	Size (acre)	Annual Visitors	Significant Interpretive Feature	Time Period	Materials	Interviewee
Chief Vann House	Murray County	137	10,000	Chief Vann House	1780-1840	Wood, Hand Made Brick	Tim Howard, Interpretive Ranger
Fort King George	McIntosh County	12	20,000-25,000	Cedar Block House	1721-1736	Cedar Wood, Earth Works	Valerie Ikhwan, Site Manager
Etowah Indian Mounds	Bartow County	53	20,000-30,000	Earthen Mounds	1000-1550	Earth Works, Waddle & Daub, Wood	Keith Dwayne Bailey, Curator and Interprtive Ranger
Jarrell Plantation	Jones County	200	6,000	Jarrell Family House (1847)	1847-1920	Wood, Tin, Iron	Christine Orr, Interpretive Ranger
F. D. Roosevelt	Harris County	9,049	500,000-600,000	CCC Structures	1935-1945	Stone, Terracotta, Wood, Bronze	Desmond Timmons, Park Manager & Amy Wait, Interpretive Ranger

Table 3.1 Case Study Sites Summary of Information (Author's Photo)

The next chapter is an analysis of how each potential technology can be used to address the pattern of issues that these case studies have revealed. Breaking down each technology by its strengths and weaknesses and theoretically applying them to these issues will reveal in what manner each technology can best be used for implementation across the Georgia State Park system. Through this theoretical analysis a primary technology will be identified to propose to Georgia State Park managers on which to invest.

CHAPTER 4

ANALYSIS AND FINDINGS

What cultural resource management and monitoring technologies could be applied to historical and cultural resources located within Georgia State Parks?

The five case study sites that have been examined have presented a sampling of the challenges of monitoring and maintaining cultural resources in the Georgia State Parks. With the discovery and assessment of these challenges, it can now be ascertained which technologies would be best suited to handle the most prevalent issue facing these cultural resources. The intent of this chapter is threefold: to summarize the key findings of the case studies chapter noting key cultural resource management issues in Georgia State Parks; to identify which issues can use CRM technologies to assist in addressing those challenges or providing alternative solutions to support physical solutions, and to prioritize the top technology (hardware/software) that Georgia State Parks might invest in to begin a program to address the identified CRM issues.

This chapter will briefly summarize the following common issues that presented themselves in the case studies: the variety of physical issues, cultural resource documentation issues, and archival storage issues noted at each site; and a single issue will be selected based on its prevalence and commonality at all case study sites. With this most common issue as the focus of analysis, the most applicable technologies will be

theoretically applied to the issue, and real-world projects where said technology has been used to resolve similar issues will be presented as evidence of the technology's applicability to handle said issue. Finally, a single technology will be recommended as the most applicable and best suited to address the challenge presented by the information discovered through the analysis of the selected case study sites.

Summary of Key Findings and Common Issues

While there are many different challenges and issues that were noted at each case study site, it is possible to assemble these issues into common groups that are unified by common damaging factors or illustrate a similar weakness that is currently not being addressed. After assessing the routine, long-standing, and major issues that each site faces regarding their cultural resources, three common issues are prevalent at all 5 case study sites. These common issues are damage caused by visitor traffic/interaction, damage caused by weathering/storms, and an overall lack of consistent monitoring and documentation on site.

Physical Issues

There are two main factors that contribute to the physical challenges facing the cultural resources in the case study sites. First, the quantity of visitors creates physical damage in the form of wear and tear from constant traffic and physical interaction. Second, weathering damage presents gradual or, in the case of major storms, severe degradation of cultural resources of multiple material types.

While these two physical issues are highly prevalent across the parks, the proposed technologies of this thesis analysis cannot directly resolve these issues; more basic visitor management strategies, and risk preparedness strategies are needed. However, this analysis does address how each technology can be utilized to improve documentation methodologies that can provide additional data to assist visitor management and risk preparedness by documenting and monitoring the cultural resources to capture the physical changes to noted challenges over time within the Georgia State Park system.

Damage Caused by Visitor Traffic/Interaction

This form of damage is created by the stress of constant visitor traffic wearing down the structural integrity of cultural resources. This damage can be foot traffic, leaning on structural elements, or accidental damage caused by physically crashing into or onto structural features. Other interactions that can cause damage are intentional acts of vandalism like carving into cultural resources or breaking parts of cultural resources. This issue applies to all case study sites, and while the cultural resources that face this challenge are made from different construction materials, wood is the most used material and suffers the most common degree of damage from visitor traffic and interaction.

Damage Caused by Weathering/Storms

This form of damage can occur over time or during sudden but powerful acts of weather. The damaging factors associated with weathering are repetitive rain damage over time, wind damage over time, and even bleaching caused by long term sun exposure

that can dry out already weakened cultural materials. This damage can lead to rot of wooden cultural resources as well as structural weakening and eventual destruction of cultural resources. Storm damage is caused when sudden, powerful storms create severe and unforeseen damage to a cultural resource. Hurricanes or tornados with powerful winds and heavy rains can quickly damage cultural resources by displacing large portions of a cultural resource or breaking structural elements by bringing heavy tree limbs or other debris into contact with cultural resources with destructive force. Additionally, powerful storm damage can also include flood damage. Like the damage caused by visitor traffic and interaction, damage caused by weathering and severe storm damage can affect the different materials that compose the cultural resources at each case study site. While the potential of damage to earthwork materials is significant, the damage that flooding can cause to wooden constructed cultural resources is more widespread and accounts for more issues facing the cultural resources at each case study site.

Cultural Resources Documentation/Records

There does not appear to be a consistent process in place across all parks to document and record information about their cultural resources. In some instances, the park staff relies on dated processes such as hand-written index cards or reports and photographing the cultural resources on an irregular schedule. In other instances, there is no effort to document specific types of cultural resources at all. Documentation can be accomplished via record keeping in excel spreadsheets, digital photographs taken in a uniform and consistent method, hand drafted images, digitally scanned images applied to model building software that can create manipulable 3D models, accurate measurements

used to create architectural elevations and floor plans in a software program like AutoCAD®, or video recordings of cultural resources captured by UAS equipped with digital video cameras.

Each of these possible tools and processes are invaluable to the management and monitoring of cultural resources. By maintaining a consistent record of documentation, up-to-date and accurate information concerning cultural resources can be used to facilitate numerous management functions in a park, including innovative and educational interpretation practices and preventative repair and maintenance planning. Reliable and consistent documentation also provides the verifiable data that can be useful in presenting specific needs for repair funding or to encourage outside investment in park projects. Solving this issue is a primary example of how many of the proposed technologies in this analysis can be used and will be heavily addressed in these findings.

Lack of Consistent Monitoring and Documentation

Without a consistent method for monitoring a site's cultural resources, and a well-maintained documentation of these cultural resources, numerous issues can go unaddressed. If a program of monitoring and documentation of cultural resources is not instituted at a site, it can make maintaining the cultural resources on a site more difficult. With proper monitoring and documentation, early issues can be caught and possibly addressed before they become major costly issues. Proper documentation can also facilitate more accurate budgetary requests, easier repair efforts based off current and past data recorded for specific cultural resources and allow for tracking of changes to cultural resources over time.

Archival Storage

There is a detectable inconsistent process in archival storage across the parks. Some parks retain their records in indexed shoe boxes while others do not retain any sort of records on their cultural resources at all. Many of the parks indicated that their records were kept off site at HPD. Without an expressed value in maintaining cultural resource records on site, the result is that the parks simply do not attempt to keep any records. This issue does not present an opportunity for the technologies in this analysis to solve. However, this practice is still vital to facilitating an effective cultural resources management plan. By maintaining on site records for the cultural resources, a park has access with which they can base numerous management and interpretation decisions. Having ready access to historic information can inform how a cultural resource could be interpreted and provide information that can help determine treatment options for the repair and maintenance of specific cultural resources. Creating a database that follows consistent record keeping practices will provide an easily accessible and navigable archive of information that can help facilitate expedient planning and decision making when dealing with a parks cultural resources. In addition, having ready access to reliable onsite archives can provide information that can bolster presentations concerning cultural resources that are geared towards education or financial investment.

Proposed Application of Technology

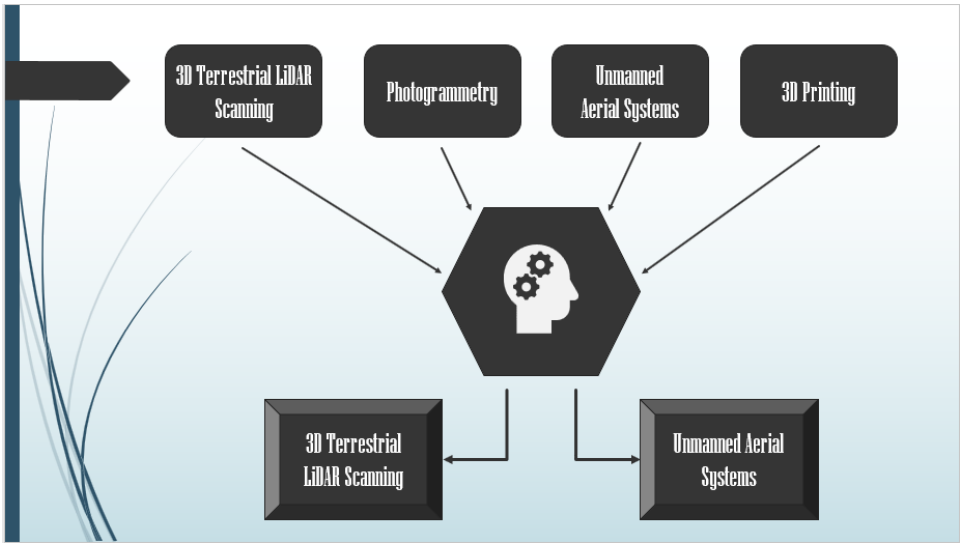

Figure 4.1 Process to Narrow Potential Technologies (Created by Author)

Taking into consideration the three main issues that affect the cultural resources at each site, and how documentation and records presents the challenge that these technologies can directly address, the technologies that are best suited can be narrowed down to two technologies: 3D terrestrial LiDAR scanning and UAS. Three-dimensional printing has limited applicability in each of the case study sites and fails to address most of the issues that arise from the previously mentioned common issues that affect the cultural resources at each case study site. The two technologies that represent the best applicability for the common issues that can directly address the challenges presented by the documentation issue are 3D terrestrial LiDAR scanning and UAS technologies.

3D Terrestrial LiDAR Scanning

Three-dimensional terrestrial LiDAR scanning can be used to capture highly detailed records of the numerous wooden structured cultural resources. By scanning these cultural resources with a 3D terrestrial LiDAR scanner, a highly accurate 3D model can

be created to illustrate whatever structural issues and surface damage are challenging the cultural resource. This can allow the state park staff to orchestrate a complete and thorough repair plan. By comparing scans taken over time against each other, weaknesses and alterations in structural integrity can present themselves before the issues become visible and a costlier problem. The high level or reproducible scans are what makes this type of comparison possible. A 3D model created from this form of recorded data provides documentation that is capable of being saved safely over time, is accessible by many different observers simultaneously without fear of damaging the documentation and can streamline project management. This form of technology can capture the damage caused by visitors and weather factors equally. The high degree of accuracy and reproducible results can combat the effects of damage from these two factors and help provide a valuable tool from which preventative care and maintenance planning can originate to fix established issues and head off trouble before these issues become more expensive to repair. The properly recorded 3D scans also provide a rich source of documentation that can be used for multiple archival purposes.

Professional Application of 3D Terrestrial LiDAR Scanning

The Historic American Building Survey (HABS) has been working on a multi-phase project documenting Ellis Island hospitals and associated buildings since 2009. HABS has been producing measured drawings, historic reports, and large format photographs of the project site, but in 2014 HABS used High Dynamic Range (HDR) panoramic photos and laser scans to create a virtual tour of Ellis Island's restricted

areas.[165] The animated fly-through created by HABS to document the restricted areas was created by using the data comprised from 180 individual laser scan stations, combined and textured with HDR panoramic photograph data. The rendering of more than 1.7 billion data points was done using Pointools® point cloud animation software.[166]

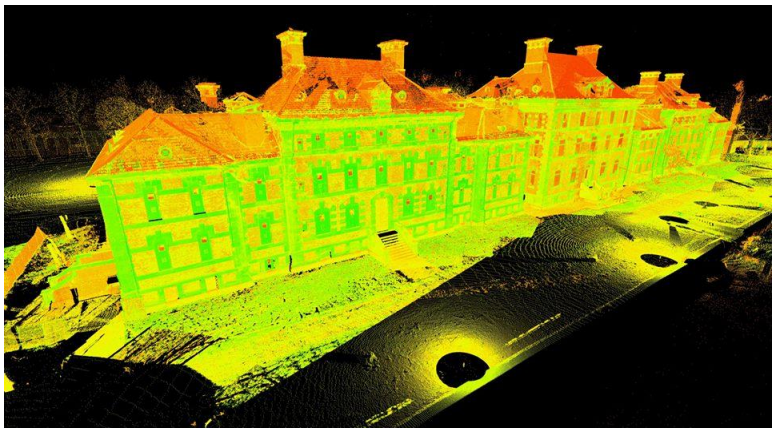

Figure 4.2 Ellis Island Point Cloud screen capture of hospital building exterior (https://www.facebook.com/pg/HeritageDocumentationPrograms/photos/?tab=album&album_id=696349627095657)

Figure 4.3 laser Scan of original paneled door at Ellis Island (https://www.facebook.com/pg/HeritageDocumentationPrograms/photos/?tab=album&album_id=696349627095657)

[165] "Ellis Island," Heritage Documentation Program, accessed 2/7/2018, https://www.nps.gov/hdp/exhibits/ellis/Ellis_Index.htm.
[166] "Main Hospital Buildings Fly-through," Heritage Documentation Program, accessed 2/7/2018, https://www.nps.gov/hdp/exhibits/ellis/ellis_interior_video.htm.

Additional Uses of 3D Terrestrial LiDAR Scanning

There are numerous added benefits that come from using 3D terrestrial LiDAR scanning. The 3D model data that is produced by these scans can be used to create material to serve educational, interpretive, advertising, and presentation purposes. An interactive tool can be created to fulfill multiple needs. Repair information can be tagged to different data points within a 3D model, making repair and constructions projects more accessible and allow for clarity in construction and repair goals for a cultural resource. Education programs can also be tied into the 3D model allowing visitors to pull up specific historic or architectural facts associated with different features and locations of a cultural resource. This feature can also allow for a more expansive and interactive interpretation of a cultural resource, providing both history and information that can be updated at regular intervals and allow for new discoveries concerning the cultural resource to be accessible. Similar to the project at Ellis Island, an animated presentation can be created to provide an entertaining and informative tool for visitors, and investors. This technology also provides visitors who have physical restrictions the ability to appreciate a cultural resource that they normally would have difficulty accessing. This form of highly accurate documentation can also be used to better represent a cultural resource to potential investors who may be able to provide a site with additional funding. Finally, this data can also be used to add to a site's social media presence, demonstrating a new and exciting face of a site's cultural resources that will bring more visitors to the site.

Unmanned Aerial Systems

UAS represent a versatile technology that can offer an adaptable platform from which to capture multiple forms of documentation. Depending on the size and design of the UAS, different types of data can be recorded. When equipped with a high-resolution camera or video recording device, an UAS can capture the entirety of a cultural resource. An UAS is not restricted by the size, location, or precarious nature of a cultural resource. An UAS can capture aerial shots of a cultural resource, giving site context and mapping position. In addition, highly detailed photos and video data can be recorded for a cultural resource allowing for comprehensive documentation. When an UAS is equipped with a high-resolution camera, it can capture properly overlapped photographic data that can then be turned into a 3D model using photogrammetry. When equipped with aerial LiDAR, a UAS can record a laser scan of a site's terrain, which can be used to detect site features that may not be discernable from a ground level inspection. It should be noted, however, that aerial LiDAR is expensive, and still shots or digital video can be input into software programs to essentially create a point cloud that is nearly as good as an aerial LiDAR image. An UAS has the adaptability to fulfill numerous documentation approaches. Through these forms of data recording, an UAS can be used to identify damaged sections of a cultural resource that cannot be seen due to inaccessibility. In addition, known points of damage can also be recorded through UAS data collection and used to illustrate points of concern that allow for the creation of a comprehensive repair plan. Damage caused by visitors or weather can be documented using UAS. Through repeated use, damaged elements of a cultural resource can be tracked and presented for repair and preservation purposes. UAS fit the need for a standardized method of

monitoring of cultural resources, providing the ability to completely document the external and internal zones of a cultural resource. With the proper software, and staff training, UAS is capable of recording damage to a cultural resource to facilitate repair project management, and a reliable form of documentation.

Professional Application of UAS

The cultural resource management firm ECORP Consulting and Parker Development Company began a project to assess the impact of land development in the historic Marble Valley in California. Marble Valley was known for a large marble quarry that was vital to the development of the Sacramento area. To accomplish this project, ECORP hired the UAS documenting firm Aerotas to document the site and two of the key historic features of the site: a lime kiln and a limestone monolith.[167]

Aerotas identified three primary objectives: to record a high-resolution map of the complex to establish context for the site; to document the lime kiln, providing views of the kiln that could not be recorded by terrestrial methods; and to produce a 3D model of the entire site.[168] To accomplish the three project objectives required three separate UAS operations. The entire process, including moving between flight sites, took a total of 90 minutes.[169]

The aerial map was captured via a preprogrammed flight path that was carried out by an autopilot program. The Lime Kiln inspection was carried out by a Aerotas pilot, who piloted the UAS into the inaccessible chimney of the kiln, recording details of its

[167] "UAVs for Cultural Resource Management," AEROTAS, accessed 2/7/2018, https://www.aerotas.com/cultural-survey/.
[168] Ibid.
[169] Ibid.

construction (See Figure 4.3) This proved informative, as they initially believed that like most kiln chimneys of the time it was packed with limestone, but discovered it was lined with firebrick. The final objective was achieved by combining the data collected from the aerial mapping flight, with the data recorded by individual piloted flights. This data was then turned into a 3D model of the site.[170]

A 3D model of the entire Marble Valley quarry complex, combining the highly detailed imagery of key features from close-up flights with the overhead imagery from the site over-flight, is an invaluable resource for future researchers and historians. They will be able to effectively walk through the site themselves, pursuing their own discoveries from before the Marble Valley Village development.[171]

Figure 4.4 UAS aeriel view of the Marble Valley Lime Kiln Chimney (https://www.aerotas.com/cultural-survey/)

[170] "UAVs for Cultural Resource Management."
[171] Ibid.

Additional Uses of UAS

UAS can be instrumental in creating video material that is excellent for the creation of various promotional materials. Cultural resource videos can be a valued educational tool that can be made available both on site and through social media. Carefully planned out aerial tours of a site can provide visitors, and people accessing the social media sites, access to the interpretive story of the site, featuring the cultural resources and other key features of a site designed to interest the public. Documented recordings attained by UAS can also be used in presentations geared towards different audiences. These videos can accomplish two goals simultaneously. They can be presented to potential investors, school groups, and for special occasions that would benefit from a detailed view of the site. At the same time, they can offer unrestricted access to the cultural resources that may not traditionally be accessible to the public. The data and video gathered using UAS is also capable of providing access to cultural resources that in the past may have been unreachable to disabled or handicapped visitors.

Final Technology Recommendation

After the most prevalent issues facing the cultural resources in each of the case study sites have been considered. An assessment of which technologies presented the best applicability to the common issues experienced across all sites can be performed. Then, the technologies that do not address the common challenges in the most appropriate manner can be eliminated from the study. It has become clear that while some of these technologies can address these challenges, only one represents a choice that can directly address the documentation and record needs of the parks. Additionally, this primary

technology can provide aid in the management of the additional common issues facing the cultural resources in the case study sites, including benefits that help mitigate the cost of the technology.

Through this analysis, it has been determined that 3D terrestrial LiDAR scanning represents the most versatile and applicable technology for implementation in the Georgia State Park system. While the initial cost of a unit is significant, the cost is quickly dropping down into more manageable ranges. The benefits of this technology are numerous and can easily help recoup the initial cost. By providing reliable documentation, and highly accurate data recording, potential issues facing cultural resources can be identified early enough that their repair costs will be minimal and thus reduce the amount of high budget repair requests that are submitted by the parks on an annual basis. Additionally, this technology can seamlessly integrate Excel software that is currently in use at most parks and historic sites. Documentation of existing damages through this technology also allow for a more streamlined repair and construction process, allowing access and input by multiple divisions at one time, cutting down on communication issues and time. Three-dimensional models created through this technology have numerous applications for promotional material geared to bring in more visitors through social media and provide detailed and well-presented material that can be used to appeal to potential investors and donors. The data and models created using this technology can also add to the interpretive and educational value of the cultural resources for the visitors that come to these sites, creating a more enjoyable and informative experience that will encourage repeat visitation and word of mouth notoriety.

Initially, the use of this technology may have to be restricted to a few teams of trained staff that are responsible for going from site to site documenting the cultural resources. This process can be worked into a standardized monitoring and documenting methods that can benefit all Georgia State Parks. This will limit the expense of buying multiple scanning units, and limit the time needed to train the appropriate number of staff to perform these duties. Should this new method prove to be financially beneficial, more teams could be added over time to spread out the work load and increase the documentation increments. This technology will increase the percentage of issues recognized at early stages and reduce repair costs by keeping these problems to minimal repairs.

Alternatively, the Georgia State Park system can take advantage of established partnerships with universities and vendors that already have access to this technology. By creating a working relationship with these organizations, the Georgia State Park system can easily implement this technology throughout their parks at a decreased cost. With this partnership comes invaluable documentation material that can provide all the aforementioned benefits and provide an opportunity to strengthen academic and commercial relationships. These newly created partnerships can also produce additional project benefits in other fields and programs within the Georgia State Park system.

It is the summation of this study that 3D terrestrial LiDAR scanning represents a sound investment for the Georgia State Park system.

CHAPTER 5

CONCLUSION

Expectations

When I began this process, I had a simple premise in mind - to examine the applicability of new technology in the Georgia State Park system. Specifically, what cultural resource management and monitoring technologies could be applied to historical and cultural resources located within Georgia State Parks. This premise was grounded in the idea that with the application of newer technology, solutions to challenges facing the cultural resources residing in the state parks could be found. These technologies would provide faster, practical, and more productive avenues by which park staff could address the issues facing their cultural resources and improve their monitoring and management methods.

Through the process of this analysis I discovered that some of the assumptions that I had going into this project would prove to be false, and that interesting and unforeseen revelations would manifest as I delved into the specific nature of the technologies I was investigating, and the inner workings of the Historic Sites and Parks on a local level. By speaking with experts in the field of preservation technology I learned about the interconnected relationship of technology when it is being used to document and investigate cultural resources.

During my site visits, I encountered park staff members that were passionate and protective of their sites and cultural resources. I was introduced to unforeseen issues that I had not anticipated, and weaknesses in practice that I had assumed would not be present, described further below. Technologies that I believed would be viable at one site, were met with low expectations or with sound reasoning for the unnecessary implementation of that technology at other sites.

What I Expected to Discover

When I put together my prospective list of technologies that I would theoretically apply to the cultural resources found within the Georgia State Parks, I anticipated well-defined lines of separation, where one technology would address a specific type of issue or be applicable to a certain venue of cultural resources. I believed that each site I visited would be interested in each technology that I presented as a viable option, and that prioritizing the use of each technology would be difficult.

Before I began this project, I expected to find an established system within the parks that reflected a standardization of monitoring and management practices and that were simplified in their technological aspects but would nevertheless be well-organized and documented. I assumed a system of communication that facilitated an orderly exchange of needs and information that would facilitate a responsive and straightforward process of goal management.

What I Discovered

Upon speaking with experts in the field of preservation technology and after examining projects in which these technologies were used, I learned that each of these technologies have specific strengths and very acute weaknesses when put into the context of preservation documentation and application. The weaknesses were not insurmountable, but merely required that the technologies be used in conjunction with each other. Three-dimensional terrestrial LiDAR scanning has the versatility and high degree of accuracy to accomplish many objectives, but in conjunction with photogrammetry, it can gather detailed data on small features. UAS are a valuable documentation tool but are limited in their scope unless paired with other technologies such as 3D terrestrial LiDAR scanning. Combining these technologies requires varying types of UAS with different sizes and weight capacities. In the end, it became evident that these technologies could accomplish many objectives on their own, but when they were used in conjunction with each other they achieved their full potential. Some technologies were clearly better suited to some forms of cultural resources over others and each of them could all be applied with varying degrees of success to most cultural resources.

As I visited each of my case study sites, and spoke with members of the park staff, I learned that each park has its own strengths and weaknesses. I learned that in practice, there is not a standardized method for monitoring and documentation. This seemed to go against the implied site investigations carried out by the ECD and HPD that I was informed about by Georgia Park management. This disparity only further indicated a break in communication between the parks and management. In many instances the

only form of monitoring is initiated by the site/park managers and these practices are not standardized, but instead are carried out on a casual or sporadic basis. Documentation varies from limited and sparse to non-existent. Communication also appeared to be one-sided, with messages going out of the parks without responses or guidance from upper management. I discovered that relationships between some parks and their satellite parks are breaking down because of lack of communication. However, in some instances, I found a positive attitude towards the ability to communicate with members of different divisions to better address specific problems that a site/park manager may be facing. Yet overall, a lack of communication was evident, and many thought that this factor was a primary cause in many of the issues manifesting regarding the maintenance of cultural resources.

Supportive Discoveries

As I attempted to address my initial question, I learned much about the parks that I visited and the technologies that I sought to apply towards my end goal. The spectrum of information that I gathered was informative and thought provoking. Indeed, there were moments when I wondered if another avenue of investigation within the Georgia State Park system should not also be explored in addition to my initial line of questioning. Still, much of what I learned pointed me towards my goal, coalescing into a solid line of reasoning and example that allowed me to answer my question in a satisfactorily manner.

Commonality of Issues

Despite my attempt to establish a broad variety of cultural resources and to accumulate a spectrum of potential issues and challenges, I was surprised to discover a repetitive trend. While each site had their own specific issues that pertained to their specific cultural resources, I was able to note that at each site the same issues manifested themselves repeatedly. At each site, wear and tear caused by visitor interaction and weathering presented itself. This commonality of issues, while somewhat surprising, did lend itself to allowing for a more comprehensive application of a single technology that could be used across all Historic Sites and parks within the Georgia State Park system.

Interconnectivity of Technology

Through my discussion with Dana Lockett, I quickly learned that the technologies that I had selected made up the primary tool set of the HABS/HAER/HALS program. By going over the methods of their projects, and his description of how and when they use their technologies, it became evident to me that the instrumentation of 3D terrestrial LiDAR scanning for documentation was the cornerstone of their methods. 3D terrestrial LiDAR scanning represented the most versatile and accurate technology that they implemented in their projects. However, he was quick to point out how they integrated the other technologies in my study, and in some cases, relied heavily on them for their individual strengths. Still, the majority of the work was carried out with 3D terrestrial LiDAR scanning as the foundational technology. In addition, the ability to work with other technologies and software also added to the versatility of 3D terrestrial LiDAR scanning, providing the freedom of approaching any project with the security of knowing

that it could handle the objective and work with any additional technology to produce an excellent and high-quality product. As I examined additional projects carried out by other organizations, I saw this consistent versatility and reliance. I became more confident in the primacy of 3D terrestrial LiDAR scanning as an applicable technology in the Georgia State Park system.

Technology Improves Physical Solutions

In many instances, the issues that presented themselves could and have found solutions in physical effort: staff adhering to stricter monitoring policies concerning visitor interaction with cultural resources; the physical repair of damaged or weakened structures, etc. All of these can and have been implemented to resolve the challenges and issues that have faced the cultural resources in the Georgia State Parks. However, the opportunity presented by implementing technology in addition to the physical solutions are too beneficial to be ignored. By using 3D terrestrial LiDAR scanning to augment these efforts, park staff can increase the accuracy of their work. Issues that were not readily observable can be identified through comparing scans taken at different intervals. Documentation through written physical description, or photographs can be accomplished, but with a 3D model staff will have access to a malleable and interactive representation of their cultural resource that is highly accurate, reproducible, and can be accessed from multiple sites to allow for organized and expedient project management. The additional benefits are also valuable to the productivity and profitability of the site. Using the data collected and 3D model produced from these scans can allow for the creation of educational tools, diverse interpretation, and promotional material accessible

through social media, and during presentations to interested donors or political audiences. The technology itself is a transposable product that can be used to draw in visitors during its implementation at a site. Parks can take advantage of the days where the very use of the technology becomes an event and provides opportunity for education and interpretation.

Different Approach

When completing a comprehensive project such as this, there is always the question of could I have done it better? Should I have done things differently? There are always different ways of reaching a similar goal. The question is, do I think I would have acquired the same quality of information by taking a different approach? Upon reflection, I have identified a few different avenues that I could have explored, and gained the same type of information, but I feel like the nature of that information would be different and present a different character to my findings.

1. *Selecting which sites that I would use for my case study*. I could have deferred to Georgia DNR and requested a list of sites that they felt would represent the best variety of cultural resources. I chose not to do this because I felt it was important that I understood exactly why I was selecting the sites that I did. By implementing my own methods to select my case study sites, I knew what cultural resources that I would be looking at, and I developed my own reasoning for those choices so that I would be able to justify them in my study. By making these selections on my own, I feel that I was strengthening my overall methods, and allowing

my process to build on itself, rather than borrowing from the reasoning of outside sources.

2. *Identify what types of issues were facing the cultural resources at my case study sites*. I could have taken a top down approach. It is possible to have examined the yearly budgetary requests from each site and taken note of which issues presented themselves on a regular basis. This approach would have given me a list of issues to examine upon my site visits, and I could have similarly applied my technologies in a theoretical fashion. However, I felt that by approaching this aspect of my study from a local perspective, I would gather much more information, and gain a greater understanding of the nature of the issues facing the cultural resources in each site. In addition, I would have the added benefit of gathering data on issues that did not find their way into an annual report. I may not have come to understand the issue regarding monitoring and maintenance methods. The challenges that each site faces are varied, and I felt that to properly document them in their totality, it was best to learn about them from those who deal with them daily.

3. *Integrating the visitor's perspective of a site and their cultural resources.* To accomplish this, I could have selected a prominent review site, such as TripAdvisor® or Yelp®, and analyzed visitor reviews to determine a consensus of their impressions and opinions. For example, identifying how they felt about the cultural resources, if they had noticed issues with

the cultural resources, or if they had any feelings concerning the staff in their daily activities within the site.

I am sure there are other approaches or alterations to my approach that could be explored, but I feel that my project reflects the priorities that I placed within my style of investigation. It was important to me that my methods originate from my own ideas and work, so that I understood why and how I came to the results that I did. I wanted to approach this from a bottom up perspective to gather as much information as I could from which to distill my findings into a workable and justifiable solution. Finally, I took this approach over the other options above because I like to talk with people, I like the interaction that comes from seeking out this information from human sources for a project like this because I feel that I can learn so much more through personal contact.

Future Research

During the process of carrying out my study, other possible avenues of research presented themselves to me. As I mentioned, I often wondered if these research possibilities would be appropriate to incorporate into this study, but upon reflection, determined that they did not strictly pertain to my line of investigation. It is my belief that these avenues of research should be explored in the future by other researchers.

1. *Analyzing the impacts and potential benefits of an active social media presence.* During my interviews, and from my research into each site, I determined that each case study site had varying degrees of social media presence. Some had Facebook® pages, others had only Instagram® pages.

The awareness of the park and their event activities, relied heavily on their social media presence for some sites, while others did not indicate if they saw any benefit from their social media efforts or not. A more comprehensive study could point towards more beneficial social media practices for all state parks.

2. *The pros and cons of having a friends group*. A friends group is an independent organization that aids a park/site through donations of materials, funds, or even volunteer staff. Determining what impact comes from such a partnership could be accomplished by analyzing the following factors: what financial benefits there are to be gained with such an association, if there are any drawbacks, are conflicts of interest produced because of the interaction between a friends group and a Georgia State Park. The relationship between these entities and the Historic Sites and Parks within the Georgia State Park system may offer useable information for future management practices.

3. *Exploring avenues of non-traditional interpretation.* This could be a study on what form interpretation in the Georgia State Park system has taken to this point and examining other non-traditional styles of interpretation that are being implemented elsewhere. This approach could include technologically-driven forms of interpretation like tour guide apps for your phone, or more simple forms of interpretation such as the glass sketch windows that are placed in front of demolished cultural resources, or partial ruins. These glass sketch windows illustrate in a very simple

way how the original cultural resource would have looked when it was complete, including the visual of what remains of the cultural resource visible through the glass and an artist's sketch of how the rest of the cultural resource would have appeared connected to the ruins. This type of interpretation can also be accomplished by means of augmented reality methods. The potential benefits and costs of these forms of interpretation should be investigated.

4. *Examining the lasting effects of the segregation of Georgia State Parks.* A focused look on the past of these sites, and how remnants of segregation and slavery can affect state park visitation, either through architectural evidence, or layout and design of the park itself would be informative. Are there still physical reminders of this time period? Has this portion of the park's history been included in the interpretation? Did the segregation of these parks have a lasting impact on the development and growth of these sites after they were desegregated? I am sure that this avenue of investigation could be very enlightening and create interest for the parks.
5. *Investigating the differences between old and new employees at Georgia State Parks.* Examining the differences or similarities in their goals, what brought them to work for the Georgia State Park system, why they have remained for so long, or conversely, do they see themselves making a career out of working in the Georgia State Park system? Defining their perspective on the cultural resources, or the history of the site. These sorts

of inquires could be used to help in determining hiring practices, or employee incentives and management practices.

Additional Observations and Recommendations

As with any study, observations that do not apply to the focus of your investigation make themselves evident. This was the case as I carried out my study, and while these observations did not pertain to my line of inquiry, they still may present challenges, or opportunities, that could be addressed to the benefit of all involved.

1. *Improving the communication chain between the parks, as well as between the parks and division management.* Many thought that the chain of communication was far too often a one-way line of information. An effort to create a more reciprocal chain of communication and information exchange could facilitate more expedient progress for all parties involved. Perhaps institutionalizing bi-monthly conference calls between site/park managers and division management to touch base on the status of the parks and their staff could be beneficial.
2. *Working towards improved implementation of new methods or software.* At the beginning of this study, I learned about the method of implementation of new technology and methods, and as an example I learned about the most recently implemented software, PastPerfect®. However, in the process of my interviews, I asked about the implementation of PastPerfect®, and I was either told the park staff had never heard of it or that they had heard of it but had heard nothing about

implementing it. This was concerning, as all the sites that I visited could have benefitted from its archival attributes.

3. *The nature of budget priorities between Historic Sites and recreational parks*. Examining the concern that budget allocation amounts were set to meet the needs of recreational parks, but that these allocation amounts were disproportional to the needs of a historic site should be explored. I did not have the opportunity, or the information to verify to the extent that this was occurring, but it was a concern expressed during my study.
4. *Increasing the partnership potential between the Georgia State Park system and universities*. Creating a robust internship program could create strong ties between the Georgia State Parks and universities and provide a rich source from whom to seek project assistance for specific tasks within the parks. An internship program would also aid in the short staff issue that many parks are experiencing. Still, the greatest advantage of strengthening this partnership is the access to new technologies that these universities have to promote new projects within the Georgia State Parks.
5. *Establishing a standardized system of monitoring that can be maintained constantly by the staff on site.* A formal monitoring regimen could go a long way towards preventing potential issues from developing in the parks, especially in the low visibility areas of the much larger recreational parks.
6. *Require a maintained and updated baseline of information about each park and their cultural resources.* Standardized documentation and

recording of information, kept on site and updated on a regular basis, would ease the transition of new employees and managers when they first come to a new site. A well-informed staff could serve to prevent unintentionally ignoring a potential source of future issues, simply because the new manager or employee was unaware of certain aspects of their new historic site or park.

In Conclusion

The Georgia State Parks are a host of beautiful, interesting, and wonderful cultural resources. One of the best things about carrying out this study was being able to visit so many sites and get a chance to learn about them from the people that are the most passionate about their wellbeing. The variety and history of the cultural resources that I was privileged enough to see and inspect was truly a monument to the history of Georgia and the story that it has to tell. It is because I am so awe struck by these cultural resources, and the wondrous design of these parks that I hope that we can do more to help preserve them. I believe that the advances that we are seeing in technology are going to be key to preserving these cultural resources for future generations, as well as provide new and non-traditional ways in which we can educate visitors and present their interpretation. Monitoring, maintenance, management, and documentation are just some of the methods and practices that we must ensure are being carried out to the highest potential possible. I think that implementing new technology will help us do that. Through the process of carrying out this study I am certain that the implementation of 3D terrestrial LiDAR scanning will be applicable and beneficial to cultural resources at all

DNR. sites. I hope that my work here will be of great use to the future of Georgia Historic Sites and State Parks; just as I hope that I will soon be able to help do my part to preserve and manage these amazing cultural resources.

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APENDIX A

GEORGIA STATE PARK HISTORY

During the period of 1933-1942, the Georgia State Park system was closely aligned with the NPS, which allowed for joint site planning using professional landscape architects and architects to do the park planning and design. During this period many federally funded staff support positions were increased to maintain the required standards because the NPS required the state parks to maintain certain professional standards to receive funding.[172] The physical development of Georgia's State Parks and facilities must give credit to the Department of the Interior's Civilian Conservation Corps (CCC) which was instrumental in doing a great deal of the work to develop and create new state parks in Georgia during the 1930's.[173] There was a total of 35 CCC camps in Georgia with the main responsibilities of the CCC consisting of constructing camps, cabins, shelters, roads, trails, and other physical facilities for the parks.[174]

From 1933-1935, with help from the federal government and the available work force provided by the CCC, the Georgia State Park system grew from 500 acres to 5,000 acres.[175] In the years leading up to World War II, the federal government began buying up farmland for federal land use. This land was a prime source by which the State received land for future parks.[176] At the time, the general practice was that land was bought with federal funds, developed by the CCC and then turned over to the State as a new park. In the final years of the CCC (1940-42) five additional properties were acquired and developed into state parks: Cloudland Canyon, Black Rock Mountain, Kolomoki Mounds, Magnolia Springs, and Jefferson Davis Memorial State Park[177]

In 1943, the Department of Natural Resources was abolished, and replaced by the Department of Conservation which contained three divisions: Forestry, Mines & Mining and Geology, and State Parks, Historic Sites and Monuments. The new Department of State Parks, Historic Sites and Monuments was an unaltered version of the previous incarnation.[178] Also in 1943, an act was passed that created a State Park Advisory Committee for each county where a state park was located and operated. The Governor of Georgia was responsible for appointing each committee that consisted of five citizens from within the county, who would be responsible for handling any complaints directed at the parks within their county. In 1956, the act was repealed after numerous instances of the committees expanding their positions from simply an advisory role to operations and personnel managers.[179] After the abolishment of the State Park Advisory Committees, the

[172] Townsend, "Georgia State Parks,", 4.
[173] Ibid, 3.
[174] Ibid, 7.
[175] Ibid.
[176] Ibid, 6.
[177] Ibid, 7.
[178] Ibid, 6.
[179]Ibid, 6.

State Park Division was administered by one Commissioner, who was directly in charge of the Director of the State Parks. The Division of State Parks, Historic Sites, and Monuments consisted of three departments: History, Development and Plans, and Development. The National Park Service maintained a central design office within the division as well, responsible for working with the CCC to organize future projects. However, with the beginning of WWII, the CCC program ended, and the Georgia State Park system's land acquisition came to a halt. During the period surrounding the war, the budget for state parks was minimal, which led to stagnation in the growth and maintenance of the State Park System.

In 1951, The Georgia Historical Commission (G.H.C.) was established. The objective of the commission was to,

promote and increase knowledge and understanding of the history of this State, to assist in the publicizing of historical resources of the State, to coordinate any of its objectives efforts or functions with those of any agency, and to cooperate, council and advise with local societies, organizations or groups staging celebrations, festivals or pageants of historical purpose.[180]

In 1952, the U.S. Army Corps of Engineers leased two properties the federal government owned on the Clark Hill Reservoir to the Georgia State Park system to become new state parks. These two parks are significant because Mistletoe Park was the first state park in Georgia where all utility lines were buried under ground, and Keg Creek Park was specifically designated for use by African Americans.[181] Those two parks represented a new standard of practice in the Georgia State Park system, both considered progressive developments for their time.

The year 1956 was a significant year for the Georgia State Park system because the Georgia Legislature passed two acts and one resolution that directly affected organization and practice within the park system. The first act altered the name of the Department of State Parks, Historic Sites, and Monuments to the Department of State Parks, without altering the powers or responsibilities of the department. The second act repealed the previously mentioned Act of 1943, which authorized and directed the Governor to appoint an advisory committee in each county in which a state park was located and operated.[182] The resolution recommended the discontinuation of building cabins at state parks, because they were viewed as a financial loss to the Department of State Parks. Finally, the 1956 General Assembly also allocated funds for the establishment of six new parks: Yam Grandy, Lake Chatuge, Bainbridge, Seminole State Park, Fairchild, and Reidsville State Park.[183]

During the 1950's, parts of parks were leased in an attempt to bring more money into the Georgia State Park system. That practice turned out to be a failure in the long run. The 1950's represented a time of political and racial strife in the United States, and this division was keenly expressed in the racist practices and segregated designs of

[180] Townsend, "Georgia State Parks," 9.
[181] Ibid, 11.
[182] Ibid, 12.
[183] Ibid.

Georgia State Parks.[184] In 1955 Vogel and F. D. Roosevelt State Parks were leased to private vendors who chose to operate the parks as private clubs, with the objective to keep out minorities and limit access to specific races. Some parks had designated areas, such as "Area A" and "Area B," to segregate the park space. In some cases, as with Keg Creek Park mentioned earlier, certain parks were racially segregated and designated for the specific use of African Americans only.[185]

Vogel and F. D. Roosevelt parks were returned to State control by 1963. Long-time Maintenance and Operations Chief Jeff B. Naugle stated that it cost the state almost a million dollars to return the leased parks to good order because of the deferred maintenance by the private operators. Vogel State Park had been turned into a type of amusement park, with pony and tram rides and a miniature golf course. The facilities were created without any consideration for the natural environment and left those cultural resources in poor condition. F. D. Roosevelt State Park became something of a party location for soldiers at Fort Benning and attracted many soldiers and their lady friends to the park, where there was little attempt to maintain the natural environment and its cultural resources.[186]

Between 1960 and 1965, there was very little land acquisition by the State Parks Division. Yet, during this time, a new practice began to manifest in two of the established parks. In 1963 the first 9-hole golf course was begun in Little Ocmulgee State Park, and later another 9-hole golf course was started at Hard Labor Creek State Park. Environmentalists were quick to criticize the Parks Department because they felt the chemicals introduced to maintain the golf course would have a terrible effect on the natural environment of the parks.[187]

In 1963, the Georgia General Assembly passed two laws that had a direct effect on the Georgia State Parks. The first law repealed the resolution to discontinue building cabins on state park lands, while the second law created the Georgia Recreation Commission, which created additional staff thus affording Georgia better access to federal funds from the Bureau of Outdoor Recreation.[188] The 1970's marked another period of great change in the Georgia State Park system. In prior years, the Georgia State Park Department was subject to instability as each governor appointed a new director. However, during the 1970's some stability was maintained at the operational level because of the long-term appointment of Assistant Director Henry D. Struble who had worked for the Georgia State Parks since 1959. In 1972, Struble was appointed Director, serving in that position for 13 years. With Struble's guidance, a new practice of placing college-trained parks and recreation majors in charge of new parks, and older parks where older super intendents were retiring was instilled.[189]

Director Struble emphasized cultural resource management and visitor services in the form of programs that were oriented toward the state parks as special places. By this time, state parks had become a multi-million dollar business, and Struble felt that the

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[184] A thorough examination of racial issues, and how Georgia State Parks specifically managed their parks in response to these issues is a subject that should be explored further, but for the purpose of this research, will not be explored here.
[185] Townsend, "Georgia State Parks," 12.
[186] Ibid, 14.
[187] Ibid, 15.
[188] Ibid.
[189] Ibid, 16.

maintenance and construction aspects of park management needed to be separated from the operations aspect for all parks to receive better management.[190] The professionalization of the parks and recreation division, initiated by Struble, led to the start of an interesting trend. The children of Georgia State Park employees, having grown up closely tied to the park system, went to college to get recreation and related field degrees, and then came back to the park system to begin their careers. [191]

Also, at this time, Director Struble and the Georgia State Park staff noted that in the heavily populated areas of Georgia, residents were not having their outdoor recreation needs met by the current number of state parks. As a result, in the early 1970s, there was an effort to increase land acquisition proposals to set aside more land for parks. In 1972, Governor Jimmy Carter established the Heritage Trust Commission whose objective was to, systematize the effort to protect the State's cultural and natural heritage and provide open space and the recreational needs for Georgia's expanding population. The Department of Natural Resources established committees to seek out, rate and make recommendations for the acquisition and development of cultural and natural properties. This effort led to the development of several new parks and Historic Sites and several protected areas that were not developed across the state.[192]

Interestingly, in 1973, the Board of Commissioners for the Georgia Historical Commission was abolished with all their functions transferred to the Department of Natural Resources, and their sites transferred to the renamed Parks, Recreation and Historic Sites Division of the Department of Natural Resources.[193]

The latter half of the 1970's saw a drastic economic downturn, and the effects were far reaching. In 1975, Governor George Busby called a special session of the General Assembly to de-appropriate $124 million from the State budget. Due to this reduction in funding, the Department of Natural Resources had $1,678,000 and 40 positions taken out of its previously approved budget. Without the proper funding the department had to reduce the number of parks and Historic Sites operated by the State and was forced to close some parks or turn their control over to local managing groups.[194]

During the 1980's, another change in common park practices came about due to the sheer size of some parks; in some cases, parks were the equivalent of self-contained cities with needs for sanitation, water, fire, road, sewerage and police. The need for an immediate law enforcement presence led to some park superintendents being appointed as law enforcement officials at a local level. In 1977, the first group of State Park and Historic Site Superintendents attended a three month basic training course at the Police Academy required of DNR conservation rangers. Increasing numbers of managers were formally trained in the 1980's until there was one or more trained law enforcement officers at almost all of the Parks and Historic Sites.[195] The 1980's also saw the end of the 13-year long tenure of Director Henry Struble in 1985. Struble was replaced by O. R.

[190] Townsend, "Georgia State Parks," 17.
[191] Ibid.
[192] Ibid.
[193] Ibid, 20.
[194] Ibid.
[195] Ibid, 22.

Cothran III who would remain director until 1990 when he was replaced by Lonice C. Barrett.[196]

The 1990's brought about a need to bring more revenue into the parks. Some of the methods were new in name, but had been in practice for decades, while other methods were new like The Parks and Historic Sites Division began collecting user fees in the form of visitors paying for parking and to use park facilities. [197] At the State level, Governor Zell Miller was downsizing and privatizing government functions. As such, the Parks and Historic Sites Division, like many departments across state government, was told to turn over as many operations as possible to private individuals or private companies. This privatization effort led to internal division changes including abolishment of two of the five regional park offices, the privatization of other functions within the Georgia Park System, and the loss of much of the support infrastructure that Director Struble created during his tenure as Director.[198]

The effects of privatization within the parks continued to be felt into the early 2000's. Unfortunately, many of the operations that had been privatized saw a downturn in profit, productivity, and quality. Although control of many operations and functions were returned to the parks during the early 2000's, park funding did not increase to accommodate the new hires required to fill the old positions, and so the parks were left with severe budgetary problems.[199] Furthermore, during the period of privatization, visitor services suffered as prices for services had been raised by the private operators so much they essentially priced visitors and their families out of going to the parks.[200] Since the early 2000's, the Georgia State Parks have been facing an uphill battle to return the park system back to a more economically efficient visitor friendly system.

[196] Townsend, "Georgia State Parks," 27.
[197] Ibid, 23.
[198] Ibid.
[199] Ibid, 24.
[200] Ibid.

APPENDIX B

CULTURAL RESOURCES MANAGEMENT PROCESSES AND TOOLS

Cultural Resources Management Philosophy and Practice

The overall philosophy of cultural resources management (CRM) is succinctly defined by the Secretary of the Interior's standards of preservation as stated in the National Historic Preservation Act of 1966 (NHPA). The NHPA lays out the criteria by which a cultural resource can be identified, and then prescribes the treatments available by which an organization or individual can manage a cultural resource.

As previously noted, there are four distinct approaches, or treatments, that can be applied to cultural resources when considering how to manage and maintain those cultural resources: preservation, rehabilitation, restoration, and reconstruction. By selecting what approach to take in respect to a cultural resource, a plan of action is readily laid out in a general sense. However, to determine what approach should be initiated when dealing with a specific cultural resource, it is important to consider supplementary information that can inform the concerned party about what treatment they should use.

An inventory of the cultural resources that are present in a specific area or property is an important consideration to make for an informed decision. Documenting what cultural resources are present and recording what condition they are in provides a foundation from which to build a cultural resource management plan. Then, by identifying challenges facing the cultural resources a proper treatment course can be determined. In addition, access to historical documentation concerning the cultural resource can inform what treatment options are or are not available to pursue, and from there the possibility of management procedures can be instituted. Once the cultural resource has undergone the properly determined treatment option, a carefully planned monitoring method should be introduced to keep the cultural resource on course to remain within the optimal stasis of the treatment option.

If the treatment option selected for a cultural resource is to preserve the cultural resource, then monitoring needs to be focused on keeping the cultural resource clean and prevented from further deterioration. A restoration treatment requires that the cultural resource be returned to a previous state of stasis that conforms to a specific time in the cultural resource's history, usually determined by historic documentation. Monitoring this type of cultural resource project relies on keeping the cultural resource in line with the pre-determined historic interpretation of the cultural resource and that no additional work on the cultural resource contradicts this interpretation.

Rehabilitation is generally reserved for a cultural resource that is being converted for a new purpose but still needs to retain the integrity and authenticity of the original cultural resource. This requires a monitoring plan that ensures that the new purpose of the

cultural resource does not expressively detract from the significance and integrity of the cultural resource.

Finally, reconstruction is a treatment option for a cultural resource that is either no longer existing in a recognizable form, or in such a state as to be all but unrecognizable. This treatment requires a heavy reliance on historic documentation to choose a historic interpretation point that the cultural resource should be constructed to match. This monitoring plan dictates that the cultural resource is preserved in this newly reconstructed state and that all work and materials used to reconstruct and maintain the cultural resource are chosen to represent as closely as possible the materials and resources that the original cultural resource would have been made from.

With each of these treatment options, the cultural resource must be monitored with regular documentation of the condition of the cultural resource and appropriate maintenance and care of the cultural resource as new issues present themselves. In any instance where physical work must be done to the cultural resource, park staff must adhere to the requirements of NHPA and ensure that proper materials are used in accordance with the selected interpretation of the cultural resource.

No matter the treatment option, when dealing with cultural resources it is important to be aware of what mechanisms and practices have been put into place to best administer and protect them. There are certain processes/practices that when broken down, apply to different aspects of maintaining cultural resources. These practices are as follows: Cultural Resources Inventory, Documentation, Assessment, Monitoring, and Management.

Cultural Resources Inventory

A Cultural Resources Inventory (CRI) is exactly what it sounds like—a property's complete and verified list of cultural resources. Within a certain area or region, exists the potential for a multitude of different historic cultural resources. Given the history of that area, or known immigrations of varying people to that area, one can assume what types of cultural resources may be found. Without a CRI, however, these will only be educated guesses at best, and will fail to capture a complete picture of what cultural resources an area possesses. A CRI requires an invested party to inspect the area for cultural resources that meet the accepted preservation standards of significance. These cultural resources will be surveyed and investigated to varying degrees of depth, and then compiled into a list that is designed to give the assessor a clearer picture of the types of cultural resources that reside in an area and if any effort should be made to gain more information on certain cultural resources, or if other plans should be made around the findings of the CRI. In the clearest of terms, a CRI informs the reviewer of what materials are available and allows them to make more educated decisions based on that information.

The Cultural Resources Inventory is carried out through archival research and field research. Field research uses two forms of survey techniques, reconnaissance and intensive surveys. Reconnaissance surveys are more general and broader in their coverage. A reconnaissance survey documents the kinds of properties looked for, the boundaries of the area surveyed, the method of survey, including the extent of survey coverage, the kinds of historic properties present in the surveyed area, specific properties that were identified, and the categories of information collected, and places examined that

did not contain historic properties. The intensive survey is, as its name suggests, more thorough and requires a higher level of inspection. An intensive survey documents the kinds of properties looked for, the boundaries of the area surveyed, the method of survey, (including an estimate of the extent of survey coverage), a record of the precise location of all properties identified, and information on the appearance, significance, integrity and boundaries of each property sufficient to permit an evaluation of its significance.[201]

Documentation

Documentation is a commonly understood methodology in the field of preservation. The detail and level of documentation is generally the variable that is dictated by the organization responsible for the management of the cultural resource. Optimally, the level of documentation should meet the standards of NHPA, ensuring the complete documentation of a cultural resource. Documentation can consist of photographs, sketches, physical descriptions, excel sheets, budget sheets, work details, all recorded information that provides the observer with more understanding of the history of a cultural resource and what has been done to it in the past, or even future plans. While it is important to obtain at least one method of documentation, multiple methods are ideal. With multiple methods in use, a more complete record of the cultural resource can be obtained and thus making it easier to design proper management plans for the cultural resource, and more accurate maintenance work can be enacted when working on the cultural resource in the future.

Documentation is tied into the research of the cultural resource that can help to inform what kind of treatment is best for the cultural resource, and what elements are needed to fulfill a treatment choice that has been implemented. Documentation is also important to keep the cultural resource's National Register profile up-to-date.

Assessment

Assessment is a term often used when determining what to do with a cultural resource. Assessment, perhaps more than any other practice, facilitates the designation of the proper treatment plan for a cultural resource. One must assess the current condition of a cultural resource, determine its context and significance according to the standards of NHPA, and then weigh that against available financial resources and determine what treatment should be used for each cultural resource. This process leads into a large portion of the thought and planning that goes into the monitoring and management of a cultural resource. Depending on the treatment option, management goals can vary, and the treatment level denotes what aspects of the cultural resource should be monitored more closely than others.

[201] "Secretary of the Interior's Standards for Identification," Archaeology and Historic Preservation, accessed 1/27/2018, https://www.nps.gov/history/local-law/arch_stnds_2.htm.

Monitoring

Monitoring as a practice is dependent upon both the treatment determined by an assessment of a cultural resource, as well as managing goals set for the future of the cultural resource. The assessment will help to point out places of current concern and areas of potential trouble. Using that information gives those responsible for the cultural resource a clearer idea of what to monitor and a better chance of catching early warning signs of future trouble. Management goals can also dictate what an observer may be keeping an eye on. If it is in the future interest of the cultural resource to be used in a particular manner, then monitoring for wear and tear caused by fulfilling that purpose can help protect and extend the longevity of the cultural resource.

Management

Management of a cultural resource encompasses the daily care of a cultural resource, setting progress goals based upon the treatment plan for the cultural resource, and designing and following through on plans to make a cultural resource self-sustaining financially. Management also relies heavily on instituting a carefully thought out and enforced monitoring plan that features thorough documentation. Management is responsible for maintaining proper documentation in addition to integrating new assessments of the cultural resource should something unexpected occur to damage or alter the cultural resource.

Each methodology works in conjunction with the standards laid out by the criteria of the NRHP. The standards direct which aspects of a historic cultural resource have a higher priority than others, and then those aspects influence the treatment choice that best suits the cultural resource. The treatment helps influence how each CRM tool will be implemented, and to what extent. The NRHP lays out a standardized criterion that allows for an easy to follow system by which historic cultural resources can be assessed, treated, monitored, and managed.

APENDIX C

PARK STAFF INTERVIEW QUESTIONS

General Introductory questions:
1: Name
2: Position
3: How long been at that park?
4: How long with park system?
5: Park staff member's assessment of how the Georgia State Park System works.
6: What does the park staff know about the UAS policy in Georgia State Parks?
7: What are the established technology policies/traditions in Georgia State Parks?

Park:
1: Park visitor stats- About how many visitors does the park get in a year?
2: Would you say that your cultural resources are a major reason for visitors to come to your park?
If not, what is?
3: Can you list/describe all the cultural resources that you have on site?
4: Do you feel that maintenance/ monitoring /physical conservation of your cultural resources take up a large or small portion of your parks budget?
-In general, how is the funding allocated in the park?
5: What are some of the most reoccurring issues that affect your cultural resources? By affect I mean physically cause wear and tear, such as visitor caused damage, or weather damage?
-Are there any issues that reoccur due to maintenance problems caused by lack of funding?
6: Currently, what methods have you been using to monitor your cultural resources?
-Do you find that any of these tools are lacking in any way to help manage and preserve these cultural resources?
7: Are there any long standing issues that have been troubling your cultural resources that have repeatedly been submitted to the annual budget for repair work, but have not been accepted for funding?
8: How often do you survey your cultural resources to assess their conditions?
9: How often do you submit repair budgetary requests for your cultural resources?
-What kinds of repairs do you typically ask for?
- Is it always repairs, or is it conservation work that requires trained contractors to perform the conservation work?

10: Are there any challenges to your cultural resources that present themselves on a reoccurring basis?

11: Do you maintain an archival record of what issues manifest with your cultural resources? And then track what is done

- Do you keep that record of treatment over time to go back and refer to?

12: If so, what form of documentation do you use to record these issues: sketches, photographs, physical descriptions, Past Perfect, etc.?
13: Have you taken any steps to monitor reoccurring issues, or preventative monitoring methods to attempt to head off issues before they become more troublesome? If so, please describe.
14: How much wear and tear to your cultural resources are caused by visitors?

-What methods have you taken to prevent this?

Technologies:
15: Do you believe a 3D scan (laser scanning – aerial or terrestrial- LiDAR) of your cultural resources resulting in an electronic 3D model, would allow for a detailed examination of your cultural resources/ structure, and potentially prove beneficial to the monitoring and maintenance of those cultural resources over time?
16: If a complete scan, either through video recording or laser scanning, were performed using a UAS that can achieve close examination of hard to reach areas of your cultural resources, do you think such an examination would be beneficial in keeping a record of your cultural resources, or locating issues that have remained unaddressed thus far?
17: As far as park policy goes, is it in the interest of the park to restore damaged cultural resources on site when it is budgetarily feasible?

-If so, have you noticed any features on your cultural resources that have suffered severe damage that may benefit from the use of 3D printing to fabricate missing or damaged components? in order to replace them and restore the cultural resource to a more representative state of its original construction?

Park Specific Questions:
Chief Vann House State Historic Site Questions:
1: What is the focus of the site's interpretation, Cherokee Vann family history?

-Is the Expulsion of the family mentioned?

2: Has there ever been a search for a family cemetery on the premises, small family plots being normal on plantations of this size. Or, is there evidence that the Vann family buried their deceased elsewhere?
3: The Chief Vann House State Historic Site has the sister park of New Echota, what does that mean to be a sister park?
4: Do the two parks share any kind of interpretation plan?

Fort King George State Historic Site questions:
1: How much of a challenge does the salt from the local waterways present to your cultural resources?
2: Given the potential for hurricanes and severe storms along the coast, how often are the cultural resources threatened by these climate challenges?
3: Is there any evidence of more tabby ruins within the area of the historic site?
4: Given the time periods that the cultural resources at the site span, what is the main period that you focus on for your interpretation?

Etowah Indian Mounds State Historic Site questions:
1: How well are the stairs leading up to the top of the mounds maintained?
    -Given their importance in providing access to the tops of the mounds, are they a maintenance priority?
2: How often is the interpretation for the cultural resources changed?
3: Are there any future excavations planned for other sections of the historic site?

Jarrell Plantation State Historic Site questions:
1: Is there a museum on the site for artifacts?
2: As the Interpretive Ranger in charge of the cultural resources on site, would you be open to exploring non-traditional forms of interpretation?
3: Does the site institute a living history program?
    -How often can visitors expect to experience the living history program?

F.D. Roosevelt State Park questions:
1: Are the CCC constructed cultural resources more of less difficult to maintain and repair than other cultural resources on site?
2: Have you experienced any specific issues or challenges with any of your bronze statues on the site?