STORM GUIDANCE FOR FLORIDA'S HISTORIC COMMUNITIES

APPENDIX D: ARCHAEOLOGY

PDP

APRIL 2023

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Unless otherwise noted, all components of the *Storm Guidance for Florida's Historic Communities* including all text, graphic design, photography and illustrations unless noted otherwise were prepared by Dominique M. Hawkins, FAIA, LEED AP, and Jennifer Wolfe, AICP.

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ARCHAEOLOGY REPORT
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A dugout canoe. (Florida Memory)

D APPENDIX

ARCHAEOLOGY

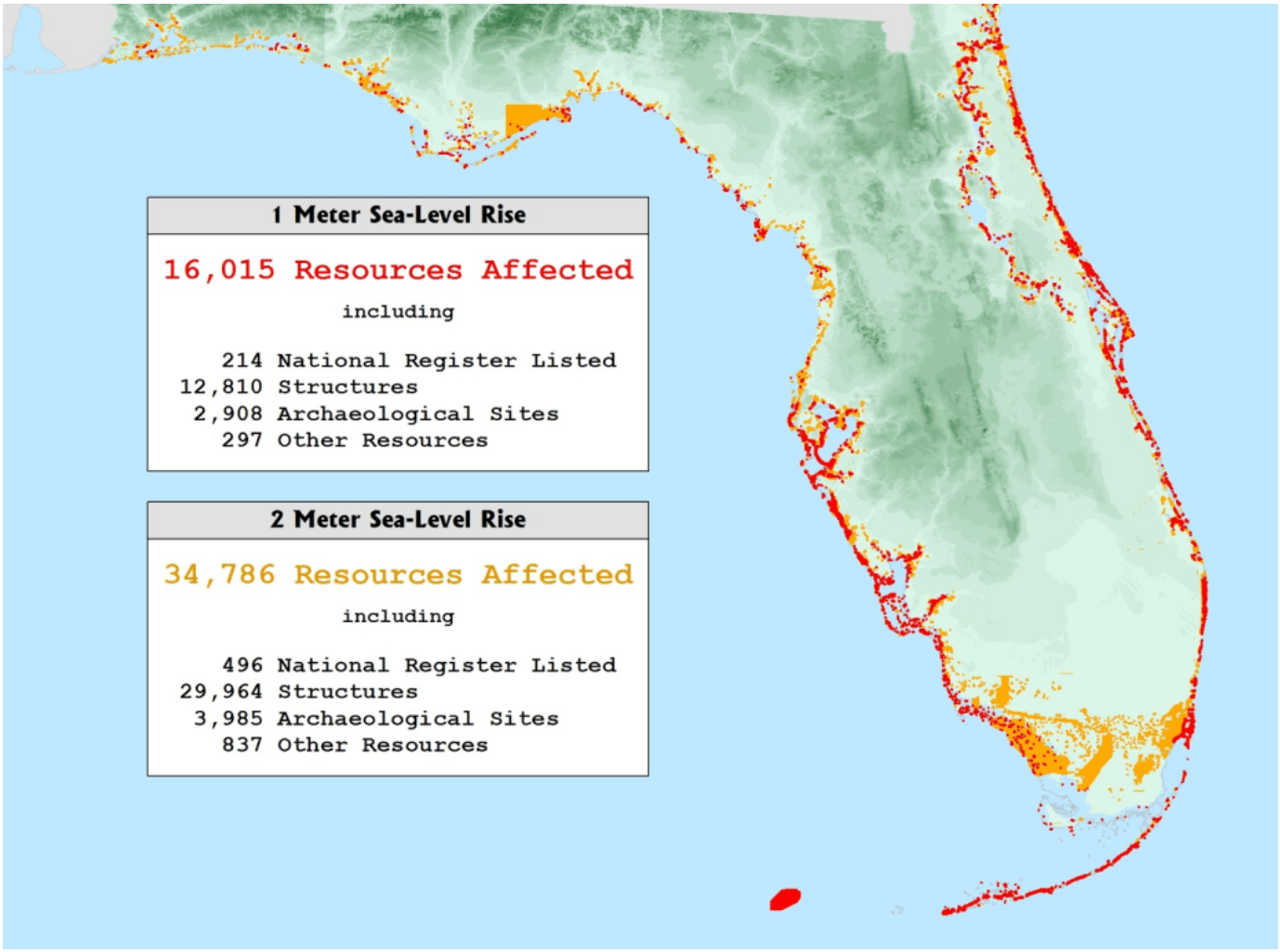
Report Author: Greg Charles Smith, Ph.D., RPA

INTRODUCTION

Archaeology is the scientific study of the physical remains of past human life and activity. An ***Archaeological site*** is any place where these physical remains exist. There are many types of archaeological sites just as there are many types of human activity. Sites can contain a great deal of information that informs us of ancient people and their culture and adaptations to the environment, including environmental change adaptation.

Archaeologists analyze sites and artifacts to learn about the human groups who left them. ***Artifacts*** are things made, modified, or used by humans. While artifacts are usually thought of in terms of objects like stone tools, pottery, or metal; sites may also contain artifacts like soil stains that show where wood structures, hearths, or pits once existed, and may contain a host of natural ***ecofacts*** such as bone, charcoal, seeds, and pollen that identifies human diet and subsistence patterns. Together, these artifacts and sites provide remarkable clues to understanding the social and religious systems, technologies, environmental adaptations, and cultural interactions and change that have occurred in Florida over the last 12,000 years.

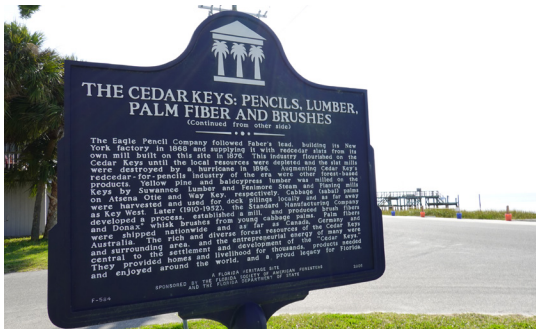
Florida's unique and varied natural environments, from the tidal oyster beds of the Atlantic and Gulf shorelines to the karst topography of freshwater springs and sandhill ridges of the interior, have attracted human occupation for over 12,000 years. As now, people in the past often chose to live on higher elevated lands close to water. When



Florida archaeological sites at risk from current and future flooding. One meter measures just over 3 feet. (Image from Florida Division of Historical Resources)

ABSTRACT

The diverse types of historic and pre-contact period archaeological sites found along the coastal zone are reviewed with information in the Florida Master Site File. Assessed topics include the impact of flooding and hurricanes on archaeological resources, cemeteries, and maritime sites, as are legislative and management efforts designed to protect sites. Mitigation options to reduce impacts and gather archaeological data prior to total site loss are described, followed by four case studies of coastal communities (Miami, Pensacola, Sarasota, and St. Augustine) that include mitigation efforts at local sites. Steps toward better integrating archaeological sites into cultural resource protection at state and local levels are offered through a gap analysis that proposes modifications to current hazard management, mitigation, outreach, and policy. Finally, considerations regarding a ranking of site significance are discussed as are best practices for use in hazard mitigation planning.



The Cedar Keys Historic and Archaeological District faces significant flood threats to multiple islands with a long settlement history.

Above ground features and vaults like these in the Key West Cemetery can become dislodged or flooded from storms or increased inundation.

Erosion can disturb protective sands and scour site components of shipwrecks that may be otherwise preserved underwater. (NOAA)

Erosion and fallen trees can destroy shell mounds and related features of archaeological sites.

people use one place for a long time, soil and artifacts accumulate on top of each other over decades and centuries. ***A single archaeological site may contain evidence of many different societies and their activities through time up to the present day.*** Consider, for example, the high rise condominiums of Miami Beach which tower over the famous "Miami Circle" archaeological site. These are architectural constructions from different cultures in the same place separated by a period of 1,000 years.

The deposits that remain in the soil today are irreplaceable links to the past that provide information otherwise not available. It is important that this physical evidence, which has survived in the soil beneath or feet for thousands of years, be protected and preserved to the greatest extent possible so that future generations can continue to learn from this past. ***The archaeological record is the body of physical (versus written) evidence about the past, a record of human prehistory and history that can shed light on how cultures changed over time and grew, and why previous civilizations prospered or failed.*** Documentation of the archaeological record transcribed into written format by archaeologists is important but does not replace the value of the physical evidence. As technology improves and more data is collected, new information can be obtained from remaining physical evidence amending or expanding previous written studies.

The value of archaeological sites extends beyond the artifacts they contain or that are displayed in museums. Artifacts within their original location are key to understanding how they relate to one another and how one site may relate to another site. ***Artifacts, whether found in different colored layers of soil, a buried trash pit, or an abandoned well provide clues to their association with one or more culture or time periods, their use, technological manufacture, or even the size and type of a site.*** This information is referred to as the ***context*** of an archaeological site. These associations provide a great deal more information about past human behavior than the artifacts themselves.

The position of artifacts in the soil is fragile. ***When artifacts are moved or an intact site is disturbed, the context is destroyed and can never be recreated. The artifacts then lose the majority of their informative data.*** Similar to the organization of chapters in a book, missing pages will affect the ability to comprehend the plot. Archaeologists record multiple characteristics of a site during excavation using field notes, maps, drawings, and photographs to document the context. Without this archaeological research, excavation, and thorough recording, opportunities to learn new information is lost.

Human and animal disturbance or natural events can easily reposition artifacts and remove them from their original context. Disturbances occur from erosion and unstable surfaces, from fallen trees and uprooted foundations, from construction, or from digging and looting. When the context is mixed or destroyed an archaeological site loses site integrity, which is one of the factors determining a site's significance.

KEY TERMS UNIQUE TO ARCHAEOLOGY

(Descriptions are taken from the National Park Service unless indicated otherwise.)

Archaeology. The study of ancient and recent human past through material remains. It is a subfield of anthropology, the study of all human culture. From million-year-old fossilized remains of the earliest human ancestors in Africa, to 20th-century buildings in present-day New York City, archaeology analyzes the physical remains of the past in pursuit of a broad and comprehensive understanding of human culture. [Society for American Archaeology]

Archeological resource. An artifact, feature, site, and associated documentation found through archeological methods that evidences past human activities.

Archaeological Site. An area where human activity took place, which is often represented by material remains.

Artifacts. An object made by a person, typically an item of cultural or historical interest.

Context. Position and associations of an artifact, feature, or archeological find in space and time.

Curate or **Curation.** The process of cataloging archeological artifacts and associated documentation into a collection to be stored for perpetuity.

Deposit. A specific physical structure or element within a soil matrix.

Diagnostic. Artifacts that allow archeologists to pinpoint relatively specific time periods during which they were produced based on documented changes in technology.

Disturbance. An event or sequence of events, either natural or cultural, that dislodges and disrupts archeological deposits.

Ecofacts. Natural materials that have been used by humans, for example the remains of plants and animals that were eaten by a given community. More generally taken as material recovered from archaeological sites, or other sealed deposits, which is relevant to the study of ancient environments and ecology. Examples include animal bones, seeds, snail shells, waterlogged wood, and pollen.

Evaluation. The consideration of eligibility for archeological properties to the National Register of Historic Places, as per the National Historic Preservation Act (NHPA).

Features. A distinct structure or element (such as a post hole, fire pit, or floor) that is made or altered by humans, but cannot be removed intact from a site.

Historic. For the United States, the period of time after Europeans made contact with indigenous peoples in the New World.

Looting. The illegal act of plundering archeological sites to find artifacts to sell or keep. Common examples include metal detecting at battlefields or removing pot sherds from caves.

Material culture. Any remains from the past manipulated by people, including physical objects and landscapes.

Mitigation. A process in which archeologists work with contractors; state, tribal, and federal offices; and stakeholders to avoid damaging archeological resources during a project.

Monitoring. The process of an archeologist physically being present at a construction site to ensure archeological resources are not disturbed by the work being conducted.

Phase I. A preliminary investigation to determine the presence or absence of archeological resources in a project area.

Phase II. Investigations of archeological sites that include shovel test pits, excavation units or other techniques to establish sufficient data to evaluate the eligibility of a site for the National Register of Historic Places.

Phase III. Excavation of an archeological site to recover as much data as possible. **Posthole.** A hole bored into the ground to hold an upright post.

Pre-contact/Pre-historic. In the United States, the period before Europeans made contact with indigenous peoples in the New World.

Radiocarbon Dating (Carbon Dating, C-14 Dating). A method of absolute dating that identifies the loss of carbon-14 isotopes within a once-living organism.

Research Design. Before an excavation begins, archaeologists write a research design. This outlines the "who, what, where, when, how, and why" of the fieldwork. [Society for American Archaeology]

Shovel test pit. A standard method in Phase I surveys in which archeologists dig small holes in a systematic way to determine the location of possible sites.

Soil sample. Dirt removed from an archeological deposit for additional systematic testing, such as for phytoliths, pollen, botanicals, and other remaining organic materials.

Stratigraphy. The study of strata, layers or contexts of soil, sediment and material culture at an archeological site.

NATIONAL REGISTER OF HISTORIC PLACES

The National Register is the official Federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture. National Register properties have significance to the history of their community, state, or the nation. ***A historic property is any pre-historic or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places; including artifacts, records, and remains related to such a property or resource.*** The National Register criteria for evaluating significance are as follows:

> ***Criterion A:*** *Properties that are associated with events that have made a significant contribution to broad patterns of our history.*
>
> ***Criterion B:*** *Properties that are associated with lives of persons significant in our past.*
>
> ***Criterion C:*** *Properties that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; and*
>
> ***Criterion D: Properties that have yielded, or may be likely to yield, important information in prehistory or history.***
>
> - National Park Service *(nps.gov)*

Note that NRHP determinations can change over time as additional documentation is researched or new discoveries occur. This is especially relevant for older studies and collections that have not yet been analyzed.

HISTORIC PROPERTIES AND 50-YEAR RULE

The National Register of Historic Places states that properties less than 50 years old are not eligible for designation. There are exceptions for particularly unique sites which are described in more detail in the National Register criteria for evaluation. Historic preservation professionals thus use the 50-year rule as a benchmark for determining potential for significance and distinguishing between historic and pre-contact periods.

National Register of Historic Places marker in Pineland Archaeological District.

GENERAL SITE MANAGEMENT

Mechanisms for public and private management of historic resources, which includes archaeological resources, are generally categorized within the field of ***cultural resource management***. The National Historic Preservation Act of 1966 (NHPA) chartered the National Register of Historic Places and many other programs, guidance, and regulations that exist in some form today. While there are often situations in state and local governments where there is no Federal involvement in cultural resources management, and vice-versa, most state and local government preservation and regulatory programs are based upon the framework established by the NHPA and its codifying regulations *36 CFR Part 800, Protection of Historic Properties.*

FEDERAL FRAMEWORK

Not all archaeological sites are significant and not all sites can be preserved, so the objective is to identify those sites for which efforts should be made for preservation. To help prioritize the preservation and management of archaeological sites, the NHPA established a framework and for identifying, documenting, and assessing the significance of archaeological sites and other historic resources. For a site to be considered a significant resource, it must meet one or more of four specific criteria established in *36 CFR Part 60, National Register of Historic Places*, and *36 CFR Part 800, Protection of Historic Properties* (refer to sidebar, at left). The evaluation of a site for inclusion in the National Register of Historic Places (NRHP) rests largely on its ***research potential***, that is, its ability to contribute important information through

preservation and/or additional study. Research potential is evaluated based on various levels of archaeological testing.

The most common criterion of the NRHP used for archaeological sites is Criterion D, the potential to "yield information important in prehistory and history." However, this criterion is rather vague. To clarify the issue of site importance, the following evaluations add specificity that can be used in assessing site significance and NRHP eligibility:

1. **Site Integrity:** Does the site contain intact cultural deposits or is it disturbed?
2. **Preservation:** Does the site contain material suited to in-depth analysis and/or absolute dating such as preserved features, botanical material, faunal remains, or human skeletal remains?
3. **Uniqueness:** Is the information contained in the site redundant in comparison to that available from similar sites, or do the remains provide a unique or insightful perspective on research concerns of regional importance?
4. **Relevance to Current and Future Research:** Would additional study of this site contribute to our knowledge of the past? Would preservation of the site protect valuable information for future studies? While this category is partly a summary of the above considerations, it also recognizes that a site may provide valuable information regardless of its integrity, preservation, or uniqueness.

CULTURAL RESOURCE MANAGEMENT IN FLORIDA

Identifying historic sites is the most essential element and the first step in managing cultural resources. The NHPA framework for documenting sites that exist in the United States requires that each state maintains a system to record historic resources and identify significance. In Florida, a digital database called the ***Florida Master Site File*** (FMSF) is filled with archaeological and historical survey reports relevant to history and historic preservation in the state. ***A historic resource form is used that allows the recorder and the SHPO to document general and detailed information as well as advise on the historic integrity and value of the resource.*** The FMSF is the first place to research information on any cultural resources, and it utilizes GIS to plot the locations of all these resources.

Most information is available to the public upon request. Site File staff are available to assist citizens, government agencies, and historic preservation professionals in performing searches and obtaining information from the inventory. Sites are recorded in the FMSF using a trinomial system: for example, the Etna Site (8CI795) refers to the Etna Turpentine camp in Citrus County. The 8 refers to the State of Florida (8th alphabetically), CI refers to Citrus County where the site is located, and 179 is the resource's unique number.

When conducting research, some knowledge of Florida's archaeological heritage will be helpful. A general cultural sequence for Florida is summarized on page D.8. The following section provides an overview of pre-contact and historic site types, underwater sites, and cemeteries.

IDENTIFYING AND RECORDING SITES:

The Florida Master Site File is the State's official inventory of cultural resources and is administered by the Bureau of Historic Preservation, Division of Historical Resources, under the Florida Department of State. Irrespective of significance, the Site File maintains an inventory of:

- Archaeological sites
- Standing Structures
- Bridges
- Resource Groups
- Cemeteries

Florida does not have a register of historic resources, they can only be designated at the national or local level.

LOCAL INVENTORIES

Local governments can refer to the NRHP criteria to manage archaeological resources subject to local laws. Sites and structures, and related groups of them, that meet some or all of the NRHP criteria can be placed in a local register of significance. Some government agencies have archaeological site locations built into their geospatial data management systems (GIS). ***All municipalities should have knowledge of their known archaeological sites and an understanding of where there is the potential for site disturbance from weather events or development.*** A very useful tool for local government land planning is to have an ***Archaeological Probability Model*** developed for use in GIS applications in order to make informed decisions about archaeological site potential in any given location.

Pottery helps archaeologists determine cultural affiliations. (Florida Public Archaeology Network/ FPAN)

Traces of a shell midden along an eroding edge.

Indian Mound shown in 1952 at Crystal River. (Florida Memory)

RANGE OF FLORIDA'S ARCHAEOLOGICAL SITES

Florida's archaeological record spans over 12,000 years and includes both pre-European periods and historic, post-European contact sites (refer to general time line at left). Archaeologists use artifacts, radiocarbon dating, and an established cultural sequence based on known dates of manufacture for some artifacts (stone tool types and pottery types) to determine associated time periods for a site (or individual soil layers).

PRE-CONTACT PERIOD SITES (12,000 - 1492)

Pre-contact sites represent the time before arrival of the first Europeans in North America. With few exceptions, this time period in North America has no written, historical documents associated with it.

Period artifacts can include stone tools (whole or broken spear points, arrowheads, knives, chipped stone debris, stone axes, hammerstones, drills, grinding stones, mortars and pestles, awls, etc.), pottery, clothing and ornamental pins, decorative items and ornaments, scraping tools, bone fishhooks, and stone, shell, or bone beads and much more.

Discrete archaeological deposits within pre-contact sites, called ***features***, include fire pits and hearths, burned earth and clay, trash and garbage pits, postholes, evidence of house floors, storage pits, clusters of artifacts (e.g., chipped and broken stone, caches of projectile points, or pottery sherds), human and animal burials, clusters of animal bone, and earthworks (such as mounds and circular enclosures), petroglyphs and pictographs, and middens (cultural refuse buildup). ***Although buried, many pre-contact sites reflect extended occupations that accumulated over hundreds or thousands of years.***

Pre-contact period site types in Florida include, but are not limited to:

- **Shell Middens** (also known as shell heaps or shell mounds) are essentially garbage accumulations left by pre-contact period peoples in coastal areas. They contain discarded shells, other food remains such as bones and charred plants, broken pottery, and other artifacts. Located along the barrier islands and coasts of Florida, ***shell rings*** are circular or semicircular deposits of midden material. Additionally, it is not uncommon to find burials within shell midden sites.
- **Earthen midden mounds**, often called ***black earth middens***, consist of discrete deposits of dark-colored earth rich in organic content and concentrated artifacts that represent the deliberate discard of refuse, food bone, and artifacts. Black earth middens occur throughout poorly drained southern Florida and on ***tree islands*** - slightly raised areas containing localized midden deposits amid a very wet environment.
- **Burial Mounds** are artificial hills of earth built over or containing the remains of the dead. These can occur as flat topped, platform mounds or smaller sand mounds.
- **Unmarked human burials** can be found in both pre-contact and historic contexts and can occur anywhere; individually or in groups. Burials have been found in middens, mounds, and even muck ponds and peat bogs. The Windover Site in Brevard County contained the well-preserved, 7,000-year old skeletal remains of 168 individuals.

PERIOD	SIGNIFICANT ACTIVITIES / POTENTIAL RESOURCES
12,000+ BC	Hunting and gathering Paleoindian people lived near Florida sinkholes and springs
7500 BC	Early Archaic Period people hunted and gathered near wetlands
5000 BC	First semi-permanent settlements in Florida
5000-3000 BC	Middle Archaic sites along major rivers, modern environments established
3000 BC – 1513 AD	Late Archaic, marked by shell middens along coasts and rivers; later regional cultures including the Tekesta, Calusa, Ais, and Timucua adapted to coastal living
1513-1565 AD	Juan Ponce de León landed on the peninsula given the name Florida; thereafter other explorers including Narvaez, de Soto, and de Luna explored the State
1565	Pedro Menéndez established St. Augustine, the first permanent settlement by Europeans in North America
1763	Spain ceded Florida to Britain
1770s	Creeks from Georgia and Alabama, later called Seminoles, entered Florida
1783	Florida returned to Spain after Treaty of Paris
1821	Florida becomes a Territory of the United States
1845	Florida admitted to the Union as a state

Range of Florida's archaeological sites organized by major dates in Florida prehistory and history, adapted from Florida Division of Historical Resources (2013).

Note: BC (Before Christ) is also referred to as BCE (Before Common Era)

Miami Circle National Historic Landmark, aerial view. (Florida Division of Historical Resources)

University of Southern Alabama photo showing the disturbance from a wave shown in the sediment patterns of their Mobile Bay excavation.

Seminole Indian and family, in dug-out canoe, Miami between 1900-1915. (Library of Congress)

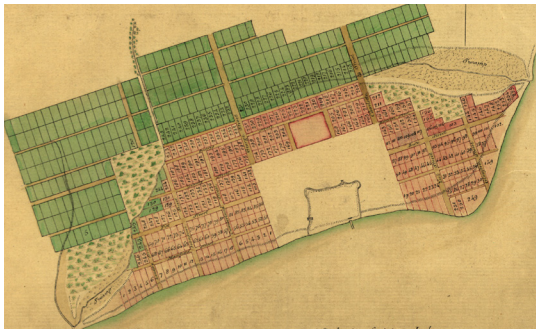
- **Earthworks** are human-made mounds, embankments, ditches, canals, plazas, open courts, borrow pits, and other constructions containing purposefully placed soil. These earthwork elements can include linear or variously shaped mounded earth creations occurring in combination but sometimes one element is found in isolation. ***The association of earthwork features at a site is best visualized and interpreted when mapped in plan and/or as seen in aerial photography or LiDAR mapping.*** Historic earthworks, such as those associated with military activities, also occur in Florida.
- **Habitations** are places where people lived, whether permanently or temporarily. They can occur as a concentration of artifacts, or as former dwellings represented by stains in the earth from postholes, or within a cave or rock shelter. Most habitations are near a water source and directly associated with other kinds of sites like burial grounds, desired resources, agricultural fields, etc.
- **Villages** represent a cluster or community of temporally associated habitations or "residential spaces." The discrete domestic occupations within a village may represent individual family groupings.
- **Special Use/Resource extraction sites** occur near desired resources. One example would be an activity area used to quarry raw material from a source of stone suitable for tool making. The term can also describe a location near a productive fishing area, an area where nuts were gathered, or where Native Americans gathered culturally important plant species.
- **Campsites** are locations where the limited horizontal and vertical distribution of artifacts, both below ground and/or on the surface, suggest short term use.
- **Surface scatters** are sites where artifacts have been recovered from the ground surface and may or may not be subjected to subsurface testing.
- **Archaeological occurrences** ***are isolated finds of fewer than three non-diagnostic artifacts.*** Because of the limited nature of these finds, they are not recorded as archaeological sites with the FMSF but are documented as a means of patterning past human presence within a given area.
- **Water craft** like wooden canoes/log boats (dugouts) are found preserved in bodies of water throughout Florida. Because some organic material is preserved indefinitely in water, canoes made from trees are common finds.
- **Petroglyphs**, both pre-contact and historic in context are rock carvings (rock paintings are called pictographs) made by pecking directly on the rock surface using a stone chisel and a hammerstone. Such evidence of human occupation is often found in caves.
- **Indian Trails** appear and are labeled on early surveyor's plat maps from the 1800s; some of these transportation routes were no doubt established long before the arrival of Europeans. In some cases, these trails still follow current roadways.

HISTORIC SITES (1492 - PRESENT)

Historic period archaeological sites contain material over 50 years old. Artifacts found can include glass windows or containers; iron and other metal items and tools; bricks; ceramics; clothing items such as buttons, buckles, and leather footwear; worked wood; horse equipage; weaponry; clothing items such as pins, scissors, and thimbles; furniture hardware; beads and ornaments; and farm equipment to name a few.

Historic archaeological features can include evidence of fires and fire pits, ash and charcoal occupational lenses and stains, trash and garbage pits and dumps, middens, postholes, house foundations, wells, cisterns and other structural remains. ***In other words, historic period site types include many of the functional types found at pre-contact sites.*** Other historic site types include, but are not limited to:

- **Towns/Communities, and Residential/Domestic occupations** reflect how Florida's coastal areas have thrived. Typical coastal economic activities began with simple harvesting of seafood. Soon, cooperative processing and transportation provided opportunities for commerce, which led to new industries and new jobs. Over time, a complex cultural and economic web of human coastal settlements developed with various customs, traditions, and rituals characteristic of the people who lived there. Pensacola and St. Augustine are two examples of coastal colonial settlements.
- **Missions** were established across Florida throughout the colonial period by Spanish missionaries to convert native peoples to Christianity. Starting at existing Native American villages, missions probably began with a simple altar, followed by a church, a mission bell, garden, housing for priests and friars, a baptismal font, corrals, and other elements of the complex constructed later in time.
- **Lighthouses, Harbors, and Ports** are sites constructed in or near water. These structures may become submerged or collapse into the water.
- **Seminole Sites**, or Seminole components within other sites, occur but few have been intensively studied in the archaeological record. Oven Hill in Dixie County is an early Seminole occupation site, dating to the last third of the 18th century. It has both a land component and an underwater refuse component.
- **Plantation sites** were common throughout the state, especially during the Early American and British Periods, that included vast landholdings devoted to the production of sugar, cotton, rice, indigo, tobacco, oranges, and other products. Plantation sites can include cabins for enslaved people, a plantation house, one or more wells, barns, a blacksmith shop, a mill house, livestock enclosures, cooperage, warehouses to store produce and naval stores, and wharves for shipping produce.
- **Farmsteads, Homesteads, and Ranches** served as places to farm or raise livestock. These can be expected to contain a variety of internal features like wells, stables, enclosures for livestock and poultry, tack rooms, dumps/refuse piles, and other associated outbuildings and features.



A Plan of the town of Pensacola, 1767. (Library of Congress)

Plan Map of Colonial St. Augustine 1764. (Library of Congress)

Slave cabins at Kingsley Plantation on Fort George Island.

Fort Jefferson is due west of Key West and is surrounded by water.

- **Forts, Blockhouses, and Military Sites** occur along the Florida coastline, from Pensacola (Forts Barrancas and Pickens) to St. Augustine (Castillo de San Marcos), and as far south as civil war era Fort Jefferson in the Dry Tortugas. Some of these locations were reused and reestablished through time. The earliest military activities were carried out by the French and Spanish. Later, the British became active militarily, and there are also Civil War fortifications. Later military bases and any associated remains over 50 years old are included in this category.
- **Trading Posts** once played a significant role in often disparate Florida communities, providing necessities to those who settled throughout Florida. These were usually along old roads and Indian trails. The Brickell trading post in Miami was occupied during the late 19th and early 20th centuries serving the area's pioneer communities.

A turpentine still photographed in 1923. (Florida Memory)

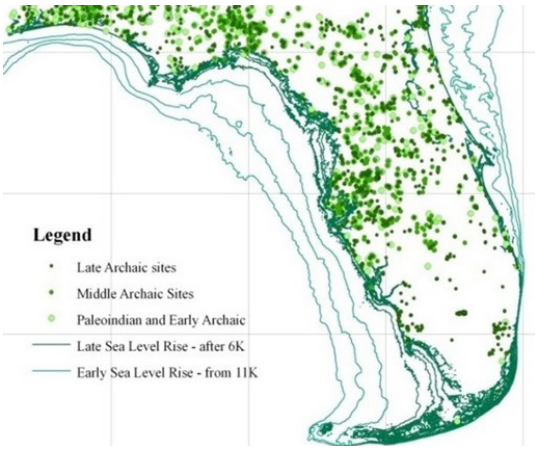
- **Building Remains** can include structural remnants of foundations and walls, as well as any associated outbuildings (barns, sheds).
- **Industrial, Extraction, and Production sites** can include water-powered grinding mills and sawmills, mines and mining camps, quarries, and lumber and turpentine camps. Also common are sites that produced specific products (e.g., brick companies, and stone, metal, or ceramic workshops). Such sites can have a variety of associated outbuildings, residences for workers and overseers, and tramlines for transporting products to a nearby railroad.
- **Earthworks** sites from the historic period can include mounds, embankments, dams, enclosures, fortifications, canals for moving goods to a wharf, irrigation ditches, etc.

- **Road Segments, Old Trails, and Transportation Routes** over 50 years old have made a significant contribution to the development of Florida, such as the Old Kings Road, Old Dixie Highway/US 1, and Tamiami Trail.
- **Wreck salvage** is a rarely identified site type known in Florida. The Higgs Site in Indian River County is thought to have been a salvage camp occupied in 1716 by Spaniards and Indians who were attempting to salvage remains of the Spanish plate fleet ships that sank in 1715. This land was last investigated during the 1940s and may contain human remains. However, because of the long duration of some site use in Florida, some FMSF site types are not a definitive or correct description.

UNDERWATER SITES

At one time, the Florida peninsula was almost twice as large as it is today but over the centuries rising sea level has reduced its size (see also Sea Level Rise Impacts page D15). As a result, coastal and riverine habitation sites 12,000 years old, or more, representing the earliest, pre-European inhabitants of Florida are now under water and located mostly offshore and in rivers and sinkholes across the state. Farther offshore, although often covered by sand along Florida's beaches, are numerous ships that wrecked.

Florida's river systems and sinkholes contain fossil evidence of extinct mammals associated with pre-contact Native American artifacts, including Little Salt Spring and Warm Mineral Springs. Another one is the Aucilla River, which includes The Page/Ladson site and the Sloth Hole site that have both yielded evidence of the first Floridians hunting mastodons in Florida at least 12,000 years ago. Both underwater archaeologists and sport divers have investigated such sites, and divers in central Florida have found a vast network of springs and caves with evidence of the earliest Americans. This research is ongoing along the Gulf of Mexico, where ancient river basins are under water today.



Expanse of pre-contact sites across Florida shown with stages of sea level rise that changed the coastline (Image by Michael Faught, 2016, published on www.nps.gov)

Inland and coastal waters served as primary transportation routes until the introduction of the railroad and the automobile. These were first used by Native Americans and then the Spanish with Juan Ponce de Leon's arrival in 1513. In subsequent centuries, countless ships from around the world have carried people and cargo through Florida's waters. Deepwater anchorages at Pensacola Bay supported Spanish, French, and British development along the northern Gulf Coast. Other communities along the coast have unique history linked in their underwater resources.

State underwater archaeologist on wreck Herrerain of the 1733 Spanish Treasure Fleet. (Florida Memory)

A considerable number of historic period shipwrecks lie off the coast of Florida resulting from the hazards of strong currents, the Gulf Stream, reef systems, and hurricanes. Each wreck is a time capsule that contains information on life, commerce, and technology during the period in which the ship went down.

In contrast to sailing vessels, there are many different types of structures built in the water, including fishing weirs, wharves, docks, and lighthouses. The Windover Archaeological Site is an approximately

8,000 year old site found in a peat-filled pond during construction near Titusville. This site contained extremely well-preserved human remains intentionally staked at the bottom of a freshwater pond during a burial ceremony. One example of a historic site built in water is the San Marcos de Apalachee Historic State Park, which contains wharf structures dating to the 17th century found at the confluence of the St. Marks and Wakulla Rivers.

Historic navigational aids such as light towers, lighthouses, and beacons are other sites constructed in, or near, water. Some remain as they are and other structures may have become submerged or have collapsed into the water. For example, several lighthouses erected offshore of Cape San Blas have collapsed or been destroyed during storms. To illustrate coastal history for the public, the Florida DHR created a *Maritime Heritage Trail* and features 15 historic shipwrecks (search maritime trail at *www.flheritage.com*).

Saltwater intrusion from a tidal event will impact the natural landscape.

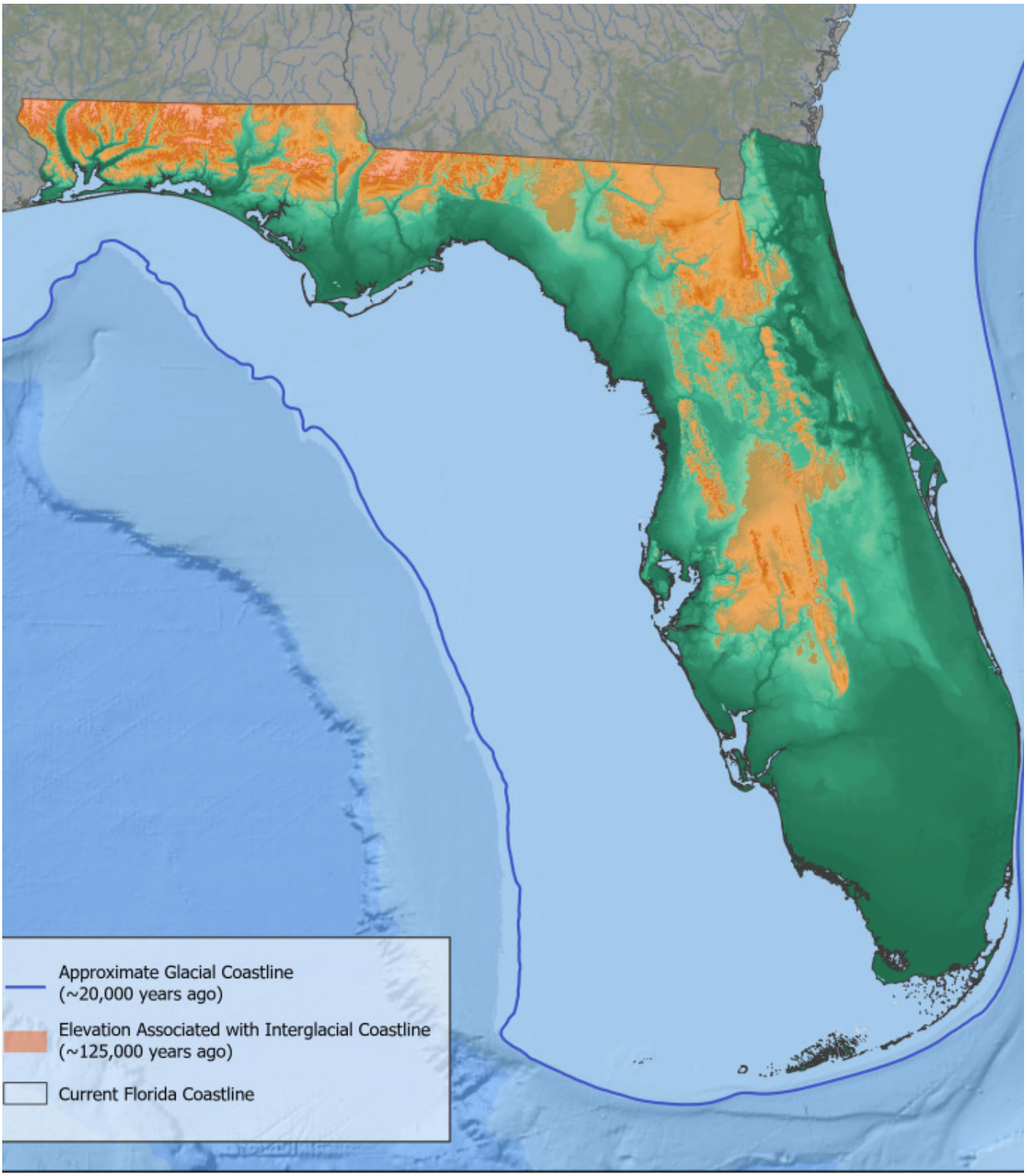
A toy truck situated near broken gravestones. (Florida Memory)

CEMETERIES

Beyond providing a resting place for the dead, the significance of cemeteries is in the meaning they have for living descendants or affiliated groups, as well as their aesthetic beauty and the sense of serenity they can provide.

Cemetery Considerations:

- Grave markers, monuments, boundary markers, furniture, ornamental planting may be architectural or landscape resources
- Above ground studies on the placement and design of gravestones often reveal information about socioeconomic development, trends and attitudes toward death
- Cemeteries are also gathering places for many communities
- As an archaeological site type, cemeteries are not normally considered eligible for National Register listing unless the site has an architectural or landscape design or artistic qualities that distinguish it, or is the only surviving site associated with an important historical figure
- Local designations may allow more flexibility for a landmark designation according to the community's particular regulations
- Burial sites may be listed in both the architectural and archaeological inventories
- Plantation graveyards and small family plots that may exist as abandoned or neglected due to changing land use practices and/or may be forgotten among hidden, vegetated areas



Florida's coastline has evolved over millennia and the archaeological record reflects locations of pre-contact cultures that follows the sea level. (Lori Collins, University Of South Florida Libraries And School Of Geosciences)

Fort Clinch shoreline near Fernandina Beach has been managed by the USACE as early as the 1840s. (USACE)

SITE VULNERABILITY TO FLOODING AND STORMS

The impacts of Hurricanes Harvey, Irma, and Maria in 2017, Matthew in 2016, and other hurricanes and tropical storm events, have caused extensive and costly damage to coastal areas. The impacts of storm events can bring extreme costs measured from impacts to local economies, cleanup costs, loss of visitor access, investments in recovery, and the irrevocable loss of unique cultural resources. See also *Storm Guidance for Historic Communities, Chapter 7*. ***Evidence suggests that the combined effects of sea level rise, flooding, storm surge, wave action, erosion, and related consequences brought on by increasingly frequent and intense weather events may get worse. These coastal flood hazards, especially on barrier islands, pose an increasing threat to archaeological sites.*** Sites such as Jupiter Inlet, Calusa Island, Egmont Key, numerous sites near Cedar Key, and Butcherpen Mound Complex along the Gulf Coast have all suffered from coastal weather hazards, as have sites along the Atlantic coast like Big Talbot Island, the Strickland Mound Complex, and the Totten Key Complex. Documenting the impacts of these sites is especially important to inform mitigation strategies at sites that do not currently have preventive measures in place.

SEA LEVEL RISE IMPACTS

The effects of sea level rise on coastal archaeological sites is perhaps best seen in the sparsity of Paleoindian period sites, when people living in the Americas occupied vast areas of the continental shelf that are covered by water today.

ARCHAEOLOGY OF CLIMATE CHANGE

The archaeology of climate change offers opportunities to identify the factors that promoted human resilience in the past and apply the knowledge gained to the present, contributing a much-needed, long-term perspective to climate research.

> The Archaeology of Climate Change: The Case for Cultural Diversity, 2021, *www.pnas.org*

SEA LEVEL RISE

Human activities release carbon dioxide into the atmosphere causing the Earth's atmosphere to warm. Rising global temperatures cause ice located on land and in the sea to melt, and further warming of the atmosphere will cause sea levels to continue to rise. This environmental activity will affect how coastlines are managed and protected while addressing population displacement and land area loss.

SUMMARY OF FLOOD HAZARD IMPACTS TO ARCHAEOLOGICAL RESOURCE ON LAND						
FLOODING	**INCREASED AND/OR HEAVIER PRECIPITATION**	**INCREASED OCCURRENCE OF FLOODING**	**HIGH WATER TABLE**	**INCREASED COASTAL EROSION**	**EXTREME WEATHER EVENTS**	**INCREASED FREQUENCY AND/OR SEVERITY OF STORM SURGE**
Total submersion of sites	Site erosion from overflow and new flood channels	Site erosion from scouring and new flood channels	Damage to artifacts, stratigraphy, and features from site saturation from below	Full or partial loss of coastal sties and artifacts	Erosion of coastal sites due to higher, stronger storm surges	Destruction and total site loss due to storm surge
Downstream movement of items due to undercut shoreline sediments	Destabilized or shifting ground and subsidence	Direct physical damage to site from large, floating debris during floods		Exposure of new and known sites	Disturbance or exposure or burial due to stronger wave action	Erosion from wave action
Changes in pH of buried artifacts and/or buried environments	Damage to unexcavated artifacts and site integrity from direct force of water	Destruction to or loss of artifacts during flooding		Altered erosion patterns from changes in sea level	Deflation or abrasion due to stronger winds	Disturbance or removal during post-event response and recovery
Increased risk of looting after artifacts are exposed following topsoil erosion		Increased risk of post-flood subsidence		Increased risk of looting from exposure	Disturbance to or removal of soil during post-event response and recovery	
Increased erosion of sites due to encroaching water levels, wave action exposure, and increased exposure to wet/dry cycles		Impacts from flood mitigation (debris removal, infrastructure repair)			Destabilization and damage to underwater sites through movement of sediment and/or protective vegetation	

Adapted from State of Maryland 2019; NPS 2016; and Rockman et al. 2016.

An excavation unit located inside a Spanish Colonial building in St. Augustine prior to a storm event.

The same excavation unit after a storm event where the rising water table disturbed the stratigraphy.

NOR'EASTER

A nor'easter is a storm along the East Coast of North America. They occur at any time of year but are most frequent and most violent between September and April. "King Tides," which bring unusually high water levels, can cause local tidal flooding. The king tide is the highest predicted tide of the year at a specific location and is above the highest water level reached at high tide on an average day.

CRITICALLY ERODED BEACHES IN FLORIDA

During the Heritage Monitoring Scout Archaeology Assessment project performed in 2021 by Florida Public Archaeology Network, the report noted approximately twice as many sites were lost to shoreline erosion exasperated by sea level rise, storm surge, and active erosion in comparison with development sites.

Sea level has been rising on a global scale and continues to displace large numbers of people and inundate large areas. Global mean sea level has risen about 8–9 inches (21–24 centimeters) since 1880, with about a third of that coming in just the last two and a half decades. The rising water level is mostly due to a combination of melt water from glaciers and ice sheets and thermal expansion of seawater as it warms. In 2020, global mean sea level was 3.6 inches (91.3 millimeters) above the 1993 average, making it the highest annual average in the last 28 years *(Lindsay 2021; Climate.gov)*. The study further notes that recent analyses reveals that the rate of sea level rise in the last century was greater than during any preceding century in at least 2,800 years.

In the United States, much of the population lives in relatively high density coastal areas, where sea level plays a role in flooding, shoreline erosion, and other hazards from storms. See also Chapter 1, *Storm Guidance for Historic Communities*. Globally, 8 of the world's 10 largest cities are near a coast, according to the *U.N. Atlas of the Oceans*. The Florida coastline, which has a rich history, draws many residents and is very susceptible to the combined effects of sea level rise and its accompanying negative effects. Future storm surges will be exacerbated by sea level rise nationwide, which can be especially dangerous for the southeast region of Florida that already experiences hurricane-strength storms.

COASTAL AND RIVERINE FLOODING

Inundation due to coastal flooding is associated with severe storms such as hurricanes, tropical storms, and ***nor'easters***, as well as unusually high tides. Flooding and heavy rains can cause total submersion of coastal sites; landforms can be reshaped both horizontally and vertically; and floodwater saturation can destabilize the ground, causing shifting, heaving, or subsidence. Such disturbance and mixing of soil layers can change the position of artifacts at a site, which can destroy site integrity by combining resources from different time periods and cultures. Flooding also leads to soil and artifact displacement, and exposure of cultural material due to undercut shoreline soils and erosion. Once exposed, subsequent floods can undercut coastal banks to the point of failure and collapse, destroying all or part of a site. Additionally, shifting soils increase the risk of site looting after artifacts become exposed.

Standing water can have numerous deleterious effects on certain archaeological resources and artifacts as well. Sites that are preserved because they are dry can degenerate in water. ***Saltwater saturation*** can lead to changes in the pH of buried artifacts and/or buried environments. At interior sites, such as the black earth midden tree island sites of southern Florida, continued exposure to freshwater wet and dry cycles can deplete collagen in faunal bone, which could otherwise be used for radiocarbon dating.

STORM SURGE

Storm surge is an abnormal rise of water generated by a storm, over and above the predicted normal tide. All locations along the U.S. East and Gulf coasts are vulnerable to storm surge, which can extend well inland from the coastline. ***Storm tide*** is the water level rise during a storm due to the combination of storm surge and the normal tide. For example, a

Site erosion with gradual loss of shell material into the adjacent Jupiter Inlet. (Florida Public Archaeology Network)

15 foot storm surge on top of a high tide that is 2 feet above mean sea level results in a 17 foot wave (NPS 2018).

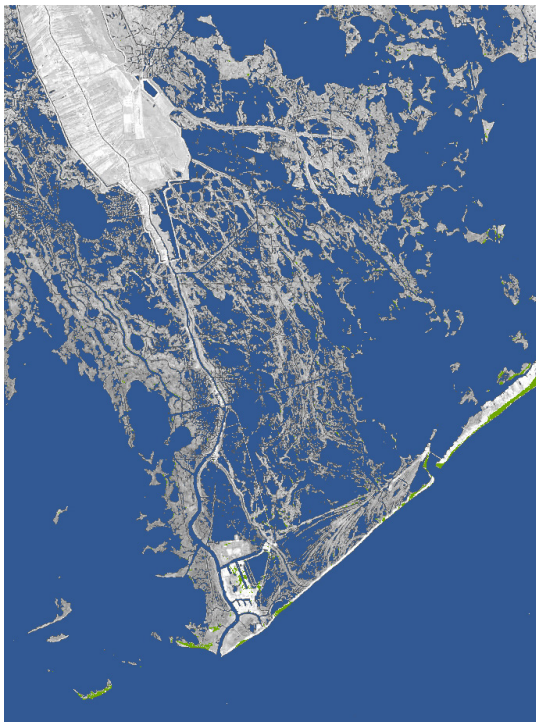
Destruction from storm surge can lead to total site loss and intensified erosion from wave action. Above-ground features at cemeteries can be completely wiped out by a single storm surge, as has occurred in the Florida Keys. Trees are often blown down and uprooted. After a storm surge has ceased, it is important that tree disturbance and uprooting, as well as tree removal during response, recovery, and clean-up be done carefully to avoid additional site impact. Over time, the gradual erosion of a shoreline from storm surge or other wave action can completely remove soil content at a coastal site, exposing subsurface structural remains or historic wells that were once many feet inland and flush to the ground.

SHORELINE EROSION (COASTAL & RIVERINE)

Coastal erosion is the process by which local sea level rise, strong wave action, and coastal flooding combine to wear down or carry away soils, sands, and trees along the coast (see also Shifting Landscapes in Chapter 1). ***Erosion is caused when water moves very quickly or crashes consistently into the coastline*** (e.g., wave action). The water causes the sands, the sediments underneath, and the shell accumulations at coastal shell mounds/middens and other sites to loosen. These deposits then become dislodged, which causes them to wash away as coastal bluffs literally fall away from the land.

The *Florida Administrative Code* (F.A.C.), defines ***"critically eroded shoreline"*** as ***"a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost."*** In *Critically Eroded Beaches in Florida* (2021), an inventory of Florida's erosion-threatened areas is provided for the 825

Southern Louisiana land mass recorded in 1932. (National Oceanic and Atmospheric Administration)



Southern Louisiana land mass recorded in 2011. (National Oceanic and Atmospheric Administration)

miles of sandy beaches fronting the Atlantic Ocean, Straits of Florida, Gulf of Mexico and the roughly 66 coastal barrier tidal inlets. The entire coastline is shown on a statewide map as well as on enlarged individual maps showing segments throughout the state. The report is periodically updated to include additions and deletions. *(www.floridadep.gov)*

Many factors contribute to the loss of a shoreline, such as whether areas are armored; the presence or absence of breakwaters, such as jetties; the direction of water movement toward the shore; the composition of the soils and cultural deposits; and the presence or absence of vegetative covering.

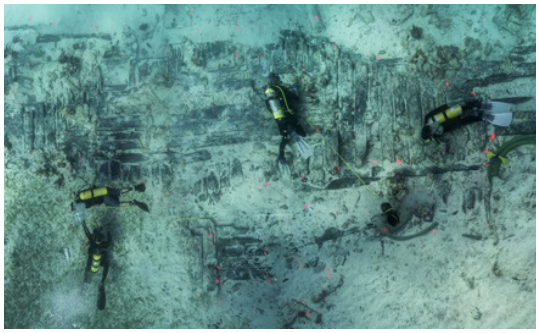
Shoreline erosion can lead to partial or full loss of coastal sites and artifacts; the exposure of new and known archaeological sites; and increased risk of site looting after artifacts are exposed due to erosion of surface soils.

INCREASED PRECIPITATION

Increased precipitation due to heavier rain, storms that are stationary for a long period of time, and frequent flooding events, can be anticipated as a result of severe weather. Increased precipitation saturates the ground for longer periods of time and can contribute to flash flooding and scouring (see also *Climate Change and Severe Storms* in Chapter 1). Floodwater saturation can destabilize the ground, causing shifting, heaving, or subsidence that can adversely affect archaeological sites.

EFFECTS ON SUBMERGED SITES

Tidal events can uncover once buried shipwrecks and expose them to environmental erosion.



Aerial view showing divers on the wreckage site of the HMS Fowey. (National Park Service)

Underwater archaeological sites along coastlines are subject to frequent episodes of being covered and uncovered by alternating processes of sedimentation and erosion. Hurricane and strong storm impacts can speed up these processes through increased wave action and higher high tides. ***The effects of erosion and sedimentation on submerged or intertidal sites can be either positive (when a previously exposed site becomes buried and protected) or negative (when a once-buried site becomes exposed).***

Following Hurricane Irma, a damage assessment of shipwreck sites was conducted by the National Park Service (NPS) at Biscayne National Park. Of the shipwreck sites that were evaluated, the primary impacts were erosion of protective sands/sediments, abrasion and scouring of site components, exposure of artifacts and site features, artifact movement, and an increased threat of site looting.

Once submerged, shipwrecks and other underwater archaeological sites become part of an underwater environment that can include coral reefs, seagrass meadows, and periodic shifting sand. Underwater plant species act as stabilizers for underwater archaeological sites, as does protective sand. When this rich marine environment is washed away by storms, the protective yet fragile armoring they provide is destroyed.

One example of this is the HMS Fowey shipwreck located within the boundaries of Biscayne National Park in southeast Florida. An 18th century British Man-of-War ship, HMS Fowey wrecked in 1748 when she ran aground. The otherwise stable wreck experiences significant seagrass erosion since its discovery that has led to increased site

exposure, making it even more susceptible to continued human and natural damage. Cultural resource managers with the NPS try to stabilize the site by reburying it and/or planting seagrass but these efforts have largely been unsuccessful. If climate change-driven storms increase in severity and frequency, options for preserving sites like HMS Fowey become limited.

EFFECTS ON CEMETERIES

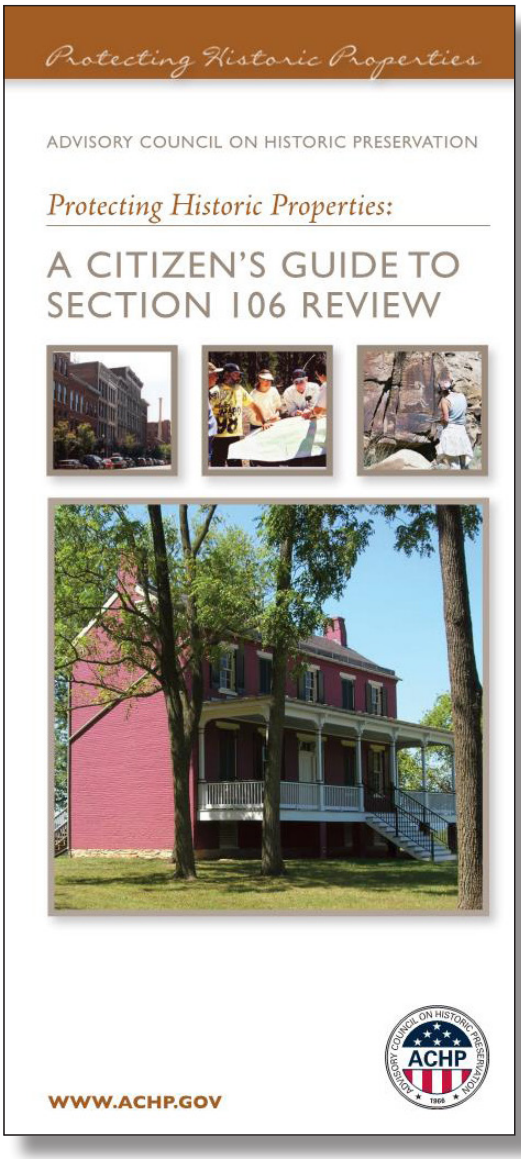
Cemeteries can be affected by flooding and damage from high winds and water; particularly considering the soft sands and clay soils in Florida. In flood-prone locations where burials are in above ground vaults, advancing floodwaters can carry caskets away or displace headstones. In other areas, underground caskets that damaged or not airtight can fill with water and burst open. Also, a rising water table can cause burials to fill from below the surface. Finally, flood waters are not always just water – they can contain sewage, toxic waste, and other contaminants. Flood waters may also contain large amounts of salt that can damage headstones and kill vegetation.

One common impact to cemeteries from storm surge and flooding occurs when trash, fallen tree limbs, downed trees, other debris, and materials that are displaced float into the cemetery. At the same time, strong winds can uproot trees or cause large tree segments snap off and fall on gravestones, standing markers, and monuments. Like many older cemeteries in Florida, sprawling, Spanish-moss laden branches are particularly vulnerable and that periodic trimming of all vegetation is recommended.

Cemetery cleanup after a storm is necessary to assess damages, but this can also cause damage if not done carefully. Removing fallen trees can often require the use of heavy equipment, which should not involve large and/or tracked vehicles that would tear up the ground surface, especially when the ground is wet. Cutting up large trees into smaller segments and moving them to one location can help in removing debris while limiting the use of large machinery. When necessary, steel plates can be placed on the ground to identify a safe route. Routine tree trimming can also serve as a mitigation measure before storms, both by clearing out dead limbs and providing vehicle access during future debris removal.

Some cemeteries in Florida use above ground vaults.

Felled trees can cause severe damage to above and below ground resources in a cemetery.



The Advisory Council on Historic Preservation is the federal agency responsible for Section 106.

The construction of a new seawall in St. Augustine required compliance with federal preservation legislation. (City of St. Augustine)

SITE LEGISLATION & MANAGEMENT

ARCHAEOLOGICAL SITE LEGISLATION

The primary legal authorities on the federal and state levels are Section 106 of the National Historic Preservation Act (NHPA), as implemented by *36 CFR Part 800, Chapter 267, Florida Statutes* (F.S.), and *Rule 1A-46, Florida Administrative Code. Section 106 of the NHPA* requires that every Federal agency "take into account" how each agency undertaking could affect historic resources (refer to Federal Level Management, page D24). The intent of *F.S. Chapter 267* is to establish regulations and to foster quality assurance through the standardization of work and reporting requirements. At least twenty Florida Statutes contain provisions pertaining to historic preservation. Florida's historic preservation policy includes identification, evaluation, registration, protection, enhancement, and education. In the following sections, this document deals with the assessment and protection of archaeological sites at risk from storms, flooding, and sea level rise by identifying the roles and responsibilities of federal, state, and local levels of government.

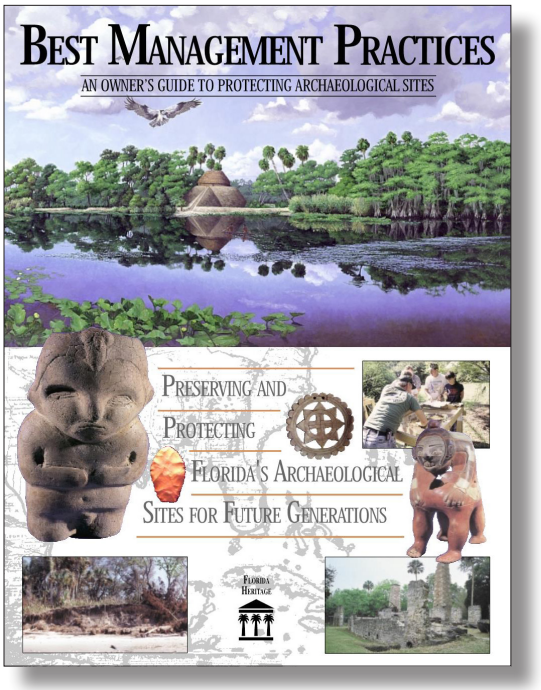
FEDERAL REGULATIONS & GUIDELINES

- *The Antiquities Act of 1906* - the first federal law that provided protection for cultural and historic resources.
- *The National Historic Preservation Act of 1966, as Amended* - (NHPA) establishes a program that furthered the preservation of additional historic properties throughout the United States.

- *Section 101 (c)(1) of NHPA, Certified Local Government Program* - (CLG) rovides a mechanism for certification of local governments by the State Historic Preservation Officer (SHPO) to receive matching grants to designate and protect historical resources if a qualified local preservation review commission is established. It makes historic preservation a public policy through a governmental partnership.
- *Section 106 of NHPA* - Under Section 106, federal agencies are required to consider the consequences of their activities on historic properties and allow the Advisory Council on Historic Preservation to consult on the issue.
- *Archaeological Resources Protection Act (ARPA) of 1979* - intended to protect archaeological and cultural resources on public and Indian lands for future generations.
- *Native American Graves Protection and Repatriation Act (NAGPRA) of 1990* - in the treatment of Native American remains and funerary goods, NAGPRA gives the rights to Native American descendants.
- *Professional Qualification Standards, 1983* - (48 FR 44716)
- *Standards and Guidelines for Archeology and Historic Preservation* (as amended and annotated by the National Park Service)
- *Standards for the Treatment of Historic Properties, 1995*
- *Marine Protection, Research, and Sanctuaries Act, 1972* - authorizes the National Oceanic and Atmospheric Administration (NOAA) to designate sanctuaries in U.S. waters, and to manage and protect them. NOAA does this in partnership with the Florida Department of State.
- *Abandoned Shipwreck Act, 1988* –gives title to shipwrecks in state waters to the respective states, managed by the Department of State Bureau of Archaeological Resources)

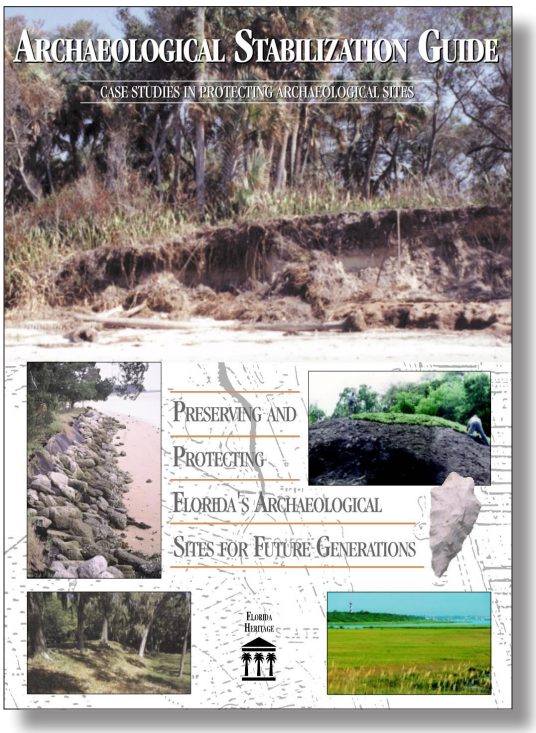
STATE REGULATIONS AND GUIDELINES

- *Chapter 1A-40, Florida Administrative Code, Administration of Permanent Collections*
- *Chapter 1A-46, Florida Administrative Code, Archaeological Reports Standards and Guidelines*.
- *Chapter 253, Florida Statutes, State Lands* – Establishes the Land Management Advisory Committee, including the Secretary of State, and authorizes the Governor and Cabinet to protect and preserve archaeological sites located on state lands.
- *Chapter 258, Florida Statutes, State Parks and Preserves* – Charges the Division of Recreation and Parks with the responsibility "to provide for the perpetual preservation of historic sites and memorials of statewide significance…"
- *Chapter 267, Florida Statutes, Florida Historical Resources Act* – Provides for review by the Division of Historical Resources of any undertaking that will affect the integrity of historical, architectural, or archaeological sites on state lands.



Florida Division of Historical Resources

- *Chapter 267.011 – 174, Florida Statutes, Florida Historical Resources Act* – emphasizes the state's responsibility to protect underwater sites, including but not limited to, sunken or abandoned shipwrecks, engineering works, treasure trove, artifacts or other objects of historical or archaeological value.
- *Chapter 187.201(18), Florida Statutes, State Comprehensive Plan* – Ensures the identification, evaluation, and protection of archaeological and historic resources and properties of the state's diverse ethnic population.
- *Chapter 872.05, Florida Statutes, Offenses Concerning Dead Bodies and Graves* – ensures that all human burials be treated with proper respect and dignity regardless of the background of the individual and the location of the site.
- *Florida DHR Guidelines for Use by Historic Preservation Professionals, Module 3* - Module Three contains guidelines for the identification, evaluation, recordation, and treatment of cultural resources for use by historic preservation professionals conducting work in compliance with federal, state, and local laws, rules, and regulations.
- *Management Procedures and Guidelines for Archaeological and Historical Sites and Properties on State-owned or Controlled Lands*
- *Performance Standards for Submerged Remote Sensing Surveys*
- *Seminole Tribe of Florida's Cultural Resource Ordinance, 2013* – the CRO was adopted by the tribal council in 2013 and approved by the Advisory Council on Historic Preservation in 2016. It allows the tribe to take control of all cultural resources within reservation lands.



Florida Division of Historical Resources

LOCAL REGULATIONS

In Florida, direct regulation of activity affecting archaeological sites may occur at the level of municipal or county government, or both. As a resource, the first point of contact should be the Certified Local Government program if there is one in the local municipality or county (refer to page D28). Contacts are available on the website of the Florida Division of Historical Resources. Another resource, although not as regularly updated, is the Florida Preservation Atlas that is a directory of Florida's local historic preservation programs with links to local archaeological site protections (*floridapreservationatlas.usf.edu*).

A number of communities include historic preservation in their comprehensive plans, although that component is not a requirement or specified in the state statutes. Florida law does not mandate local historic preservation programs. Discretion is given to the municipality in terms of how a local historic preservation plan is written and formatted. Other sections of required Comprehensive Plan elements, including the Future Land Use and Housing, do require consideration of historic resources, however.

Examples of local regulations can be found by directly consulting local codes of regulations. Some local governments have inserted directives and penalties for impacting known sites within their codes regarding land development, while others have broadened their regulations to

include any areas designated as a site probability zone. ***Certificates to Dig or Certificates of Appropriateness may be required.*** Local regulations and codes may also include a specific archaeological ordinance that addresses a range of protection measures and staff positions, as in St. Augustine, or they may contain other directives and approaches to the protection and preservation of archaeological sites.

ARCHAEOLOGICAL SITE MANAGEMENT

As part of this study, an analysis of current measures for the protection of archaeological sites at the federal, state, and local levels was performed to convey how they are connected and how they can be improved. Sources that were reviewed include local Hazard Mitigation Plans; Emergency Management Plans; Comprehensive Plans; Historic Preservation Plans; scientific data related to sea level rise and subsidence; and evaluations of the impact of flooding on archaeological and underwater sites and cemeteries. Partners at state and local levels are offered that can help in preservation efforts.

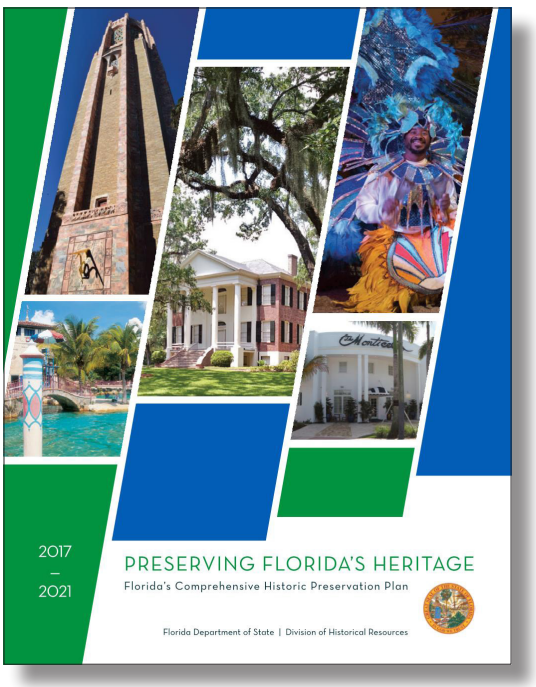
In the last two decades, the concern for losing irreplaceable archaeological sites stimulated a proliferation of guidance from Federal and state agencies, scientists, and a range of cultural resource professionals. In Florida, the NPS is a leader in addressing site mitigation efforts through site stabilization efforts. Relevant publications are provided in the bibliography to provide a basis for understanding how natural hazards affect sites and how management concerns are being addressed.

FEDERAL LEVEL MANAGEMENT

The U.S. Department of the Interior protects and manages the nation's cultural heritage and natural resources and is led by the Secretary of the Interior, a cabinet official. The Department provides scientific and other information about those resources and honors its trust responsibilities or special commitments to Native American peoples. With passage of the *National Historic Preservation Act* (NHPA) in 1966, the federal government embarked on a new era of leadership in the preservation of historic properties. Under Section 106 of NHPA, federal agencies are required to consider the consequences of their activities on historic properties and allow the Advisory Council on Historic Preservation (ACHP) to be a consulting party. Along with other responsibilities, the ACHP is the federal entity responsible for administering the Section 106 process.

Federal involvement in historic preservation in Florida dates back to 1916, when money was appropriated for the restoration of Fort Matanzas and the Castillo de San Marcos in St. Augustine (both managed by National Park Service). That was the first time federal money was used to preserve a historic resource. Both resources were declared National Monuments in 1924 and are under the management of NPS since 1933.

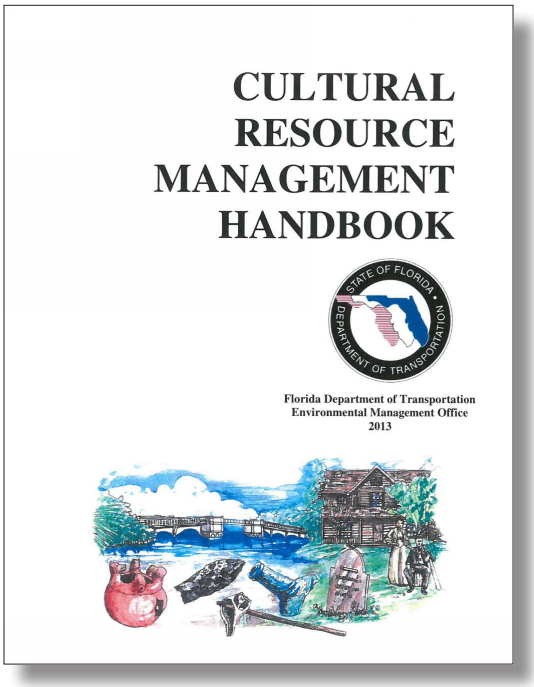
The federal government addresses cultural resources throughout the National Planning Frameworks. The National Response Framework (NRF) serves as the model for Florida's Comprehensive Emergency Management Plan. As a major landholder in Florida, the federal government manages many of the state's historic and archaeological



Florida Division of Historical Resources

resources; some agencies involved include the Department of the Interior (National Park Service), which oversees the national historic preservation program and manages 11 National Park units in Florida; the National Aeronautics and Space Administration (NASA); the Department of Agriculture (U.S. Forest Service); the Federal Highway Administration; the Department of Defense, and the Department of Homeland Security (specifically the U.S. Coast Guard). Management plans for federal lands are prepared regularly. ***In terms of military landholdings, all military facilities are required to have an Integrated Cultural Resources Management Plan (ICRMP) by the Department of Defense.***

Cultural Resources Management Plans, sometimes called Historic Properties Management Plans (HPMPs), provide an organizational and regulatory framework for managing cultural resources and historic properties. Federal and state agencies improved their response to legislative mandates and management priorities through the years. Archaeological sites are included in federal and state studies of risk assessment and hazard mitigation more frequently now in response to significant risks from the increasing and intensifying crisis brought on by coastal storms. Many studies identify the need to assess, predict, and record the damage from coastal events. ***The challenge is to move into the next phase beyond identifying vulnerabilities to take action to prioritize, extract significant information, and protect salvage sites facing imminent loss.***



Florida Department of Transportation

STATE LEVEL MANAGEMENT

Federal laws fostered the growth of state historic preservation programs and promoted private sector preservation activities. The Florida Department of State is the state's agency responsible for historic preservation programs. The State Historic Preservation Officer (SHPO) is a critical leader that carries out many responsibilities in historic preservation, as authorized by the NHPA. Surveying, evaluating, and nominating significant historic buildings, sites, structures, districts, and objects to the National Register are all important program components. The Director of the Division of Historical Resources (DHR) is the SHPO, who serves as the liaison with the national historic preservation program of the National Park Service. The Division is headquartered in Tallahassee and comprises three bureaus -- the Bureau of Historic Preservation, the Bureau of Archaeological Research, and the Bureau of Historical Museums. The Division provides a multitude of information on all types of archaeological sites and all aspects of site preservation (*www.flheritage.com*). The DHR also has a *Management Plan for Florida's Submerged Cultural Resources* (1994).

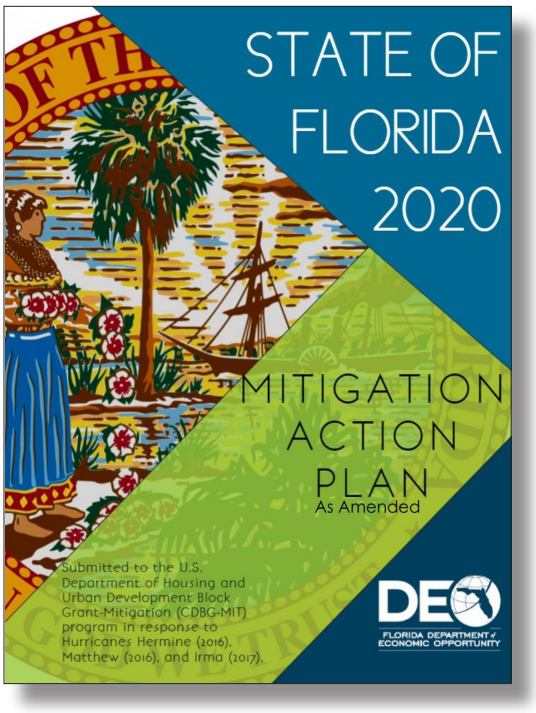
The Florida Constitution mandates a state level, long-range comprehensive plan anticipating how state and local governments will accommodate growth through the future use of land, development of necessary infrastructure, and the protection of cultural resources. Every five years, the Division of Historical Resources revises their own *Florida Statewide Comprehensive Historic Preservation Plan*, as required for Florida to remain a participant in the federal historic preservation program and to receive federal historic preservation funds. The most recent state plan covered the years 2017-2021.

The Florida Division of Emergency Management (DEM) adopted numerous plans related to hazard mitigation. Of significance are the *Comprehensive Emergency Management Plan* (CEMP) and the *Enhanced Hazard Mitigation Plan* (EHMP). The CEMP outlines the state's planned response to emergencies, whereas the EHMP supports the CEMP by providing additional information that includes a hazard assessment. Florida's CEMP gives little attention to cultural resources or historic properties. The only mention of cultural resources is to identify where personnel with expertise in natural and cultural resources and historic preservation fall in the hierarchy of a joint field office during an emergency. The current *Florida Enhanced State Hazard Mitigation Plan* (SHMP) is approved until 2023. This plan is intended to reduce death, injuries, and property losses caused by natural hazards in Florida (see *www.floridadisaster.org*)

The Florida Department of Transportation (FDOT) published a document entitled *Cultural Resource Management Handbook* (2004) in which Chapter 9 deals specifically with Archaeological Mitigation Alternatives. Avoidance and minimization alternatives are considered as the first and preferred option, with archaeological excavation as the last resort.

Through the *Florida Resilient Coastlines Program, the Florida Department of Environmental Protection* (DEP) increases collaboration among Florida's coastal communities and offers technical assistance and funding to coastal communities. Under this program local communities can assess vulnerabilities and develop strategies to increase the resiliency of coastal areas. Protecting and strengthening natural infrastructure can help; in fact, coral reefs, mangroves, oyster reefs, and marshes are the coasts' first lines of defense. DEP's Office of Resilience and Coastal Protection is prepared to help prepare Florida's communities and habitats for changes resulting from sea level rise by 1) providing funding and technical assistance to prepare Florida's coastal communities (e.g., constructing or raising seawalls), and 2) ***continuing to promote and ensure a coordinated approach to sea level rise planning among state, regional, and local agencies.***

The *Archaeological Resource Management (ARM) Training Course* introduces state land managers to the nature of archaeological resources, Florida archaeology, and the role of the Division in managing state-owned archaeological resources. Participants gain a better understanding of the requirements of state and federal laws with regard to protecting and managing archaeological sites on state managed lands. Participants also receive a certificate recognizing their ability to conduct limited monitoring activities in accordance with the Division's Review Procedure, thereby reducing the time and money spent to understand and comply with state regulations.



Florida Department of Economic Opportunity

STATE OWNED PROPERTY PLANNING

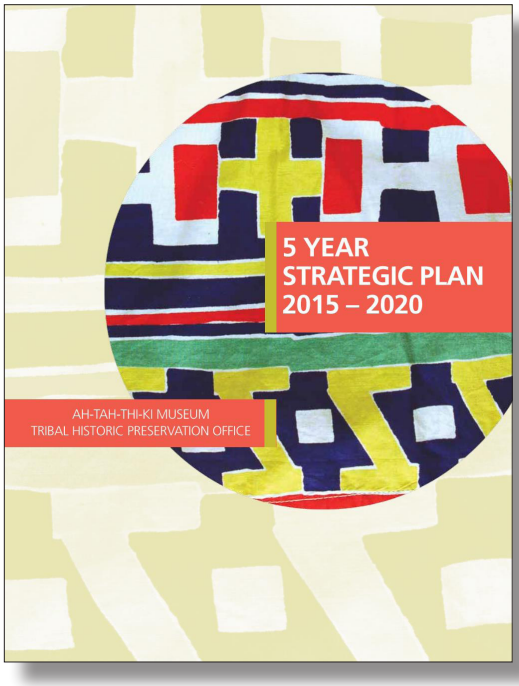
State law requires that all state agencies to locate, inventory, and evaluate cultural resources that are eligible for listing in the National Register of Historic Places. ***The mission of the Florida Park Service is to provide resource-based recreation while preserving, interpreting, and restoring natural and cultural resources including archaeological sites and structures.*** Each state park, state forest, public land holding, or

state trail has a unit management plan that is reviewed every 10 years and forms the basis for all aspects of planning, development, and management of a given park. In the plan, sites are discussed with regard to NRHP significance, condition, and recommended treatment measures (restoration, stabilization, preservation, and removal). Further site assessments are recommended as needed. Management procedures for archaeological and historical sites and properties on state- owned or controlled properties were revised June 2021.

LOCAL LEVEL MANAGEMENT

Florida statutes require that each of Florida's local governments adopt a comprehensive plan that is consistent with the state comprehensive plan, but federal or state law does not mandate local historic preservation programs. While the ***Florida Comprehensive Planning Act*** allows discretion in how a local plan is written and formatted, it states that these are typically expressed in goals, objectives, policies, and strategies. ***Given the increasing frequency and intensity of storms and the threats from sea level rise, residents of coastal communities are learning that comprehensive planning must include consideration of these effects, which are destroying many archaeological sites.***

Florida law specifically requires that comprehensive plans to be organized by elements, or subject matter, and requires plans to include several elements. Local governments abutting the Gulf of Mexico or the Atlantic Ocean, or that include or are contiguous to waters of the state, are required to include a ***Coastal Management Element*** in their comprehensive plan. The coastal management element is to guide each local government's actions to "[p]reserve historic and archaeological resources, which include the sensitive adaptive use of these resources."



Seminole Tribe of Florida

In terms of policy making, Florida statutes permit local governments with a Coastal Management Element to adopt an ***Adaptation Action Area*** (AAA), which identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising seas. ***Such a designation can assist a local government in prioritizing resources for adaptation planning, prioritizing protection of threatened cultural resources, and in consolidating data and plans related to a community's response to coastal flooding.***

Prior to 2011, Florida statutes specifically listed historic preservation as an optional element, and a number of communities have included it in their comprehensive plans. Communities still have the option of including this element even though it is no longer named in the state statutes and can include a variety of goals and objectives that promote hazard mitigation and encourage disaster planning for cultural resources. Many local governments may have a historic preservation ordinance, regardless of whether there is a specific element addressing cultural resources in the comprehensive plan. Regardless of whether a local government adopts an optional element or sub-element addressing culturing resources and promoting mitigation, ***consideration of cultural resources can be included as a goal, objective, or policy***, especially with regard to land use.

A USACE Colonel and a staff archaeologist discuss archaeological processes in the Everglades.

Florida Public Archaeology Network Heritage Monitoring Scouts

Certified Local Governments (CLGs):

The Certified Local Government (CLG) program was enacted as part of the NHPA Amendments of 1980. The program links three levels of government, -- federal, state, and local, into a preservation partnership for the identification, evaluation and protection of historic properties and archaeological sites. ***Designation as a certified local government, either as a municipality or a county, makes historic preservation a public policy through passage of a historic preservation ordinance.*** The ordinance establishes a historic preservation board to develop and oversee the functions of its program. Florida's Certified Local Governments are also eligible to apply for special matching grants from the Bureau of Historic Preservation to assist their preservation programs. Per Federal regulations, communities that participate in the CLG program are automatically prioritized for funding allocations annually from the DHR.

National Park Service

ARCHAEOLOGICAL PARTNERS

FEDERAL LEVEL PARTNERS

United States Army Corps of Engineers (USACE):

Under Section 106 authority, USACE reviews wetland, fill, and other permits to ensure the proper identification and management of cultural resources on public and private lands within their jurisdiction. In addition to identifying sites, these permits can result in the preservation and mitigation of impacts on cultural resource sites. The USACE works with the state to develop appropriate conservation or mitigation plans and strategies, along with the THPO and ACHP as necessary.

Federal Emergency Management Agency (FEMA)

The Environmental and Historic Preservation review is the FEMA's process for ensuring the protection and enhancement of environmental, historic, and cultural resources, as required by Federal environmental and historic preservation laws and Executive Orders. Resource management includes activities related to recovery efforts and mitigation against future damage to cultural resources.

Advisory Council on Historic Preservation (ACHP)

When there is significant public controversy, or if the project will have substantial effects on important historic properties, the ACHP may elect to participate directly in a Section 106 consultation. The ACHP may also get involved if important policy questions are raised, procedural problems arise, or if there are issues of concern to Indian tribes or Native Hawaiian organizations. Whether or not the ACHP becomes involved in consultation, the ACHP can provide guidance, advice, or technical assistance. Regardless of the scale of the project or the magnitude of its effects, the ACHP may assist with dispute resolution and advise on the Section 106 review process.

STATE LEVEL PARTNERS

Regional Florida Water Management Districts

Manage thousands of acres of land that include important cultural resources and they sponsor archaeological identification efforts to manage the resource.

Florida Public Archaeology Network (FPAN)

Assists DHR using a network of regional centers around the state, *(www.fpan.us)*. Their mission is to promote and facilitate the stewardship, public appreciation, and value of Florida's archaeological heritage through regional centers, partnerships, and community engagement. Since the 2016 launch of the *Heritage Monitoring Scouts* (HMS) Florida Program, FPAN has been a leader in archaeological site monitoring. HMS is a statewide, public engagement program focused on tracking changes to archaeological sites at risk, particularly those impacted by climate change in the form of erosion and sea level rise (Miller et al. 2021). Site assessment information, such as verifying site location, assessing and reporting site conditions, noting artifacts observed on the surface, and making recommendations for future visits, are recorded in an online portal and geodatabase management system called the *HMS Florida Arches Database*, which is built on Arches (*www.archesproject.org*), an open-source online cataloguing system. The HMS program trains citizen "scouts" to accompany and assist FPAN archaeologists in site monitoring fieldtrips.

FPAN often partners with other organizations to develop education and outreach strategies related to archaeological research. In partnership with the Florida Division of Historical Resource's Bureau of Archaeological Research, the Florida Historic Cemetery Inventory helps ensure these often-forgotten but important historic sites are recorded. FPAN has also developed a *Cemetery Resource Protection Training* (CRPT) to preserve historic cemeteries and human burial sites. The *Shipwreck Tagging Archaeological Management Program* (STAMP) is a public engagement program focused on documenting and monitoring shipwreck sites and disarticulated shipwreck timbers along Florida's coasts. FPAN also leads and participates in public and professional outreach, including the Tidally United Summit held periodically to enable paper presentations and discussion on Heritage at Risk. The *North American Heritage at Risk* (NAHAR) website (*www.nahar.hcommons.org*) hosts past and future talks as well as resources related to HMS Florida and other states. In a 2019 FPAN conference, archaeologists established the *Coastal Heritage at Risk Task Force* (CHART) to look at the issue on a statewide level.

St. Augustine Lighthouse Archaeological Maritime Program (LAMP)

Founded in 1999, the St. Augustine Lighthouse & Maritime Museum research program conducts research and maritime archaeology to better understand and share 500 Years of Maritime Heritage in the State of Florida. Museum archaeologists survey inland and offshore waters to discover new shipwrecks and other submerged sites, investigate both underwater and terrestrial sites, and

ARCHAEOLOGICAL PARTNERS (CONTINUED)

monitor known sites for any damage or changes (such as storm damage). Maritime archaeology education and training opportunities are available for volunteers, university students, and professionals and include an underwater field school, training workshops, and scientific diving training. Archaeologists share their work directly with the public through speaking engagements and a host of educational programs, presentations, tours, and exhibitions. Volunteers are included in every phase of the work from driving the research vessel to working in the laboratory.

As a model for other segments/counties along the Florida coast, LAMP developed the *St. Johns County Submerged Cultural Resources Inventory and Management Plan* (2019). The goal of this substantive research project was to assess and interpret the historical maritime landscape of St. Johns County, to create an inventory of maritime archaeological sites, and to develop a management plan that would be applicable to other Florida counties (refer to *www.staugustinelighthouse.org*).

Florida Anthropological Society

Founded in 1947, the main objective of the Florida Anthropological Society (FAS) is to provide a formal means by which individuals interested in anthropological and archaeological studies in Florida may come together. FAS is made up of 13 chapters located around the state, which provide public engagement in archaeology and anthropology. The chapters and their members bring attention to the ongoing need for preservation of archaeological and historical sites. Through special events, chapter meetings, speaker presentations, public education programs, and the Society's professional publications, FAS educates the public about the people, places, and cultures of the past in Florida. Membership in the Florida Anthropological Society supports public education initiatives statewide including an annual conference, student grants, and Florida Archaeology Month materials. Anyone can join *(fasweb.org)*.

Seminole Tribal Historic Preservation Office (THPO):

Approximately 3,100 members of the Seminole Tribe of Florida live in South Florida on seven reservations: Big Cypress, Brighton, Coconut Creek, Fort Pierce, Hollywood, Immokalee, and Tampa; encompassing approximately 90,000 acres of land. A major triumph for the preservation of Florida's historical resources was the establishment of the Seminole Tribal Historic Preservation Office in November 2006.

Since then, the Tribal Historic Preservation Officer (THPO) has overseen the growth of the Tribe's cultural resources in its Tribal Register. A THPO is officially designated by a federally recognized Native American tribe to direct a program approved by the NPS and assumes some or all of the functions of a SHPO on Tribal lands. This program was made possible by the provisions of *Section 101(d)(2) of the National Historic Preservation Act*. Incorporating Tribal cultural values into the state's historic preservation program is a priority for the just recognition of the significant role the Tribes have in shaping Florida, and America's, natural history.

In 2019, the THPO was awarded a $400,000 grant from NPS to determine the impact of Hurricane Irma on Seminole Reservation lands. Recently, the THPO of the Seminole Tribe was a discussant at the 2021 Tidally United Summit. The Tribal Archaeology Section (TAS) is one facet of the Tribal Historic Preservation Office and is responsible for conducting archaeology by following the tenets and wishes of the Seminole Tribe. The DHR Compliance Review Section is responsible for the review of federal undertakings located within the Seminole Tribe of Florida's area of interest – the geographic area considered by the Seminole Tribe of Florida to be ancestral, aboriginal, or ceded, that comprise the Southeastern United States, and its six reservations within the State of Florida. The Compliance Review Section assists the Tribal Historic Preservation Officer to ensure compliance with *Section 106 of the National Historic Preservation Act* (NHPA), the *Native American Graves Protection and Repatriation Act* (NAGPRA), and the Archaeological Resource Protection Act (ARPA) through government-to-government consultations. A growing staff of archaeologists is doing their part to protect sites on tribal land led by the administration of the Seminole Tribe of Florida (STOF).

With the assistance of the U.S. Army Corps of Engineers (USACE) Tribal Liaison from the Jacksonville District, representatives of both the Seminole and Miccosukee tribes were asked if they were interested in contributing to this study to ensure that a Tribal voice was heard. No responses were received. However, their office is developing research related to the affects of climate change within their society. Results of that work will provide a perspective of their priorities in adapting to climate change.

Egmont Key is a National Register site known as a military post spanning 1842 through 1921. (Florida Memory, ca. 1900)

PRIORITIZING SITES BY NRHP SIGNIFICANCE

Egmont Key superimposed with its earlier shorelines. Estimates based on the 1877 survey note that less than half the land mass remains above water.

Equipped with the framework for cultural resource management and the vulnerability of sites to the effects of flooding and storm events, one of the tools for prioritizing action may also be based on significance. Using this method is a means to provide objective information to the community when evaluating mitigation programs that could benefit cultural resources. Other factors could include whether or not the site is stewarded by a public entity and/or has the capacity to serve as an educational tool for private landowners. Each community will make its own determination of which assets are essential and important to preserve.

The standards for archaeological site significance in Florida are established in the criteria of the National Register of Historic Places (NRHP). Evaluations of site significance are offered by archaeologists when they complete an archaeological report based on their work on a given project and a completed Florida Master Site File Site Form is included. When submitted to DHR's Compliance and Review section, the office of the State Historic Preservation Officer may concur with the evaluation or assign their own evaluation.

Most archaeological sites are recommended eligible to the NRHP under Criterion D, the potential to "yield information important in prehistory and history." *(Refer to National Register Criteria, sidebar, page D5.)* To strengthen the understanding of this potential, the following considerations are useful in defining "important" information:

1. **Site Integrity:** Does the site contain intact cultural deposits or is it disturbed?
2. **Preservation:** Does the site contain material suited to in-depth analysis and/or absolute dating such as preserved features, botanical material, faunal remains, or human skeletal remains?

3. **Uniqueness:** Is the information redundant in comparison to that available from similar sites, or do the remains provide a unique or insightful perspective on research concerns of regional importance?
4. **Relevance to Current and Future Research:** Would additional work at this site contribute to our knowledge of the past? Would preservation of the site protect valuable information for future studies? While this category is partly a summary of the above considerations, it also recognizes that a site may provide valuable information regardless of its integrity, preservation, or uniqueness.

SITE SIGNIFICANCE

SITES WITH A HIGH LEVEL OF SIGNIFICANCE

By definition, these sites have integrity and represent the greatest potential for containing significant information. As such, some may require periodic monitoring to assess their stability into the future or take further mitigate actions. Coastal shell middens and other sites along bluffs in high-energy zones judged to have a high level of significance should always be monitored/revisited to assess current site condition and maintain site stability to the greatest extent possible. To ensure site protection from coastal hazards, the range of site mitigation options should be considered, with all such work conducted in keeping with Section 106 of the National Historic Preservation Act.

SITES WITH A MODERATE LEVEL OF SIGNIFICANCE

These sites could not be fully evaluated by SHPO due to "Insufficient Data" or "No Information." This can be the case because of limited subsurface testing or because only a portion of a large site was investigated for archaeological resources and defined (by size, integrity, depth, cultural context[s], etc.). The remainder of the site would need to be investigated to assess its significance. Additional shovel testing or strategic excavations could provide enough data to make a more defined evaluation of significance.

Decisions on archaeological site significance are data-driven and depend on the information available given on the site's FMSF form. Therefore, with additional information or research, site eligibility could change. As the site ages, more information could also be gathered as a result of other scholarly work. Some sites have resource forms that are decades old and if they are higher risk sites they may need to be prioritized for re-evaluation or investigation. One example is the Higgs Site in Indian River County, last investigated during the 1940s, which was recorded along an eroded dune that may no longer be present due to coastal storm effects. There are numerous other sites for which only a decades-old version of the FMSF form with incomplete and/or unreliable data is all that is available; many of the gaps that characterize sites in the moderate significance category should be addressed. Data gaps are not unique to sites labeled 'insufficient information' for eligibility recommendation. Similar issues exist for currently identified high and low significance sites.

ASSESSING SIGNIFICANCE

When a local government is seeking to determine significance levels for all known archaeological sites in their city, historic district, municipality, county, or multi-jurisdictional coalition there are some simple steps to follow. Importantly, the trained specialists at DHR and FMSF are always available to assist. First, the Historic Preservation Planner (HPP), in coordination with the GIS Database Specialist, should contact DHR/FMSF to identify the boundaries of the study area(s) and request guidance in order to:

- Obtain site locations in GIS for the study area (access to these should be very limited)
- Obtain FMSF forms for the sites within the area in question.
- Look at each site's FMSF form and assess form content for completeness.

With these data in hand the HPP and staff can look at the FMSF forms and determine how many sites have been evaluated for NRHP significance by SHPO. That will provide a starting point for ranking all the sites in the study area. If a Local Register of sites exists, incorporate those locations and associated documentation into ongoing efforts. If the local government has a designated Historic District(s), the district is itself a site with smaller, individual "subsites" within it.

Based on the information provided by archaeologists to SHPO, the significance categories on the FMSF form include and are ranked as follows:

High Significance:

- **NRHP Eligible or Potentially Eligible** (both are considered Eligible in the DHR database)
- **Potentially NRHP Eligible Individually**
- **Potentially NRHP Eligible as a Contributor to an NRHP District**

Moderate Significance:

- **Insufficient Information to Make a Determination**
- **No Information** (blank line on the site form)

Low Significance:

- **Not NRHP Eligible**

Overhead view of Mission San Luis National Historic Landmark in 2007, prior to the reconstruction of the fort. (Florida Memory)

Many significant sites in Florida have been managed and preserved through the Florida Park System.

Filling in the Gaps: Archaeological sites can be recorded and submitted to the state by professional archaeologists resulting from required archaeological surveys, excavations, construction monitoring projects; and they can also be submitted by avocational archaeologists, underwater divers, and interested laypersons. The information given to FMSF can be uneven in content, as many forms were not completely filled out, omitting information critical to those trying to understand the significance of those sites today. Also, many sites were mapped using inaccurate "General Vicinity" locations, while the majority were located/mapped prior to the use of Geographic Positioning System (GPS) technology. ***The more incomplete or unreliable the available information is, the more advisable it may be to assume that a site has the potential to be significant until proven otherwise.***

In cases where site data is insufficient in determining NRHP eligibility/ significance it becomes necessary to begin filling those gaps in the present day, and for the long term, through concerted monitoring efforts to begin recovering missing data, where possible. Such an effort could change both the number of (NRHP Eligible) high significance sites in an area as well as those that are not NRHP-eligible and of low significance.

Archaeological monitoring, such as the FPAN Monitoring Scout Program, could fill in some of these gaps to better determine whether a moderate level of significance could be updated to warrant a high or low ranking. Especially with regard to determining if the site is still extant, or mapped correctly, a visit to the site is an achievable goal – either the site is relocated, or it is not and should be considered of low significance. Either

way, site relocation/verification is the first step when updating an old or incomplete FMSF form and adding to current knowledge of the site, recording its exact location utilizing GPS, or even verifying its existence today. Site presence must be determined by one or more professional archaeologists and may depend on the results of subsurface testing.

SITES WITH A LOW LEVEL OF SIGNIFICANCE:

These sites have been determined by SHPO to be not significant at the NRHP level. As such, while each one does contribute to an understanding of settlement patterns by time period, (Paleoindian, Archaic Period, 19th century homesteads, etc.) they do not require additional effort that could instead be devoted to assessing and protecting other, significant sites that are at risk.

Sites that were previously damaged and/or have lost context are usually not significant sites.

VARIABLES TO CONSIDER REGARDING SITE SIGNIFICANCE

Archaeological site significance can vary from city to city based on specific local history, the pre-contact and historic period cultures that were present through time, one-of-a-kind sites unique to a given area, and other local or regional considerations. In order to make such determinations, it is essential to understand the culture history of the area prior to doing fieldwork. Variables that are normally considered by those archaeologists who make significance recommendations include the following, although the SHPO has the ultimate authority in the ranking of each site.

- **Potential:** The extent to which a site is likely to contain valuable information, both above and/or below ground.
- **Rarity:** The extent to which a site is represented by few surviving or known examples (e.g., a Paleoindian period tool, Colonial homestead, African-American settlement, Seminole site).
- **Survival/condition:** The extent to which a site has retained integrity in comparison with others of its type.
- **Documentation:** How much information, historical and archaeological, exists that provides a basis for understanding this site or class of sites.
- **Vulnerability:** The condition and integrity of the site and its susceptibility to deterioration or destruction.
- **Period:** The likely age and duration of site occupation(s) and how does each compare qualitatively with other sites containing similar components.

Toppled trees from Hurricane Ian further disturbed sites such as Smith Mound in southwest Florida.

BEST PRACTICES IN PLANNING

MITIGATION PLANNING

Recent weather events make it clear that coastal archaeological sites are at great risk, and mitigation measures are required for their future protection. Mitigating planning requires determining how to reduce or eliminate loss resulting from known risks. The process is not linear; rather the ideas and solutions developed while assessing risks will require revision as additional information becomes available while goals are implemented. The various disciplines involved in the broad planning process need to collaborate together as local mitigation needs are better understood.

Why should local government engage in the Hazard Mitigation Planning Process?

- It is more cost-effective to assess potential effects from a disaster and to implement preventative measures than to wait for a disaster to strike and then assess actual impacts.
- State and Federal aid is usually insufficient to cover the full extent of physical and economic damages resulting from disasters.
- A surprising amount of disaster damage can be prevented if it is understood where and how hazard impacts may occur.
- The impacts of both natural and manmade hazards can be reduced; response and recovery rates can be increased.
- Tribes, States, and local communities are required to have FEMA-approved hazard mitigation plans in place to qualify for various FEMA grant programs, including the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation Competitive Grant Program (PDM-C).

BEST PRACTICES: STEPS TO ACHIEVING THE GOAL OF LOCAL SITE PRESERVATION

Organize Resources

At the outset, local governments should focus on gathering the resources needed for a successful mitigation process. Essential steps include identifying and organizing interested community members and people with the expertise needed during the planning process. Recruit and organize professional archaeologists, educated nonprofessionals, interested community members, and staff with the technical expertise required in protecting archaeological sites to participate in planning and in following through on mitigation projects.

Utilize Tools

- FEMA (2005) guide - *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning* and 2013 guide - *Local Mitigation Planning Handbook* (2013)
- Florida Department of State (2006) guide -- *Disaster Planning for Florida's Historic Resources*
- University of Florida Levin College of Law (2017, with NPS) guide -- *Protecting Florida's History from Hazards: A Guide to Integrating Cultural Resources into Disaster Planning*

Organize People

- Introduce outreach programs to educate the public and encourage their interest and participation.
- Create a network of both civil service and volunteers willing to monitor the effects of erosion on known sites. This can be facilitated with assistance from the regional FPAN office, preservation groups, Florida Anthropological Society chapters.
- Form local partnerships to incorporate technical, financial, and/or staff resources to aid in all levels of archaeological site protection and mitigation.
- Organize a multi-jurisdictional hazard mitigation plan with adjacent local coastal governments that includes a coordinated, cooperative coastal effort.

Assess Risks and Inventory/Map Archaeological Resources

- Gain a local understanding of the characteristics and potential consequences of coastal hazards, and what the impacts would be to important sites in the community.
- Consult the Florida Master Site File to determine current site locations and descriptions of known sites in the area; incorporate that information into the local GIS data management system and overlay with a map of current tidal zones affected by erosion, flooding, and/or inundation so that sites most in danger will identified.
- Limit knowledge of site locations to a small number of involved parties.

Florida Public Archaeology Network has regional centers across Florida. (FPAN)

Educational outreach should include younger audiences. (FPAN)

Citizen scientists can be trained to participate alongside professional archaeologists. (FPAN)

ARCHAEOLOGICAL SITE MITIGATION OPTIONS

- Preservation in Place
- Archaeological Site Monitoring
- Photogrammetry
- Beach Renourishment
- Intentional Site Burial
- Site Stabilization
- Living Shoreline
- Data Recovery

Take Additional Steps

- Consult with DHR to assist in determining site priority.
- Develop a site ranking/priority system.
- Maintain a current inventory of local archaeological sites eligible for or potentially eligible for listing on the National Register of Historic Places.
- Define areas that represent High, Medium, and Low site probability for containing archaeological sites; to accomplish this, create a historic preservation specialist and/or professional archaeologist position at the local or county government level to oversee the process.

Develop a Mitigation Plan

- Once an understanding of risks to local cultural resources is developed, local governments need to determine priorities and develop ways to avoid or minimize impacts to sites from hazards. This can contribute to the community's hazard mitigation plan and possible strategies for application of archaeological site mitigation options.
- Determine how site mitigation may be integrated into existing preservation regulations and budgeting. In terms of archaeological sites, mitigation is defined as either the reduction of impacts through protective measures, or the retrieval of site data using archaeological techniques.
- Evaluate ways to mitigate hazards by prioritizing sites according to their cultural significance and risk level.
- Support new archaeological surveys in high and moderate site probability areas in the tidal zones as these are areas where sites can be expected to be buried.
- Evaluate the National Register significance of new sites, add them to the inventory, and assess hazard impacts and the need for mitigation.
- Divide sites by location into high-energy and low-energy environmental settings based on relative wave intensity during storms. High energy areas are those along open Gulf or Atlantic coasts and usually require "hard armoring" stabilization, while low-energy coasts along estuaries, lagoons, and bays are best served using "living shoreline" techniques using plants, stone, sand fill, and other structural organic materials (oyster reefs, biologs).
- Develop a list of sites needing mitigation and utilize one or more mitigation options.
- Research possible funding sources for site protection assistance as well as site testing and excavation. Identify local, regional, state, and federal resources to aid in implementation.

Implement the Plan and Monitor Progress

This can be done in a variety of ways ranging from making some adjustments in the day-to-day operation of the local government to putting mitigation options into effect.

- Conduct periodic evaluations and make revisions as needed.
- Initiate mitigation projects and conduct them on an ongoing basis.
- Plan for a Section 106 Review if federal or state funding is utilized (National Historic Preservation Act).
- Periodically monitor local sites subject to future impact, especially after storms to assess new damage.
- Define responsibilities of stakeholders regarding period monitoring.
- Review plans periodically and revise as needed.

OTHER RECOMMENDATIONS FOR LOCAL GOVERNMENTS

- Provide written and verbal information presentations to local citizens and planning staff to increase understanding of the significance and cultural value of, and threats from hazards to, archaeological sites.
- Incorporate archaeological mitigation considerations into community hazard mitigation planning at all levels within the local government regulations and capital improvement planning programs.
- Develop budgetary support specifically for site preservation and mitigation.
- FEMA's Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). Over 1,500 communities participate nationwide and the program has applicability in the protection of archaeological sites. In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program:
  - Reduce and avoid flood damage to sites and insurable property
  - Strengthen and support site protection aspects of the National Flood Insurance Program
  - Foster comprehensive floodplain management

(Refer to Storm Guidance for Florida's Historic Communities, Chapter 2, Floodplain Management.)

Building construction can lead to archaeological review requirements.

Studying foundations during a flood mitigation project can reveal new information such as foundation systems from previous buildings.

Archaeologists should be included early in the planning process for stormwater improvement projects to plan avoidance or mitigation measures if archaeological sites will be impacted.

POLICIES ABSTRACT

An analysis of historic and disaster mitigation and recovery policies at the local government level was performed based on extensive research of current disaster management and historic preservation laws, regulations, and policies. This analysis offers guidance to help shape recommendations for better integrating archaeological sites into local historic preservation and disaster mitigation policy.

MODEL COMPREHENSIVE PLAN POLICIES

A significant gap exists between the intention to protect cultural resources and the specific inclusion of archaeological sites in hazard planning by regulatory authorities. Because archaeological sites are primarily underground and not usually visible, not everyone is aware that sites can be all around them, both within and near their community. Much of the public only relates to observable/tangible cultural resources such as buildings, bridges, roadways, and other above ground aspects of the built environment. Similarly, there are coastal municipalities that are not considering archaeological resources as part of their pre- and post-hazard planning or preservation programs. Institutions with archival collections and museum facilities can be used as an essential resource for conserving archaeological collections, providing opportunities for public education, and guiding protective polices. What is needed is proactive, holistic resiliency planning that protects, or mitigates adverse effects to, both above and below ground cultural resources (specifically archaeological sites, cemeteries, shipwrecks, and other inundated sites).

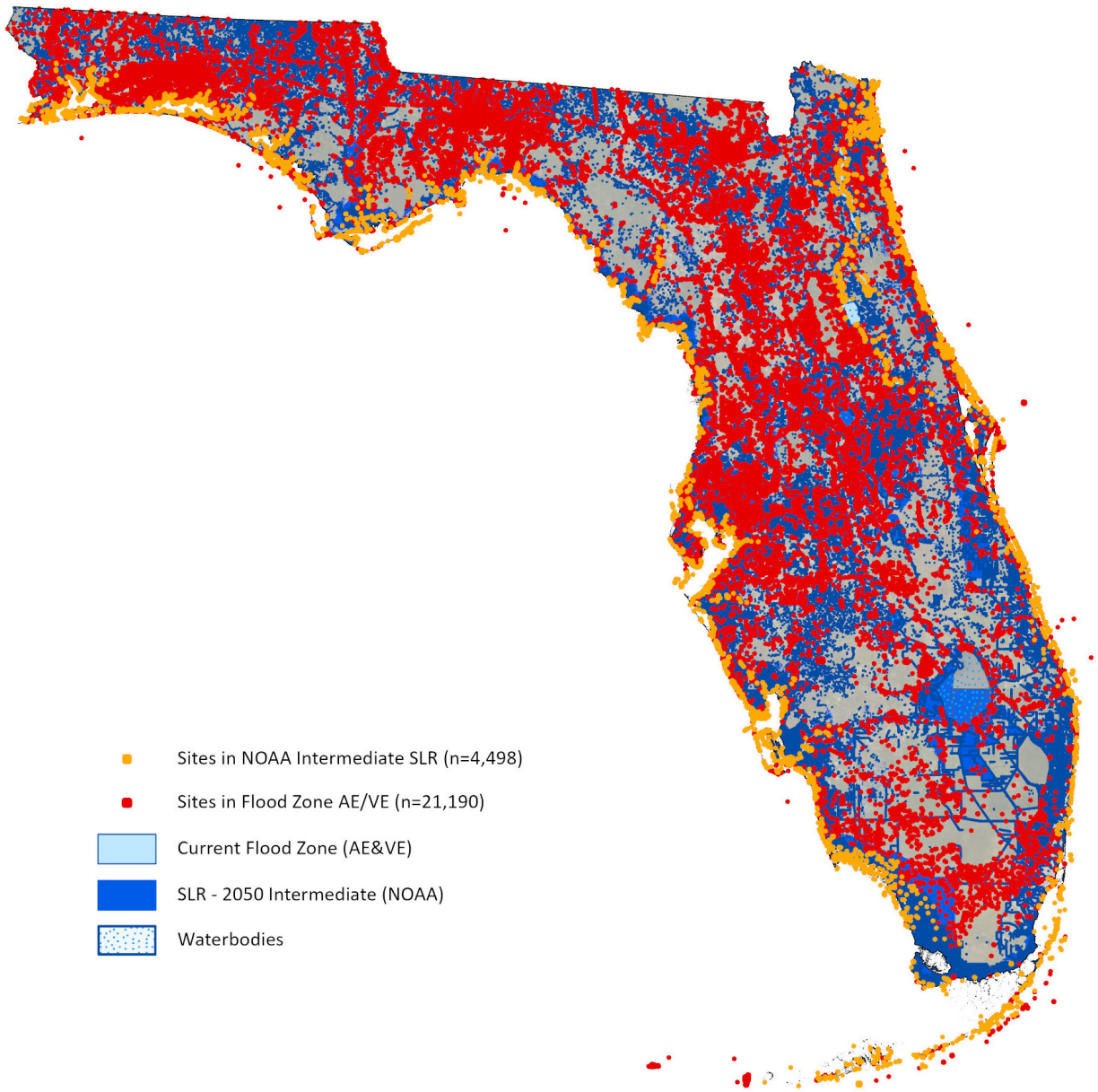
A number of communities include historic preservation in their comprehensive plans, although that component is not named in the state statutes. Florida law does not mandate local historic preservation programs and allows discretion in how a local plan is written and formatted. The language typically uses goals, objectives, strategies, and policies. The recommended model language that follows was developed based on the analysis of local level resiliency planning for threatened historic resources along the Florida coast but have broad applicability on the state and county level.

GOAL

To specifically integrate archaeological resources (sites, cemeteries, shipwrecks, and inundated sites) into the local consciousness, hazard preparedness and response measures, and the application of site mitigation techniques.

1. **Objective: Integrate archaeological sites into all hazard, management, and resilience planning on the state, county, and local levels.**

   With few exceptions, natural hazard resiliency and mitigation plans do not address archaeological resources/sites adequately. For example, many planning and management related documents



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Debris sites should avoid areas where traffic and machinery could impact archaeological sites.

use the terms "cultural resources" or "historic properties" but do not specifically mention archaeology or archaeological sites, while others include the term(s) but do not address archaeology any further. It is important to broaden the understanding of "cultural resources" to clearly include archaeological sites in terms of hazard considerations, resiliency, and hazard mitigation.

1.1. Strategy: ***Specifically incorporate archaeological sites into pertinent management plans, resiliency planning documents, hazard mitigation plans, plans for conservation and development, flood hazard regulations, the National Flood Insurance Program, emergency management plans, and other relevant plans.***

1.2. Strategy: ***For all archaeological sites, especially cemeteries and bluffs, ensure that disaster debris removal guidelines are updated to include consideration of archaeological sites so that post-storm cleanup does not cause additional site damage.*** Removing fallen trees can often require the use of heavy equipment, which should not involve large and/or tracked vehicles that would tear up the ground surface. Routine tree trimming can also serve as a mitigation measure before storms, both by clearing out dead limbs and providing vehicle access during post-storm debris removal. Debris and watercraft can accumulate along shores, and debris removal using heavy equipment can be destructive.

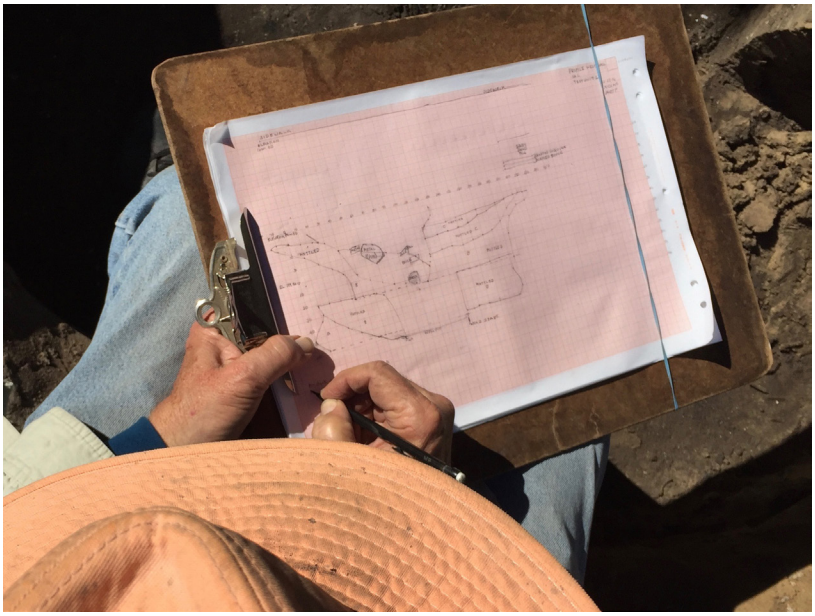
1.3. Strategy: ***Consider negative effects to archaeological sites prior to public works projects.*** The construction of water retention systems and storm water networks involve ground penetrating activities that often have an adverse effect on archaeological resources. Archaeology needs to be a component during the planning process so that appropriate measures can be taken to document or protect significant archaeological deposits and minimize project delays.

2. Objective: Strengthen local government efforts to protect archaeological resources.

2.1. Strategy: ***Integrate staff who have historic preservation education and professional training.***

2.2. Strategy: ***Obtain archaeological site locations in GIS from the State Division of Historical Resources and overlay them on a map layer showing tidal flood zones.*** Most local governments have GIS mapping; ensure that archaeological sites, cemeteries, and shipwreck locations exist as a GIS layer, although access to those locations should be limited to a small number of key individuals. The FMSF should be included in a practice of data sharing that would encourage and ensure a statewide level approach. Sites within the flood zones are most vulnerable to impacts from coastal hazards.

2.3. Strategy: ***Designate a Cultural Resource Liaison within the local government.*** This person would serve as an interdepartmental point of contact who can attend relevant meetings, be approached for information on archaeological resources, and in relation to ongoing efforts for site protection.



Field notes document the location of features, artifacts, and test units.

2.4. **Strategy:** ***Integrate introductory archaeological resource training into planning departments.*** The Archaeological Resource Management Training Course introduces state land managers to the nature of archaeological resources, Florida archaeology, and the role of the DHR in managing state-owned resources. Participants gain a better understanding of the requirements of state and federal laws with regard to protecting and managing archaeological sites. A facsimile of this course could be tailored to meet the needs of a municipality and provided to managers.

2.5. **Strategy:** ***Integrate hazard mitigation efforts by joining in a multi county/community/city coalition to consolidate preservation efforts.*** For example, Brevard County has developed a multi-jurisdictional hazard mitigation plan that includes a coordinated, cooperative effort from all local governments within Brevard County. The plan includes a provision for periodic updates in response to changing conditions. A coalition is a good way to broaden efforts and perhaps one day have a unified plan for the Florida coast. This practice will also benefit small communities with limited resources or local experience.

2.6. **Strategy:** ***Establish a Historic Preservation Ordinance. A historic preservation ordinance offers the greatest protection for archaeological resources.*** These laws protect individual sites and districts through a permitting process that requires advance review of proposed projects by a preservation commission, or other administrative body.

2.7. **Strategy:** ***Appoint a city/county archaeologist who meets the standards for listing in the Register of Professional Archaeologists and has a demonstrated background in historic and pre-contact archaeology.*** This person is responsible for identifying site

Students can become engaged in archaeology with laboratory training sessions. (FPAN)

probability zones in their municipality, for conducting Historic Preservation compliance reviews on all development, and can perform or call for an archaeological survey if archaeological sites are threatened by development, erosion, or other threats.

2.8. **Strategy:** ***Local governments abutting the Gulf of Mexico or the Atlantic Ocean, or that include or are contiguous to waters of the state, can adopt an Adaptation Action Area (AAA) designation in the coastal management element of their comprehensive plan.*** The AAA designation identifies one or more areas that experience coastal flooding due to extreme high tides and offers storm surge protection, accommodation, and retreat strategies to areas that are vulnerable. This designation can assist a local government in prioritizing resources for adaptation planning and protection of threatened cultural resources, thus consolidating data and plans related to a community's response to coastal flooding. Strategies need to include data storage and security considerations.

3. **Objective: Promote the application of archaeological site mitigation options in hazard mitigation planning.**

3.1. **Strategy:** ***Intensify efforts to implement site mitigation options.*** In keeping with Section 106 requirements regarding archaeological sites, and in consultation with SHPO, hazard mitigation should consider the pros and cons of site mitigation at sites that are at risk from the effects of coastal weather hazards (sea level rise, erosion, storm surge, and others). Measures to mitigate adverse effects to archaeological sites include, but are not limited to:

- Preservation in Place
- Archaeological Site Monitoring
- Photogrammetry
- Beach Renourishment
- Intentional Site Burial
- Site Stabilization
- Living Shoreline
- Data Recovery
- Government acquisition of cultural resources

3.2. Strategy: ***Consider applying for state funding to mitigate adverse effects to sites under existing programs or adopt an Adaptation Action Area (AAA) designation to assist in that effort.***

4. Objective: Encourage public awareness of and participation in archaeological site protection.

4.1. Strategy: ***Increase archaeological site awareness among local community management and staff, as well as local residents.*** Strengthen relationships with local partners in the local area (regional FPAN and FAS, local museums, universities and colleges, and avocational archaeologists) who may be able to provide information about local history, prehistory, and sites.

4.2. Strategy: ***Encourage public awareness of and participation in site protection.*** FPAN provides outreach throughout the state by promoting historic preservation to organizations, groups, specific audiences, or the general public. FPAN offers training programs, workshops, and informational presentations on a variety of topics.

4.3. Strategy: ***Create a network of both civil service individuals and volunteers to help monitor the effects of coastal erosion on known sites.*** Collaboration with existing community organizations and/or State programs is essential toward creating a cadre of volunteers to facilitate the implementation of a policy that documents and protects sites threatened by coastal flooding, natural disasters, and urban growth. Throughout the state, the Florida Anthropological Society (FAS), FPAN staff, and volunteers actively monitor damage to sites that are adjacent to water and subject to storm impacts. Their program, Heritage Monitoring Scouts (HMS) is based upon training volunteers and can be applied to sites in any part of the state. FPAN encourages public involvement from volunteers. BAR also conducts site damage assessments and site mitigation.

SITE MONITORING FOR COASTAL EROSION

With regard to periodic site monitoring, FPAN's Heritage Monitoring Scouts (HMS) Florida program has been very effective in reporting on current site conditions all around the state.

As Miller et al. (2021: vii) have stated:

> ***We may not be able to stop erosion of archaeological sites in Florida, but it is the duty of archaeologists to study and describe site loss as it happens. This (monitoring) is likely the only mitigation measure reasonable for a majority of sites across Florida.***

The collection of artifacts must be properly analyzed after fieldwork.

Smith Mound on the Calusa Heritage Trail is publicly accessible within the Pineland Burial Mound Site which was once privately owned.

The same view, after Hurricane Ian shows the mound is inaccessible and suffered damage from uprooted trees and storm surge.

ARCHAEOLOGICAL MITIGATION

The term "mitigation" refers to the action of reducing the severity, seriousness, or adverse effects of something. FEMA defines hazard mitigation planning as "the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards."

Mitigation for archaeological sites employs techniques including desktop data analysis, Ground Penetrating Radar (GPR), shovel testing or data recovery excavation, preservation easements, site acquisition by an agency, and others to document and/or preserve a site. Each stage of investigation can therefore be regarded as mitigation when archaeological potential is identified and examined, and solutions are applied to mitigate damage to, or loss of, archaeological sites. Preservation efforts confronting site loss due to climate change must advance toward proactive mitigation under the federal regulatory process.

BEST PRACTICES IN MITIGATION ACTIVITIES

When implementing mitigation policies into action, local officials and landowners need to evaluate mitigation strategies that will be most beneficial given the site condition and threats. With the use of any mitigation option, or the use of no option (preservation in place), site monitoring is an important aspect of site preservation in evaluating the degree of damage, data loss, and the effectiveness of any stabilization method(s) used. No stabilization method is perfectly effective, but site stabilization is becoming an increasingly recognized option in cultural resource management. In that regard, archaeologists, who are generally not trained in engineering, hydrology, soil mechanics, or erosion control, must depend on scientists knowledgeable in those fields for advice in developing a stabilization plan.

A 2015 document, *Adaptation Planning for Historic Properties: A Product of the Community Resiliency Initiative*, provides a very detailed listing of the many advantages and disadvantages of a range of stabilization/ mitigative "Adaptation Strategies" for archaeological sites, buildings, and historic districts (Florida Department of Economic Opportunity). Major advantages and drawbacks are brought out in the discussion below, but the 2015 reference is very complete in that regard.

PRESERVATION IN PLACE (NO ACTION):

While this approach is not a mitigation measure, in American archaeology the best practice has always been the avoidance of impacts through preservation in place. This perspective has its roots in ethical archaeology developed in the late-20th century, when only limited excavation was thought necessary to evaluate eligibility or to address specific research questions. Otherwise, practitioners traditionally agreed that sites should be left unexcavated and "protected" for the future. FPAN Director William Lees and studies such as that by Anderson et al. (2017) recognize preservation in place can no longer be assumed a viable preservation measure:

Tropical storms, king tides, rising sea levels, and thousand-year floods do not require permits or Section 106 review, and provide no funding for staff or action. Climate change has joined coastal development as a major threat to sites, but is less predictable, less forgiving, and is moving at an astonishing pace to destroy coastal and inland heritage. "Preservation in place" in certain landscapes and types of sites is not what it used to be.

William Lees, 2020, The Balance Sheet Will Define our Legacy

ARCHAEOLOGICAL SITE MONITORING:

Archaeological monitoring involves site visitation to identify, protect, and/ or document archaeological information or materials. This can include halting construction activities to allow for investigation or if a human burial is encountered. Site monitoring also refers to the routine examination of a known site to determine its state of preservation or to evaluate the effectiveness of mitigation options that may have been attempted. Monitoring applies to both above ground and inundated sites and is especially needed after potentially destructive hurricanes and storms.

The National Historic Preservation Act (1966) plays a central role in the nation's historic preservation programs, and a substantial body of professional literature, guidelines, and standardized practice has developed for monitoring activities. Standard practice should include:

- Development of a scope of work (SOP) and a standardized field monitoring form to be followed consistently at all sites
- Baseline (initial) monitoring to collect initial data and routine monitoring to determine if changes have occurred
- GPS data recording in keeping with the scope
- Photographs taken consistently at predetermined locations and development of evaluations/recommendations for treatment
- Perhaps most importantly, integration of results into a data management program

An important section in each standardized monitoring form should include an evaluation of site condition such as poor/ fair/ good/ destroyed which can be updated on later forms if conditions change.

The range of site observations during monitoring extend from no change to total destruction or failure of any stabilization measures that may have been applied. Measurable decline at sites can be documented after storms or on a periodic basis. Repeat assessments help describe and document changes observed at sites and can assist local governments and land managers in prioritization and stabilization efforts. FPAN's Heritage Monitoring Scouts (HMS) program has had great success with this. In a recent FPAN statement, Miller et al. (2021: vii) writes:

We may not be able to stop erosion of archaeological sites in Florida, but it is the duty of archaeologists to study and describe site loss as it happens. This (monitoring) is likely the only mitigation measure reasonable for a majority of sites across Florida.

Ground penetrating radar can assist in the detection of potential archaeological resources.

Archaeological monitoring may be required for certain sites in local or federal jurisdictions.

The St. Augustine Lighthouse and Maritime Museum conserves underwater artifacts.

Prior to removing sand for beach renourishment, the giving site is reviewed for archaeological sites.

Calusa site monitoring visit, 2020. (Florida Public Archaeology Network).

Sites may need to be partially excavated, stabilized, and then reburied (Kathleen Deagan).

Hard stabilization at Turtle Mound (Schwadron, n.d.).

Turtle Mound Living Shoreline Stabilization (Donnelly and Walters 2021).

PHOTOGRAMMETRY

Photogrammetry is the art and science of extracting 3D information from photographs; it is essentially a monitoring tool that has been used increasingly to rapidly collect data from both terrestrial and underwater sites and shipwrecks. The process involves taking overlapping photographs of an object, structure, or space, and converting those into 2D or 3D digital models. This application is less labor intensive than traditional mapping, requires less time and personnel to complete, and is entirely non-invasive and highly cost effective (Miller et al. 2021). Resultant 3D data can be shared with the public online and can be analyzed to better understand each site and to generate topographic maps and measurable images. Additionally, the data collected over subsequent years of site monitoring can be compared to track changes through time. Examples of 3D images from sites are included in two of the case studies. *(Refer to Case Studies, page D51)*

BEACH RENOURISHMENT

Beach renourishment involves placing sand from offshore and/or onshore sources on sections of coastline to maintain and restore eroding beaches and adjacent sites. Sand is placed along the shore to widen a beach and shoreline to minimize the impacts of wave energy and storm surge; it is also done to enhance steep and narrow beaches. This activity may protect an archaeological site, but usually only on a temporary basis. One advantage is that renourishment enhances beaches and is useful for recreation, tourism, and aesthetic purposes. In terms of disadvantages, beach renourishment does not stop erosion, as it merely adds sediment to help mitigate erosion but must be done on a continual basis to maintain desired beach width. It can also bury intertidal and bottom plants and disturb species' feeding patterns and nesting/breeding habitats. Renourishment is not the best choice for archaeological site protection and, when needed periodically, is also costly.

INTENTIONAL SITE BURIAL

Covering archaeological sites with dredge spoil, sand, or other surfacing is not a new idea. In fact the natural burial of sites is a common occurrence, most notably at shipwreck sites. Intentional site burial has been likened to the gradual, cultural accumulation of soil layers at a site in that each succeeding occupational layer protects the earlier, lower occupations. Before a site is covered, a certain level of data (e.g., cultural affiliations, site size, National Register eligibility status) should be collected. A design plan for intentional burial must be conceived that maximizes site protection while minimizing any negative effects. To determine the best design, a multidisciplinary team including an archaeologist, a geologist, and an engineer is recommended, with each having specific responsibilities in developing the site burial design plan.

SITE STABILIZATION:

The Florida DHR published two guides, *Best Management Practices: an Owner's Guide to Protecting Archaeological Sites*, and *Archaeological Stabilization Guide: Case Studies in Protecting Archaeological Sites* (Glowacki et al. 2000a, b). The first discusses site-management practices

and strategies that apply to privately owned sites and those owned/managed by local, state, and federal agencies. The second guide provides thirteen case studies of sites throughout Florida documenting site management problems and solutions.

Site destabilization can result from loss of ground cover, which increases the loss of soil at a site. In regard to coastal erosion, stabilization options are dependent on the sources and intensity of erosion that occur along high or low energy coastlines. In Florida, high energy coasts are those along the open Gulf or Atlantic and low energy coasts are those associated with estuaries, lagoons, and bays. A method that is successful in one location may not work in another (e.g., sheer, eroded bluffs versus low lying marsh areas).

In high-energy areas, stabilization options include revetments, groins, bulkheads, sea walls, renourishment, etc., (Glowacki et al. 2000b:11). Seawalls, groins, jetties, and breakwaters are classified as "hard, structural stabilization," and involve armoring the shoreline with cement, rock or wood constructions. Shoreline armoring helps to slow or stop upland erosion, but one disadvantage is losing beach areas and intertidal habitat along the front and sides of the structures. These types of armoring can also be costly to install and require experts in developing a project design. Perhaps most importantly, hard adaptation strategies may affect the four aspects of integrity: Design, setting, feeling, and association because it can be difficult to build floodwalls or levees, or implement other strategies without disrupting the design, feeling, setting, or association with the historic property or district. In terms of advantages, new and protective seawalls along downtown historic district waters can highlight the landscape by the construction of a pedestrian path that preserves the older seawall exposed to serve as a bench along the pedestrian path. Also, hard armoring can be combined with other strategies (groins, revetments, and living shorelines), as discussed below and in Chapter 12, Storm Guidance for Florida's Historic Communities.

In low-energy areas "soft, non-structural stabilization" involves the strategic placement of plants, stone, sand fill, and other structural organic materials (e.g., biologs, oyster reefs, etc.) to reduce wave energy and secure shoreline sediments. ***By creating a natural progression of animals and plants from the subtidal to the shore, damage from waves and boat wakes can be lessened to minimize erosion.*** While this type of "living shoreline" restoration might not be suitable for high wave energy environments (coasts directly impacted by storm impacts), it can be effective in low to moderate energy locations with a gradual slope, as opposed to a bluff, and can be much less expensive than hard, structural stabilization over time. The Florida Department of Environmental Protection (DEP) "seeks to encourage and assist local coastal property owners, both residential and commercial, to embrace living shorelines as an alternative to hardened shorelines," (FDEP 2015). The advantages to a living shoreline approach are that they are attractive and increase space for recreational use; they improve or create marine habitat; they maintain natural coastal processes and shoreline dynamics; and they are cost effective in comparison to hard armoring. Disadvantages are that living shoreline success is limited to low erosion settings, and that landowners must ensure compliance regulatory review through the State, U.S. Army Corps of Engineers (USACE), water management district/authority, or possibly a municipality.

A new seawall built in St. Augustine included preservation methods for the historic seawall shown along the right side.

Living shoreline project underway in Cedar Key (2021).

Living shorelines were deployed in Pensacola in 2003 and are maintained as needed.

Reproduction artifacts from an archaeology site created from 3-D printer.

Excavated sites and preserved sites can be interpreted with data recovered from the site.

Mitigation for the Miami Circle feature included excavations and acquisition by the State of Florida.

Living Shoreline: In applying this approach, from 2011-2021, Drs. Linda Walters and Melinda Donnelly of the University of Central Florida partnered with the Southeast Archeological Center (SEAC) and Canaveral National Seashore (CANA) to develop living shoreline methods to protect sites (shell middens, houses) from coastal hazards. Methods used for stabilization were based on species found on natural shorelines and included a combination of oyster shells (in mats or bags), smooth cordgrass, and seedlings from three species of mangroves (red, black, and white). ***As a measure of success, the Turtle Mound Site (8VO00109) was stabilized in 2011 and is now protected by a continuous vegetated shoreline with mangroves ranging in height from 2 to 4 meters (6.5-13 feet) after 10 years*** (Donnelly and Walters, 2021). Other locations with sites receiving similar attention by these researchers have included Tomoka State Park, Washington Oaks, DeSoto National Historic Site, Fort Mose, and others at CANA.

Data Recovery: Archaeological data recovery is the most common way to mitigate adverse effects to a known NRHP listed or eligible archaeological site. This process usually involves large scale excavations, multidisciplinary specialists, laboratory analysis (of artifacts, faunal remains, and soil samples), curation of all materials, and completion of reports. The goal of data recovery is to record, recover, and preserve archaeological data associated with the site in keeping with the project goals developed during research design. If sufficient site data (e.g., size, activity areas, artifact concentrations, etc.), are not available, shovel tests may be necessary prior to developing research questions and finalizing a good research design for the data recovery plan.

Because the type and quantity of data at each archaeological site vary, data recovery research designs and methods will be specific for each site. Mitigation plans must be appropriate to the size and scale of the project and the nature of threats to the location. All data recovery research designs are developed through coordination and consultation with the project sponsor, appropriate regulatory agencies (e.g., the State Historic Preservation Office or lead federal agency), and any other responsible government, tribal, or consulting parties. A state or federal permit prior to starting work is normally required.

The main advantage of a data recovery program as site mitigation is that it focuses on what archaeological sites are found significant for in the first place – the recovery of information from below ground that has the potential to yield significant new information regarding prehistory or history. The disadvantages of data recovery are the costs related to fieldwork and laboratory specialists (for faunal remains radiocarbon dating, soil analyses, curation, etc.), as well as site destruction. The costs of long-term curation including storage of physical objects, digital and physical archives, and conservation must also be included in mitigation considerations.

If approved by the review agency, alternative mitigation measures may be considered other than data recovery, or any of the mitigation options discussed. Measures could include funding archaeological excavations at one or more similar sites, developing educational curricula, developing museum exhibits, presenting site information at community meetings and professional conferences, analyzing artifact collections that are

understudied, and compiling regional or resource type databases that bring together information from a number of sites. Analysis and synthesis of existing collections, especially understudied collections, should be a part of site mitigation and data recovery strategies. The potential for the focus on collections reiterates the essential requirement of maintaining appropriate archival facilities which must also be physical structures protected from flooding and storm impacts. Museum institutions and collection facilities not only conserve material, but provide the public with opportunities to observe tangible fragments from the archaeological record. Investments in these facilities will serve the public in multiple ways.

ARCHAEOLOGICAL MITIGATION SUMMARY		
STRATEGY	**ADVANTAGES**	**DISADVANTAGES**
Preservation in Place	Meets traditional ethical practices	Sites at risk from climate change are not guaranteed preservation
Site Monitoring	Routine assessments inform the need to prioritize and stabilize sites when observations document measurable decline	Monitoring at an active construction site may not allow for archaeology best practice
Photogrammetry	Less labor intensive, non-invasive, and lower cost than traditional mapping methods	High initial investment for the equipment and staff training
Beach Renourishment	Can enhance beach areas and temporarily protect sites	High cost to provide temporary mitigation that will not stop erosion, requires routine management, and can alter species on the existing sea floor
Intentional Site Burial	Mimics a naturally occurring process	May require a multidisciplinary team to develop a site burial design plan that minimizes potential negative impacts
Structural Shoreline	Helps to slow or stop upland erosion and can be planned to include landscape and/or pedestrian enhancements	High cost, causes loss of beach or intertidal habitats, and may reduce historic integrity of a site
Natural Shoreline	Uses natural coastal processes, indigenous materials, and can improve habitats and recreation opportunities; more cost effective	Limited to low-erosion settings, possible land owner consensus, and compliance with all associated regulatory authorities
Data Recovery	Focuses on recovery of new information regarding prehistory or history	High cost of fieldwork, laboratory specialists, long term curation; and results in site destruction

CASE STUDIES

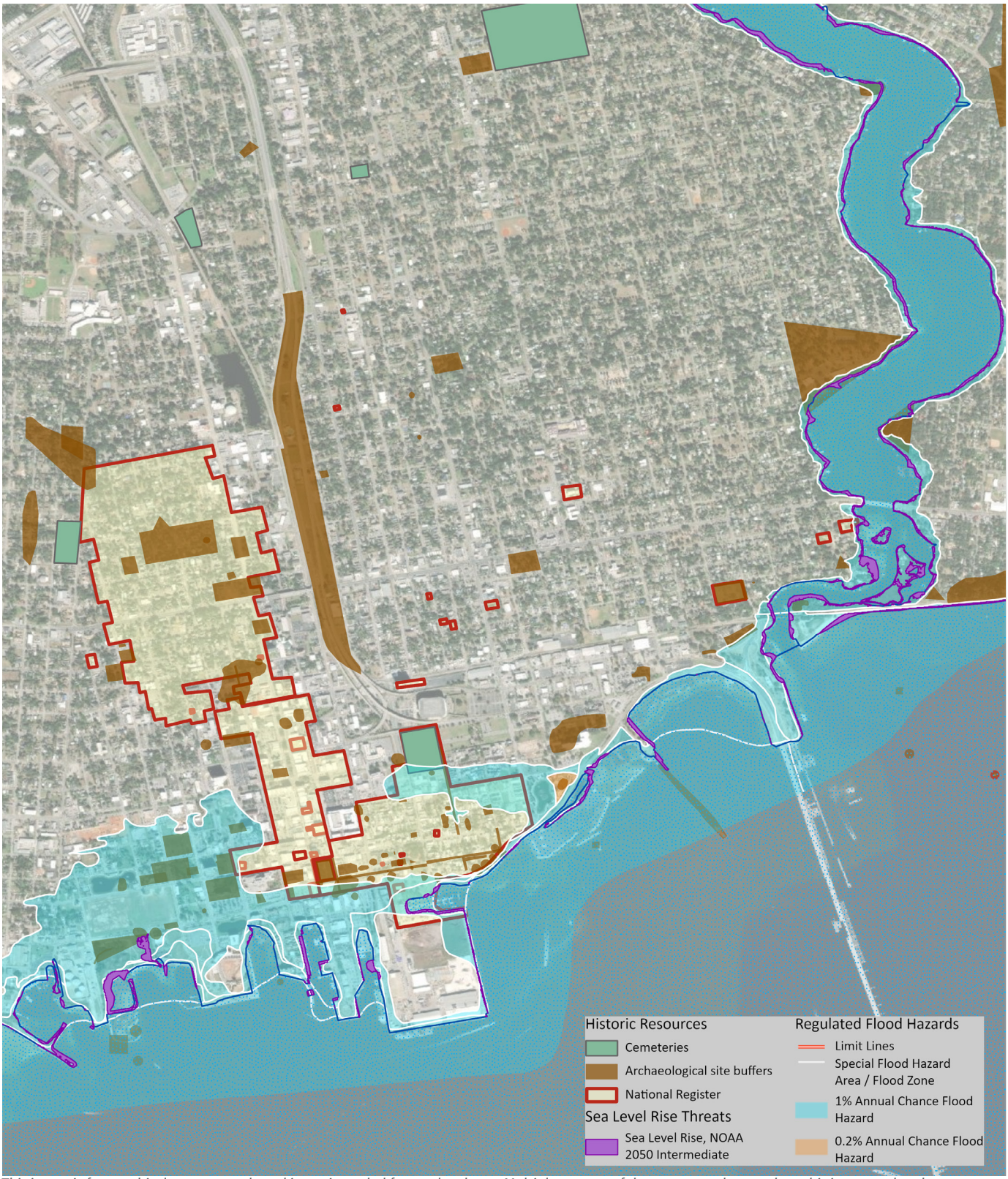
1. **Pensacola**
2. **Sarasota**
3. **Miami**
4. **St. Augustine**

Case Study locations for archaeological mitigation.

CASE STUDIES

The case studies that follow highlight steps that four coastal cities undertook in anticipation of flood hazards and a means to help organize people and other resources. Following an introduction and consideration of past hurricane experiences, a brief discussion of local archaeological resources is given and city/regional efforts at preservation planning with regard to archaeological sites are summarized. Local coalitions, stakeholders, and active preservation groups are introduced and ongoing archaeological efforts are outlined. Finally, archaeological sites threatened by flood hazards are discussed that highlight a range of mitigation possibilities.

These case studies have been compiled primarily on the basis of online sources, with input from city and county personnel, when available; as well as from input from local Florida Public Archaeology Network (FPAN) representatives due to their extensive experience in local archaeological programs and statewide research initiatives. (For more information on related work from FPAN, refer to the HMS Florida program at *www.hms.fpan.us*.)



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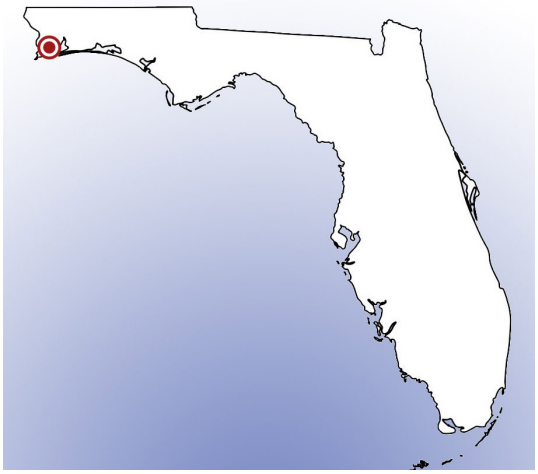


PROFILE

County Escambia

Size

- **Square Miles** 22
- **Population** 54,312

Certified Local Government No

Archaeology Regulations

- Archaeology review required for public projects on city-owned lands
- No requirements on private property

Recent Resiliency Initiatives

- Sea Level Rise Vulnerability Study, 2021
- Climate Action Recommendations, 2018
- Coastal Vulnerability Assessment, 2016

Regional Site Butcherpen Mound

CASE STUDY 1 – PENSACOLA

HISTORIC SIGNIFICANCE

Pensacola is America's earliest European settlement, established after the hurricane of 1559 by Tristan de Luna and Spanish settlers although it was not continuously occupied. The lives of the earliest Spanish settlers were made difficult after a violent storm that resulted in the loss of ships, supplies, and men. In 1561, the Pensacola settlement was abandoned for more than 100 years.

Prior to the Spanish, Native Americans lived in the area for more than 10,000 years. Following European contact, Pensacola changed hands 17 times during its more than 400 years of written history. After its abandonment by the Spanish in 1561, Pensacola served as the capital of British West Florida from 1763 until 1784, when Spain regained control of Florida beginning the Second Spanish Period. The town still reflected its early Spanish heritage through Florida's Territorial Period (1821-1845), and after Florida gained statehood in 1845, Pensacola surpassed St. Augustine in economic importance. Pensacola has been referred to as the "City of Five Flags" and the "Cradle of Naval Aviation." Known for its beaches and history, the city celebrated its 450th birthday in 2009 and is home to the University of West Florida and the Pensacola Naval Air Station (NAS).

VULNERABILITY

The City of Pensacola is the westernmost city in the Florida panhandle. Fronting on the Gulf of Mexico, the historic mainland is somewhat protected by barrier islands, but is still vulnerable to hurricanes and their effects. Along the rivers and the southern edge of the city elevation is seven feet above mean sea level.

The first recorded hurricane was in 1559, and the city has been directly hit at least eight times since. Eleven hurricanes affected the city between 1975 and 2005. Pensacola was devastated in 2004 by Ivan, which surged into Escambia Bay, destroying the Escambia Bay Bridge, much of the Bayfront Parkway, and 10,000 homes. In 2020, Hurricane Sally, though only Category 2, caused at least $29 million of damage in Escambia County and Pensacola. The most recent hurricane to affect Pensacola was Hurricane Ida in 2021. Pensacola is sixth on Sperling's List of the worst places in Florida for hurricanes.

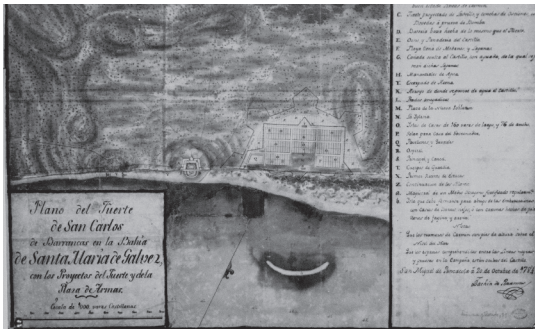
Hurricane Sally flooding in downtown Pensacola 2021. (City of Pensacola)

CULTURAL RESOURCE MANAGEMENT

ARCHAEOLOGICAL RESOURCES

The area of today's city, on Pensacola Bay and with its coastal and riverine natural resources, was occupied by Native Americans in pre-contact times. When Panfilo de Narvaez arrived in 1528, the name Pensacola was applied to the native people he encountered. In 1559, Tristan de Luna arrived after a hurricane with 1400 settlers and established the settlement, which was abandoned in 1561 after another major hurricane. Known as Santa Maria de Ochuse, ongoing research by UWF has determined the de Luna settlement encompassed about 27 acres, which was larger than St. Augustine when it was established in 1565. Undiscovered subsurface archaeological sites/deposits can be expected in the yards of historic structures, especially within the historic districts.

Archaeological deposits are found within the city limits and many others are recorded along the rim of the bay as well as on tributaries, swamps, and bayous in the vicinity. Besides those noted above, another site investigated by UWF is the Presidio Santa María de Galve; a short-lived garrison founded in 1698 by Spanish colonists. It was in the area of Fort Barrancas at modern-day NAS Pensacola. The presidio included Fort San Carlos de Austria and an adjacent settlement.



Spanish fortification plans. (Library of Congress)

Pre-contact sites are numerous in the area, especially at NAS Pensacola. Additionally, Gulf Islands National Seashore (GINS) is made up of seven islands that are rich in archaeological resources. GINS includes portions of Perdido Key as well as Ft. Pickens, Opal Beach, and Naval Live Oaks on barrier islands, and Fort Barrancas at the mouth of Pensacola Bay. GINS employs a full-time archaeologist to oversee these resources. Marine sites lie beneath Pensacola Bay, not only multiple early historic shipwrecks, but also there is a moderate to high potential for submerged pre-contact deposits that predate sea level rise in the vicinity of Pensacola.

Fort Barrancas, built ca. 1798 by the Spanish. (1962, Library of Congress)

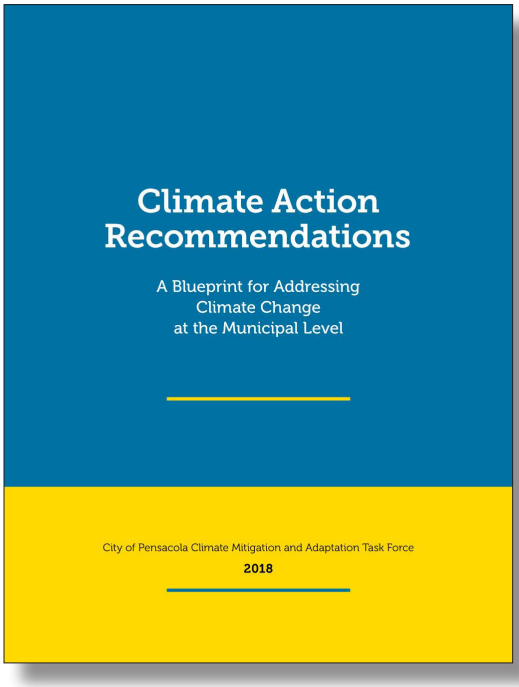
PRESERVATION PLANNING

The City of Pensacola has an Archaeological Review Procedure for proposed construction projects within the city, as cited in Chapter 10 of the city's Comprehensive Plan and outlined in the document entitled *Policies of the City Council*, adopted in 1985 and amended in 2011. The intent of this policy is to undertake the review procedure in early stages of project planning on city-owned lands so that no construction delays occur. Pensacola employs a dedicated staff person that can conduct field visits and review project plans. Archaeological surveys and investigations are carried out by professional consultants and no archaeological review of private property is required in Pensacola. In 2014, the University of West Florida Historic Trust produced *Preservation District Guidelines and Regulations* for the city, but it only addresses historic structures. Pensacola is not a Certified Local Government.

RESILIENCY AND CULTURAL RESOURCE MANAGEMENT

Florida State Parks in the area include Big Lagoon and Perdido Key State Parks on the barrier island chain that aids in the protection of Pensacola Bay and Tarkiln Bayou Preserve State Park lies on the mainland. A multi-unit management plan for these parks produced in 2018 lists known archaeological resources, discusses significance, and describes effects of erosion from storms, boat wakes, storm surge, and wind. The possibility of site stabilization of site 8ES3510 is addressed, based upon coordination with the DHR.

In 2000, *Project Greenshores* undertook the reestablishment of lost marsh habitat along the downtown shoreline, accomplishing an "accidental example of natural infrastructure improving resiliency." Breakwaters (seawalls) were built, along with five sand islands just offshore planted with marsh grass. These efforts effectively slowed wave and erosion action, so in 2007 a similar smaller scale project was undertaken nearby. At citizens' request the breakwaters did not extend above the water surface, thus, they were not as effective as in the first project, and the islands eroded. These projects, constituting one version of a living shoreline, were supported by funding from a broad coalition of local, state, and federal agencies, with over 60 donating funds. While infrastructure protection by the project was easily recognized, documentation does not note the parallel protection of archaeological and cultural sites, although that was probably accomplished.



City of Pensacola

The city undertook a *Sea Level Rise Vulnerability Study* that predicts infrastructure and land parcel impacts by 2040, 2070, and 2100. Priority planning areas were delineated; and scenic roadways, parks, and bridges are cited within the planning area but protection of archaeological resources and historic structures is not included. In 2016, a *Coastal Vulnerability Assessment* was produced for Escambia County by the Florida Department of Economic Opportunity, and cultural resources were not addressed. Additionally, in 2020 Escambia County produced a Local Mitigation Strategy document that identifies man-made, natural, and technological hazards and discusses mitigation strategies. While it contains a list of pertinent ordinances, plans, and codes, archaeological regulations and sites are not addressed. However, because goals of the plan seek to enhance coordination and communication locally and

regionally to implement hazard mitigation goals and expand vulnerability analysis, archaeological site protection could be added to the plan. In 2018, the City of Pensacola Climate Mitigation and Adaptation Task Force produced *Climate Action Recommendations* to aid in addressing climate change. Focused on improving adaptation and resilience, the document does not address preservation of archaeological or other cultural resources.

LOCAL PARTNERS

The Archaeology Institute of the University of West Florida (AIUWF) is primarily a research facility with a large professional staff associated with the Division of Anthropology and Archaeology. It is the strongest voice for archaeology in Florida's panhandle. Additionally, the Florida Public Archaeology Network is headquartered in Pensacola, as is the FPAN Northwest Regional office. The Pensacola Archaeological Society is located in the city, and the GINS employs an archaeologist. All of these entities are dedicated to archaeological site protection, as are the nearby state parks and preserves, all of which currently have their own management plans.

CURRENT SITE PROTECTION ACTIVITIES

Current site protection activities in Pensacola include survey, evaluation and excavation undertaken prior to subsurface impacts on city property, which is carried out by consultants; site monitoring by FPAN's HMS program; and any archaeological research projects undertaken by the AIUWF. USACE, under Section 106 authority, provides oversight for permits of many of the construction activities in the panhandle. The *Escambia County Comprehensive Plan* contains coastal zone management and general hazard mitigation elements geared to the protection of natural resources, without mention of archaeological resources. The local state parks management plan does address the responsibility for site protection. The 2014 management plan for Gulf Islands National Seashore mandates archaeological site monitoring, as well as the "development of stabilization strategies for sites being threatened or destroyed."

RECOMMENDATIONS

Resources dedicated to climate change and flooding can be revisited to directly state how proposed actions will improve the preservation of historic resources. Subject matter experts in the area as well as academic and professional institutions should be included in these efforts. Based on the existing research of these institutions, it is likely that resiliency strategies focused on historic preservation can be integrated quickly and effectively.

BUTCHERPEN MOUND - KEY FACTS

Located in Santa Rosa County

Overview

- Butcherpen Cove is on Naval Live Oaks Reservation (NLO), part of the NPS Gulf Islands National Seashore (GINS)
- Sites include shell middens and earthen mounds

Time Periods

- Late Woodland Weeden Island period (A.D. 500 - A.D. 1200) through Late Mississippian/ Protohistoric periods (A.D. 1200 - A.D. 1750)

Threats

- Erosion
- Looting
- Fire breaks
- Pedestrian traffic

Management

Gulf Islands National Seashore (GINS)

Mitigation Efforts

- UWF performed included ceramic analyses, carbon samples for dating, and studies of site loss along the bluff edge
- Additional future research is planned
- FPAN documented the site using terrestrial 3D laser scanning

Recommendations

- Ongoing research by UWF
- Continued monitoring
- Adherence to previous recommendations
- Conduct Phase III data collection as soon as feasibly possible before the site is lost

Butcherpen Mound stratigraphy sampling

BUTCHERPEN MOUND COMPLEX (8SR00029)

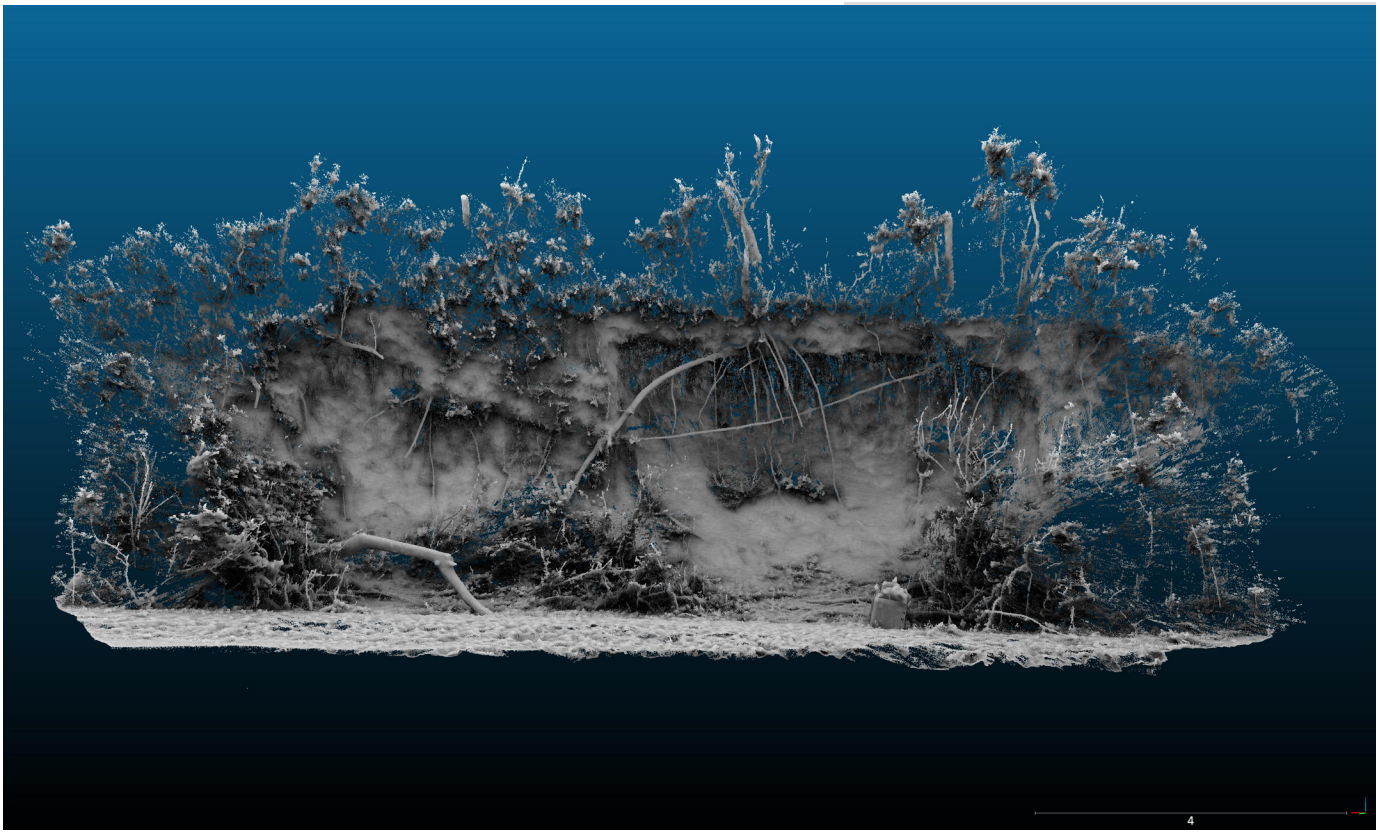
This is a multicomponent site containing extensive cultural deposits and artifacts from the Late Woodland Weeden Island period (A.D. 500 - A.D. 1200) through the Late Mississippian/Protohistoric periods (A.D. 1200 - A.D. 1750). The site complex includes shell midden and earthen mounds located along the south side of Butcherpen Cove on Naval Live Oaks Reservation (NLO), NPS Gulf Islands National Seashore, in Santa Rosa County. Listed in the National Register since 1998, the nomination states that the mounds "could contain human burials; but this has not been confirmed by professional excavations."

STABILIZATION ISSUES

Erosion is a serious threat and was noted when the site was first documented in 1973. Looting has also been a problem, as is often the case at sites containing mounds. Previous fire breaks and foot traffic have also impacted the site.

MANAGEMENT APPROACHES

Other than periodic site monitoring and documentation, no comprehensive mitigation efforts are planned to address the site's deterioration.



Butcherpen Mound orthographic . (Image using Sketchfab, Point cloud by Emily Jane Murray 2021, from Miller et al. 2021)

SITE INVESTIGATIONS

The site was recorded in 1961 and revisited in 1973 by Louis Tesar as part of a larger NLO reservation survey. Tesar found two mounds and said the site was "an important asset of the Seashore which should definitely be preserved." He noted at that time that the greater part of the midden had been lost to massive erosion of bluffs as well as looting. Since then, the site has been impacted by erosion from storm surge, wave action from boat traffic and wind, and the continuing rise in sea levels. Tesar also saw signs of commercial harvesting of shell from middens and recommended that mitigation excavations occur at Butcherpen Mound, although such efforts focused instead on other areas of NLO.

In the early 1980s, FSU conducted an intensive study through shovel testing, stratigraphic excavations, ceramic and faunal analyses, and soil analysis. Artifacts included shell tools, Archaic stone tools, a cache of Busycon shells, and a copper bead. Evidence of a third mound was noted along the bluff that had almost completely eroded. Additional excavation was recommended to gather data, but the authors stated that "many coastal engineering projects have shown human efforts to halt coastal erosion are at best a temporary victory."

Recently, UWF conducted testing that included ceramic analyses, carbon samples for dating, and studies of site loss along the bluff

Digital documentation on Gulf Islands National Seashore. (FPAN)

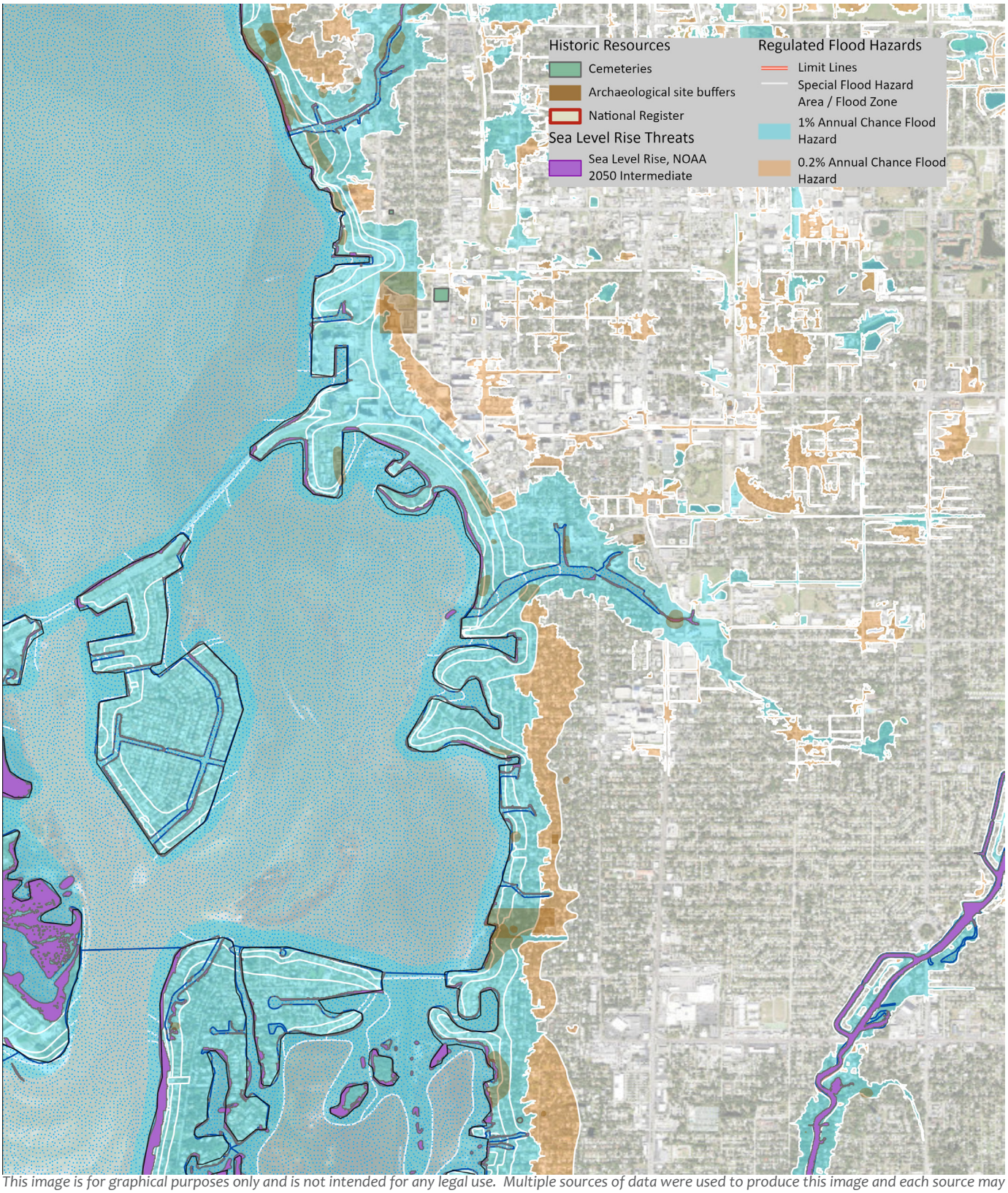
edge to assist Gulf Islands in complying with Section 110 of the National Historic Preservation Act (NHPA). Section 110 of the Act calls on all federal agencies to establish - in conjunction with the Secretary of the Interior - their own historic preservation programs for the identification, evaluation, and protection of historic properties. Plans for future research include a longitudinal study of bluff erosion, completion of topographic mapping, and a systematic survey of the entire site. Large looting pits were noted in the two remaining mounds. At the third mound, a double-banded midden reported by Doran and Piatek (1985) was still visible in the early 2000s, but now appears to have completely eroded.

RECENT APPROACHES

As part of the HMS Program initiated by FPAN, the Butcherpen Mound Complex was recently monitored and evaluated. As a result, FPAN documented the site using terrestrial 3D laser scanning, with deliverables including point clouds, measurable images, and topographic maps (Miller et al. 2021).

RECOMMENDATIONS

The great potential of this site for future research requires intensive testing before land loss takes an even heavier toll. Additionally, as stated by UWF researchers in 2020, management recommendations should include limiting site access, banning new fire breaks, periodic monitoring, and avoiding impacts from future prescribed burn programs.



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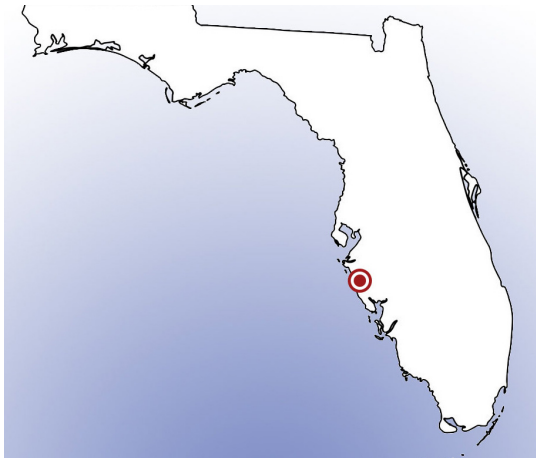


PROFILE

County Sarasota

Size

- **Square Miles** 14
- **Population** 54,842

Certified Local Government Yes

Archaeology Regulations

- Archaeology ordinance requires review of all projects for effects on archaeological sites

Recent Resiliency Initiatives

- Climate Adaptation Plan, 2018
- Vulnerability Study of Sea Level Rise in Sarasota County, 2017
- Coastal Vulnerability Assessment, 2016

Regional Site Snake Island

CASE STUDY 2 – SARASOTA

HISTORIC SIGNIFICANCE

Sarasota lies adjacent to the Gulf of Mexico on Sarasota Bay and is known for its beaches and its rich architectural heritage. Incorporated in 1913, Sarasota grew substantially during the Florida Boom in the 1920s. City limits incorporate Sarasota Bay and several barrier islands, including Lido, St. Armands, Otter, Casey, Coon, Bird, and portions of Siesta and Longboat Keys. Sarasota Bay is fed by fresh water from Whitaker and Hudson Bayous and Bowlees Creek and is designated as an "Outstanding Florida Water."

The name "Zara Zota" (Sarasota today) dates to 1539 when Hernando de Soto visited the area. In the late 1800s early settlers arrived from the north, including William Whittaker, who established the first home and cattle ranch. In 1911, the Ringling Brothers Circus began wintering in Sarasota, and later built a fabulous home, now a museum on the bayfront. Amish and Mennonite visitors to the area from the north were attracted by both the weather and by the opportunities offered for winter farming. Sarasota has developed around the Amish town of Pinecraft. In the 1920s, hundreds of homes were platted and built in Pinecraft and later in Homecraft to house Amish and Mennonite "snowbirds." Today thousands of Amish live and work there and others visit during the winter months, adding to the local cultural diversity.

VULNERABILITY

The average elevation of Sarasota is seven feet above mean sea level. The City felt the effects of Hurricanes Hermine, Emily, Matthew, Irma, and Nate during 2016 and 2017, as well as Elsa in 2021. Matthew and Irma were the worst to hit the area in memory. Sarasota is fourth on Sperling's List of the worst places in Florida for hurricanes. The Florida DEP has designated 24.2 miles of county barrier island beaches as critically eroded. King Tides periodically flood low lying areas, particularly on the barrier islands. Flood risk in the area is expected to increase from 8% in 2020, to 25% in 2030, and 40% in 2040.

Aerial image of downtown Sarasota, 1946. (Florida Memory)

CULTURAL RESOURCE MANAGEMENT

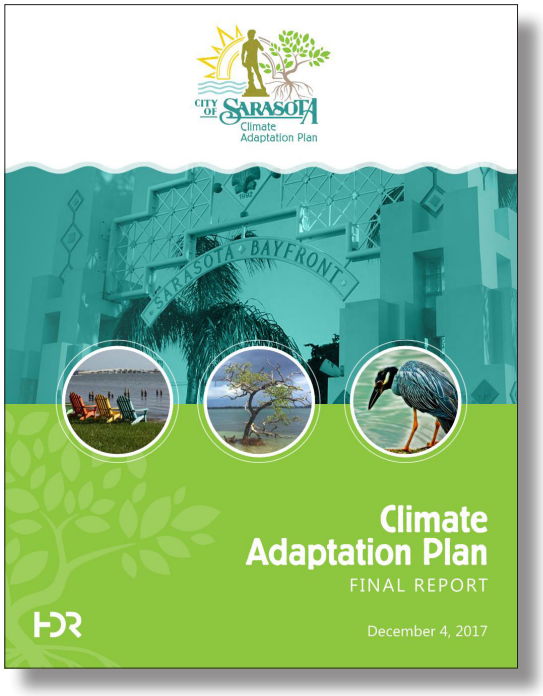
ARCHAEOLOGICAL RESOURCES

Dozens of archaeological sites have been recorded within the city and county of Sarasota. The edge of Sarasota Bay and the nearby islands have always drawn human populations. Significant sites ring the bay, including several pre-contact mound sites, coastal and riverine shell middens dating to the Archaic Period (1,000- 3,000 BC); large shoreline village sites and smaller camp sites dating to the Manasota (500 BC – 800 AD) and the Safety Harbor (1400 A.D. – contact) Periods. The "Tampa" subgroup of the Tocobago people was encountered at Sarasota Bay at the time of contact when the Narvaez and de Soto expeditions arrived. Spanish and Cuban fishermen later inhabited the area from the time of contact until the mid-1830s. Submerged archaeological sites may be present in the bay, relating not only to the Spanish explorers, but also to the early Paleoindian Period, later local fisheries, and trade with Cuba, even into the Civil War era when the confederates were trading with Havana.

Several recorded shipwrecks and the possible remains of these marine activities may lie beneath the Sarasota Bay waters, including the 1930 wreck of the Ringling's private yacht. No state parks are located within the city of Sarasota. However, Myakka River and Oscar Scherer State parks are nearby within Sarasota County. They contain archaeological sites but are not subject to sea level rise at this time. Undiscovered subsurface archaeological sites/deposits can be expected in the grounds surrounding structures over 50 years old, especially within historic districts.

PRESERVATION PLANNING

A preservation ordinance was established by the City of Sarasota in 1983 and revised in 1986; the city became a Certified Local Government in 1986. *The Historic Preservation Support Document* is a compilation of pertinent historical information, including prehistory and archaeology of the area, as well as applicable state preservation regulations. Section 4821 of the city zoning code requires review of project effects on archaeological resources, resulting in recommendations for avoidance or mitigation. Mitigation testing and excavations are carried out by consultants. The Historic Preservation Planner in the City Planning Department is an archaeologist, and the city has recently established a Sustainability



City of Sarasota

Coordinator (resiliency officer) position. The ordinance purports to "protect archaeological sites which may reveal important information," and the Historic Preservation Board can recommend "designation" of archaeologically significant sites with owner's consent.

RESILIENCY AND CULTURAL RESOURCE MANAGEMENT

The foci of local sustainability are the improvement of infrastructure and serving all parts of the community equitably, without explicit concern for cultural resources. A *Climate Adaptation Plan* was approved by the city in 2018, that lists cultural and historical resources as areas of possible projected impact by storms, but these resources are not mentioned as "prioritized vulnerabilities." The Plan addresses possible impacts to infrastructure.

In 1997, Chapter 66 of the Sarasota County Code was enacted to formalize the review of historical resources in conjunction with certain development applications, and to establish a County Archaeologist position. Over 500 archaeological sites have been listed by the County in a local register of historic places, including significant sites such as Spanish Point, Little Salt Spring, and Warm Mineral Springs. The Sarasota County History Center focuses on the preservation of historic and archaeological sites in the county, with the archaeologist and a Historic Preservation Specialist on staff. In response to major storm damage in Punta Gorda and Arcadia in 2005, county preservation staff and county Emergency Management Department personnel formed a coalition of preservation stakeholders to work together to improve disaster planning for cultural resources. They created a rating system to prioritize resources, formed action plans for the future, and determined that the top three hazards to plan for were flooding, high winds, and tidal surge. However, the emphasis was on historic structures, and archaeological sites were not mentioned.

In 2017 a *Vulnerability Study of Sea Level Rise in Sarasota County* was compiled. It addresses effects on roadways, wetlands, poverty, the elderly, and transportation, but does not consider protection of cultural resources. In 2020 the county received a $125,000 state grant to study vulnerability, but again, cultural resources were not expected to be addressed. Areas of emphasis were beaches, infrastructure, and building a better dune system.

The Sarasota County Comprehensive Plan, *Sarasota 2050*, contains a chapter on historic preservation. Overall, the 2050 Plan seeks "to improve the quality of life for the community through a unique growth management framework that allows for continued growth and economic development while preserving environmentally sensitive lands and open space within a fiscally neutral approach." It specifies that floodplain areas are to be avoided.

LOCAL PARTNERS

The City of Sarasota differs from the other case study cities, in that a coalition of preservation stakeholders was formed in 2005 to address disaster planning, primarily for standing structures. This groundwork could be called upon to formulate plans for archaeological site protection

as well. The Historic Preservation Alliance formed in 2005 and included, among other regional agencies, representatives from the Sarasota Alliance for Historic Preservation, the Historical Society of Sarasota (both county wide citizens organizations), and the City of Sarasota Planning Department. In 2018, another coalition was formed when the faculty at New College partnered with Marie Selby Botanical Garden and DeSoto National Memorial for a pilot project to address the implications of rising sea levels between Tampa Bay and Charlotte Harbor. Other agencies and entities in the area include: the West Central Region FPAN office, the Historic Preservation Coalition, the Sarasota Historical Society, the Sarasota Alliance for Historic Preservation, Sarasota History Alive!, the Anthropology Department of New College, Warm Mineral Springs/ Little Salt Spring Archaeological Society, and the Central Gulf Coast Archaeological Association.

CURRENT SITE PROTECTION ACTIVITIES

The City of Sarasota preservation ordinance may provide a level of protection of privately owned sites from destruction, although the ordinance does not contain a full explanation of this possibility. The Sarasota County archaeological program provides for the review of construction permits for the presence of site potential, and mandates survey and excavation if a site is found to be significant.

The Florida Public Archaeology Network regional office in Tampa administers a site monitoring program that includes Sarasota County. One site in Sarasota County was visited by FPAN recently that is addressed in the recent report on the *Heritage Monitoring Scouts Program* (Miller et al. 2021). While it is not within the city limits, Spanish Point is a well-known and quite significant archaeological site open to the public. It offers an example of the effects of local shoreline erosion. A portion of the extensive shell midden is threatened by wave action from storms and passing boats, and numerous artifacts have washed out of the midden. The site is managed by "Selby Gardens Historic Spanish Point," a park that also contains historic structures.

RECOMMENDATIONS

Studies on the impacts of flooding and sea level rise vulnerability identify the presence of historic resources and the next key opportunity is to prioritize resource most threatened for research, documentation, and potential stabilization where possible. Publications that address historic structures should also include archaeological resources to help landowners and partner agencies develop site protection plans.

SNAKE ISLAND SITE - KEY FACTS

Located in Sarasota County

Overview

- Situated around a two-acre island located at the mouth of the Venice Inlet
- Site includes multiple components
- Used as a temporary spoil storage site for fill when the Intercoastal Waterway was dredged and maintained

Time Periods

- Late Archaic, Safety Harbor, and late 19th/ early 20th Century

Threats

- Accelerated rate of erosion
- Trees that become storm damaged

Management

West Coast Inland Navigation District

Mitigation Efforts

- A site stabilization plan was proposed in 2001
- A stabilization project for the western shore was completed in 2014
- Erosion accelerated after stabilization efforts necessitating additional work

Recommendations

- Continued monitoring and adherence to previous recommendations

Snake Island Site

SNAKE ISLAND SITE (8SO02336)

This multicomponent site lies on and around the perimeter of a two-acre island located at the mouth of the Venice Inlet in Sarasota County. It contains artifacts from the Late Archaic, Safety Harbor, and late-19th to early-20th Century. The island was used as a disposal site during the construction of the Intracoastal Waterway. During the dredging and maintenance of the Intracoastal Waterway (ICW, completed in 1949), the USACE used numerous areas, including Snake Island, as spoil storage sites for fill from the dredging activities.

The Snake Island Site was identified and recorded in 1995 after cultural material and a shell midden were observed eroding from the shore. Intermittently, over a period of five years from 1995 to early 2000, a monitoring and surface-collection study was conducted to salvage data eroding from the site. There is also an early-20th century homestead component at the site, which was determined NR eligible in 2001.

STABILIZATION ISSUES

This site experienced an accelerated rate of erosion along the western shore and the southwestern and southern sides of the island, where cultural deposits are concentrated. Nearly all of the Australian pines along the southwestern and southern sides of the island toppled during erosion episodes and only cut stumps remained that have since been removed.

Snake Island Site, after stabilization.

MANAGEMENT APPROACHES

After an assessment survey in 2001, a stabilization project was proposed that was conducted in 2013-2014 by the West Coast Inland Navigation District to address erosion and protect the site. The undertaking included the construction of three rock revetment structures, one to the north, one to the south, and one to the west of the island to form a containment basin for the placement of fill to stabilize island erosion. Work was designed by coastal engineers Humiston and Moore, Inc., reviewed by the Florida Division of Historical Resources, permitted by the U.S. Army Corps of Engineers, constructed by TSI Disaster, Inc., and monitored by Koski et al., (2015).

OUTCOME

After removal of the Australian pine stumps, three rock structures (two groins and a break water) were constructed, one at the north end of the island 170' in length; one at the south end 245' in length; and one 80' breakwater structure west of the island. The rock structures provided a protective containment area for the placement of fill to stabilize the western shore and to protect the Snake Island Site on the south and southwest shore.

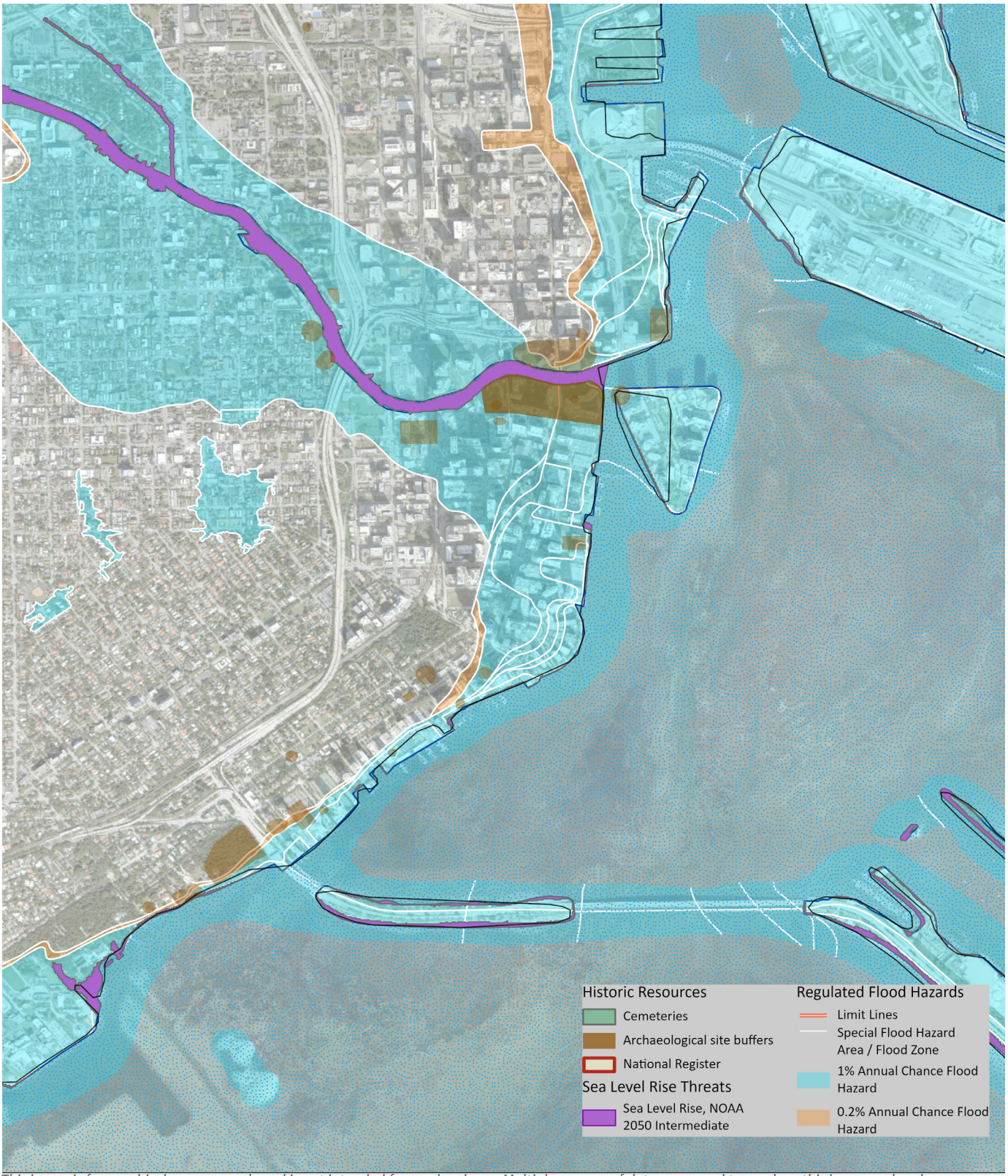
Boating activity around Snake Island. (City of Sarasota)

RECOMMENDATION

The stabilization team recommended that the completed project be monitored on a monthly basis for the first year, then quarterly, and then intermittently as appropriate (e.g., after a hurricane). It was also recommended that additional stabilization filling along the west shore containment basin be conducted when needed. If erosion were determined to be rapid and continued filling of the containment basin were found to be cost prohibitive, it was recommended that modifications to the revetment structures be considered and implemented.

RECENT STABILIZATION EFFORTS

Since initial stabilization, erosion of Snake Island has accelerated. Spoil from nearby dredging has been placed on the site to increase stabilization and the revetments have been expanded. Use of a living shoreline approach is under consideration (Steve Koski, Sarasota County Archaeologist, personal communication 2022).



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PROFILE

County Dade

Size

- **Square Miles** 1899
- **Population** 2,701,767

Certified Local Government Yes

Archaeology Regulations

- Archaeology ordinance requires a Certificate to Dig (county)

Recent Resiliency Initiatives

- Climate Action Strategy, 2021
- Resilient 305 Strategy, 2016, 2021 update
- Office of Resiliency established
- Southeast Florida Regional Climate Change Compact Founder

Regional Site Totten Key Complex

CASE STUDY 3 – MIAMI

HISTORIC SIGNIFICANCE

The Miami-Dade County metropolitan area is a unique coastal location comprising a highly developed barrier island chain and a low-lying mainland. The area was occupied by Native Americans in pre-contact times and the Spanish encountered the Tequesta people in the 16th century. The Seminoles populated the region after the early 1800s.

Portions of the coastline stand directly adjacent to the beaches of the Atlantic Ocean, and bulkheads are a common sight throughout the city. Modern development began in the 1920s, when many small islands were ringed by seawalls and filled with sand to eventually support a multitude of buildings; today The Miami Beach Architectural District (sometimes called the Art Deco District) contains the largest concentration of 1920s and 1930s resort architecture in the United States.

The area along Biscayne Bay was occupied throughout the pre-contact period. The Spanish encountered the Tequesta people during the 16th century, and the Seminoles Indians populated the region after the early 1800s. Today, Miami's vibrancy is accentuated by the presence of a variety of cultural groups and a diversity of heritage, including Haitians, Cubans, South Americans, Europeans, and others from numerous countries.

Barges settled on land after 1926 hurricane in Miami. (Florida Memory)

VULNERABILITY

"Sunny day flooding" is now part of the Miami vernacular. Sea level is rising 6 times faster than elsewhere in the U.S, and the salt water "wedge" pushing fresh and toxic water up through the porous limestone substrata has increased 400% in ten years (Moriba and Harvey 2018). For 20 days each year the tide is higher than the land surface, and continued rise is expected. King Tides are regular harbingers of things to come and most of Miami's barrier island coastlines have been designated as critically eroded by the Florida Department of Environmental Protection.

Combined with strong hurricanes and resulting tidal surge, Miami faces losses of structures, local culture, and economic stability. The coastal area is first on Sperling's List of the worst places in Florida for hurricanes. It has been hit by about 35 hurricanes since 1903, with massive devastation occurring on September 18, 1926, and during Andrew (1992) and Katrina (2005); as well as major damage during Irene and Floyd (1999), and Wilma (2005). Current protection efforts include raising seawalls and street surfaces, removing septic tanks, and initiating new building codes. Governments in the metropolitan area include Miami-Dade County, the City of Miami, and the City of Miami Beach. Each entity is now struggling with the effects of sea-level rise and storm surge, including erosion, septic tank leakage, and damage to structures and city infrastructure.

CULTURAL RESOURCE MANAGEMENT

ARCHAEOLOGICAL RESOURCES

Hundreds of archaeological sites have been recorded in Miami-Dade County. A variety of site types, populated by the Tequesta people, date from the Archaic/Glades I Period (3,000 – 5,000 BP) through the Spanish colonization era to 1763. Sites from later centuries also exist, documenting city history and regional development. Undiscovered subsurface archaeological deposits can be expected on the grounds of significant historic structures, especially within historic districts.

Many sites lie directly adjacent to the coastline or along waterways that feed into Biscayne Bay, where large areas are successfully managed by the National Park Service. Other sites on public lands include the Deering Estate, Biscayne National Park, Everglades National Park, Biscayne Bay Aquatic Preserve, Bill Baggs Cape Florida State Park, and Oleta River State Park. The submerged bottomlands of Biscayne National Park are also rich in archaeological remains, including at least six shipwrecks on the Maritime Heritage Trail. The earliest of these recorded wrecks dates to the 18th century.

In conjunction with the Heritage Monitoring Scouts (HMS) program spearheaded by the Florida Public Archaeology Network (FPAN), some of the sites in Miami-Dade County were monitored and documented in a statewide report (Miller et al. 2021) that provide examples of rising sea level and storm effects. Sites in Bill Baggs Cape Florida State Park were noted to show effects from wave action, flooding, wind, visitor traffic, storm surge, animal disturbance, and active erosion. Sites in the park have been defined as extremely vulnerable to sea level rise and many are impacted by King Tides. The Miami Circle at Brickell Point (8DA00012), a National Historic Landmark managed by the Florida Division of Historical Resources, is in serious declining condition and has been recommended for monitoring after every storm. During Hurricane Irma, the storm surge almost reached the site. As a result of the FPAN study, the Oleta River Mound (8DA00024) and the Miami Circle have been approved for terrestrial laser scanning to provide immediate 3D documentation to improve tracking through time.

Miami-Dade County

PRESERVATION PLANNING

The Miami-Dade Office of Historic Preservation supports an Archaeologist position as well as a Historic Preservation Board. The Office is responsible for 45 sites in public ownership, and issues Certificates to Dig on private property. Archaeological monitoring, survey, and excavation are carried out by consultants. In terms of protecting and preserving sites from sea level rise, at least two State Parks in the Miami-Dade region contain archaeological resources. Preservation and protection activities are included in their park management plans, but neither the Bill Baggs Cape Florida State Park Management Plan nor the Oleta State Park Unit Management Plan addresses protective measures for archaeological resources.

RESILIENCY AND CULTURAL RESOURCE MANAGEMENT

Miami-Dade County has an Office of Resilience integrates resilience into all county programs and operations, to identify vulnerabilities, and to coordinate with stakeholders. Representative documents and City officials do not indicate that the protection of archaeological sites or other cultural resources are considered.

LOCAL PARTNERS

In addition to the city, the county, and state and federal parks, such as the nearby Everglades National Park, stakeholders specifically include the Miami-Dade County Department of Parks, Recreation and Open Spaces, Southeast Florida Archaeological Society, the Archaeological and Historic Conservancy (a not for profit consulting firm), the Southeastern Regional Office of the Florida Public Archaeology Network, and the HistoryMiami Museum which conserves local archaeological collections.

The Greater Miami and the Beaches "Resilient 305 Strategy," representing a partnership between the City of Miami, Miami-Dade County, and the City of Miami Beach, contains, among other things, a list of 23 preservation tools and case studies to guide protection activities. Ideas possibly applicable to archaeological site protection include dune and barrier island enhancement, seawall improvement, increased living shorelines and permeable surfaces, mangrove and other wetland restoration, and artificial reef and breakwater construction. The partnership is part of "100 Resilient Cites" pioneered by the Rockefeller Foundation. However, there is no specific discussion of archaeological sites in the document.

There are at least three major preservation organizations in Miami that work to protect historic structures, all citing cultural resource preservation as a goal. However, none cite archaeological site preservation in documents and web sites available to the public. The Southeast Florida Regional Climate Compact is a partnership formed in 2010 between Broward, Miami-Dade, Monroe, and Palm Beach counties to coordinate sea level rise mitigation and adaptation activities. Their stated goal is to collaborate toward reducing regional greenhouse gas emissions, implementing adaptation strategies, and building climate resilience across the Southeast Florida region. Cultural resources are not mentioned within their stated goals.

CURRENT SITE PROTECTION ACTIVITIES

Both the City of Miami and Miami-Dade County have historic preservation ordinances designed to protect and preserve cultural resources, including archaeological sites and zones. The *Dade County Comprehensive Plan* prioritizes a responsibility for archaeological site and historic structures in public ownership, and the Office of Historic Preservation employs a full-time county archaeologist. The county is responsible for 45 archaeological sites and zones, along with multiple historic sites and districts.

The *Bill Baggs Cape Florida State Park Management Plan* includes procedures for site preservation provided by the Florida Division of Historical Resources, with definitions established by the US Department

of the Interior, including those for restoration, rehabilitation, stabilization, and preservation (DHR 2007). A three-part scale is used to describe the sites as in good, fair, or poor condition. However, the plan does contain an active protection program for archaeological resources, including a recommendation that the natural restoration program be expanded to protect archaeological sites. The stated objective, to bring cultural resources "into good condition," has not been expanded to state specific tasks to be undertaken. The *Oleta State Park Unit Management Plan* similarly mentions DHR site preservation regulations and states that archaeological sites lie within the park, but few details are provided. The primary management measure focuses on protection from vandalism.

In 2008, a Coastal Management Element was added to the *Miami-Dade Comprehensive Plan* with the stated goal of providing "for the conservation, environmentally sound use and protection of all natural and historic resources." The stated goal of Objective CM-12 is to "protect, preserve, and sensitively reuse historic resources and increase the number of locally designated historic sites and districts and archaeological sites and zones in the coastal area." A subsection continues by promoting increased protection of historic resources from damage by natural disasters and recovery operations; and it specifically mandates preservation and protection of archaeological sites within the coastal area by implementing hazard mitigation measures.

On the other hand, the *Miami-Dade County Beach Erosion Control Master Plan*, does not address archaeological preservation and focuses on renourishment, groin construction, and breakwater structures. The first local erosion study was done in 1930, only a few years after the area really began to develop. Since 1975, the Miami coastline has been periodically renourished to better increase tourism and access, particularly in seven specific "hotspots." As a result of Hurricane Irma in 2017 the county lost an estimated 170,000 cubic yards of beach sand; in 2005, Hurricane Wilma brought extensive erosion to Bill Baggs Cape Florida State Park; and in 1999, Hurricane Irene left water standing in some areas for thirty days.

Today, much of the offshore sand has been depleted. The county and the US Army Corps of Engineers are seeking to use sand lying adjacent to other counties as well as from the Bahamas. Meanwhile, county locations considered at highest risk of erosion are Key Biscayne, Miami, Miami Beach, Biscayne Park, Bar Harbor Islands, Sunny Isles Beach, and Golden Beach. "Miami" includes several "villages," such as Coral Gables, some of which have their own Comprehensive Plans.

Totten Key Complex (National Park Service)

TOTTEN KEY COMPLEX (8DA03439)

The Totten Key Complex is located on the west side of Totten Key along Crane Creek in Biscayne National Park. The site lies within a rockland hammock natural community, defined by the Florida Natural Areas Inventory as "a rich tropical hardwood forest on upland sites in areas where limestone is very near the surface and often exposed." This complex comprises three subsites: Totten Key Earthen Midden, Totten Key Mound, and Tequesta Sink (Figure). The Earthen Midden is approximately 120 meters (393 feet) long and has been eroding for over forty years. The Totten Key Mound is a limestone mound that appears similar to other rock mounds and structures identified throughout southeast Florida, though few of these remain today. The Tequesta Sink was recorded in 2017 as a small geological sink whose base is approximately 75 cm below the surrounding ground surface.

Radiocarbon (C-14) dating and known dates of manufacture for the pottery found indicate site occupation began during the Glades II period and continued through time to include European artifacts (A.D. 750-1700). The site is significant in that it is one of few remaining Tequesta sites in southeast Florida and for its potential to provide new information about early cultural contact between Native Americans and the Spanish during the 16th century. In 2019, SEAC determined that the Totten Key Complex is eligible for National Register of Historic Places (NRHP) listing based on its potential to yield important information on a wide range of research topics.

TOTTEN KEY COMPLEX - KEY FACTS

Located in Miami-Dade County

Overview

- Situated along Crane Creek
- Components include three subsites: Totten Key Earthen Midden, Totten Key Mound, and Tequesta Sink

Time Periods

- Glades II period through European artifacts (A.D. 750-1700)

Threats

- Highly vulnerable to sea level rise, severe storm surge, abnormal tides, increased erosion, and higher intensity major meteorological events
- Sustained damage following Hurricane Sandy in 2012

Management

Biscayne National Park, National Park Service

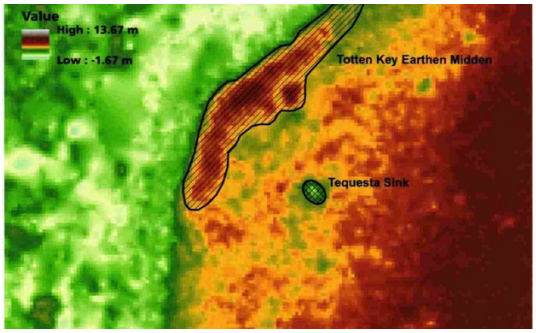
Mitigation Efforts

- Funding for post-Hurricane Sandy requested for archaeological data collection and evaluation of site stabilization
- Study found that proposed stabilization measures would not be successful given the conditions

Recommendations

SEAC recommends the following actions:

- Complete a National Register nomination for the site, conduct investigations into the untested limestone rock mound
- Conduct additional shovel testing and/or sediment coring to determine site boundaries in specific areas
- Evaluate the Tequesta Sink
- Develop an erosion monitoring program
- Conduct Phase III data collection as soon as feasibly possible before the site is lost



Aerial imagery of Totten Key

STABILIZATION ISSUES

The Totten Key Complex is highly vulnerable to the effects of climate change including sea level rise, severe storm surge, abnormal tides, increased erosion, and increasingly intense storm events. The site sustained damage following Hurricane Sandy in 2012 and led to the study discussed below.

MANAGEMENT APPROACHES

In 2014, NPS requested funding for post-Sandy archaeological data collection and evaluation of site stabilization at the Totten Key Complex. Despite the wealth of information provided by the subsequent archaeological survey (Parsons, Rothrock, and Schwadron 2018), the excavations provided only a small sample of the site that is currently being lost to erosion. Intentional site stabilization was considered but was ruled out based upon its location and environmental setting.

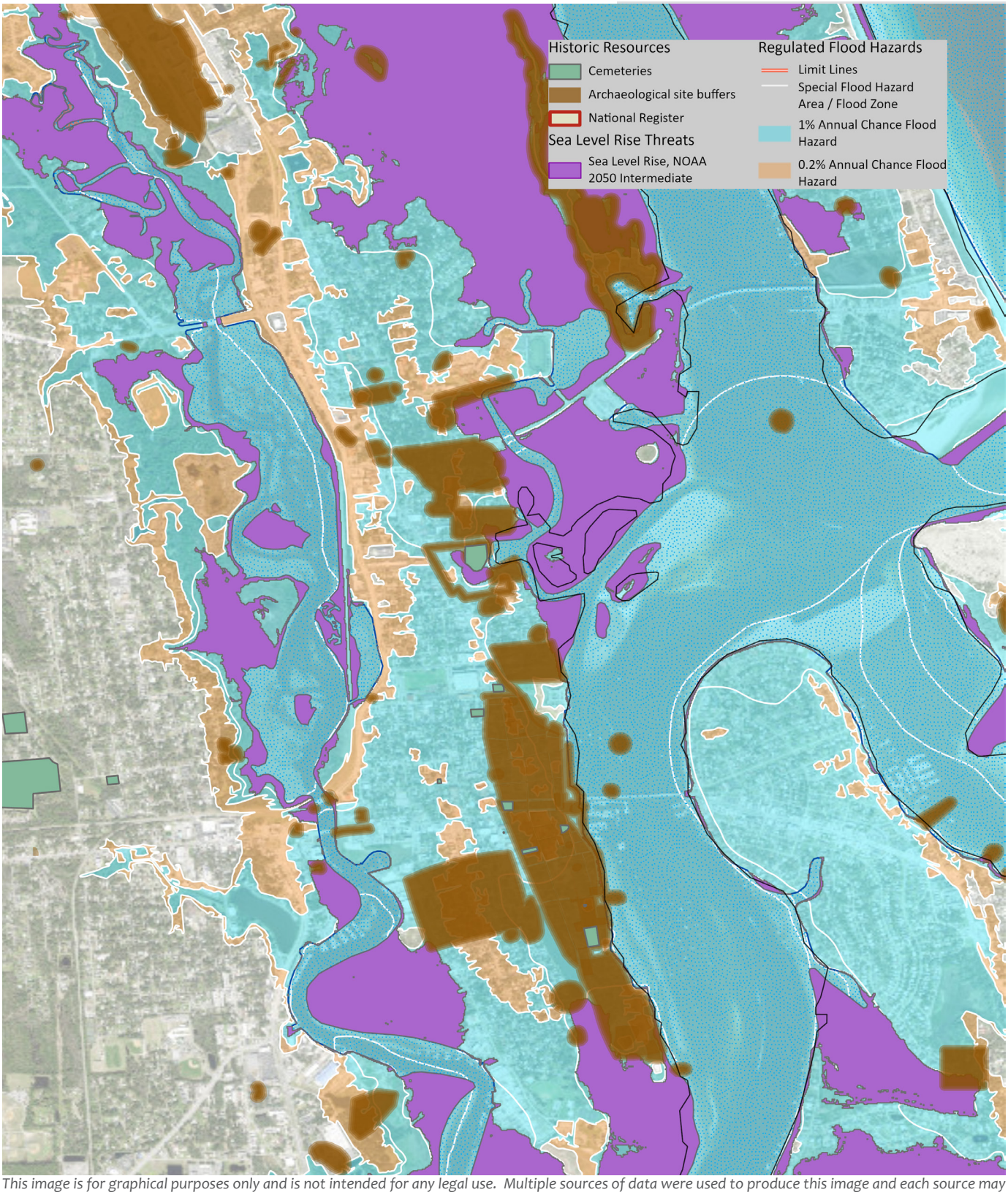
A team of geologists and biologists from Florida International University examined the site as part of a stabilization assessment for sites in Biscayne National Park and Everglades National Park. Unfortunately, the location of the Totten Key Complex in a high energy setting makes it highly unlikely that soft-stabilization efforts such as living shorelines would be successful. Hard stabilization efforts, such as the use of limestone riprap (originally proposed by the park) would be very labor intensive and costly because of the remote location. Also, it is unlikely that riprap would provide a long-term solution. Because stabilization of the site is unfeasible, mitigation of data loss through additional excavation was strongly recommended.

SEAC also verified that the site is highly vulnerable to the effects of climate change including sea level rise, severe storm surge, abnormal tides, increased erosion, and higher intensity major meteorological events. Ultimately it was determined that the proposed stabilization measures would not be successful given the specific conditions at 8DA3439, the Totten Key Complex.

RECOMMENDATIONS

SEAC recommends the following actions for management of the site:

- Complete a National Register nomination for the site, conduct investigations into the untested limestone rock mound;
- Conduct additional shovel testing and/or sediment coring to better determine site boundaries in specific areas;
- Evaluate the Tequesta Sink; develop a formal erosion monitoring program; and
- Conduct Phase Ill data collection as soon as feasibly possible before the site is lost.



This image is for graphical purposes only and is not intended for any legal use. Multiple sources of data were used to produce this image and each source may have varying degrees of accuracy. Contact the following entities to obtain this data directly Esri, Federal Emergency Management Agency National Flood Insurance Program, Florida Master Site File, Florida Department of Environmental Protection, National Oceanic and Atmospheric Administration.

PROFILE

County St. Johns

Size

- **Square Miles** 9
- **Population** 14,329

Certified Local Government Yes

Archaeology Regulations

- Archaeology ordinance requires review of all projects in designated archaeology zones

Recent Resiliency Initiatives

- Flood Mitigation Design Guidance for Historic Residences, 2021
- Resilient Heritage in the Nation's Oldest City, 2018
- Adaptation Plan, 2017
- Coastal Vulnerability Assessment, 2016

Regional Site Shell Bluff Landing

CASE STUDY 4 – ST. AUGUSTINE

HISTORIC SIGNIFICANCE

St. Augustine, settled by the Spanish in 1565, has been continuously occupied since its founding. Located in St. Johns County, one of the most popular developing areas in Florida where residents are struggling with the effects of overdevelopment, traffic, and water-related hazards. The cultural resources of the city, including archaeological sites, are addressed in ordinances and other city regulations, but the question of flooding is now paramount.

The area contains evidence of occupation going back to early pre-contact peoples. When the Spanish arrived, they met the Timucuan people and other native groups that later moved southward into the Spanish colony. For over 450 years, the city has been characterized by cultural diversity. As a Spanish and later a British colony, "strangers" visited from all over the world, some returning frequently and some taking up residence. Early residents of Spanish, African, Caribbean, and Native American origin intermarried, fought on behalf of the Spanish, and joined the Catholic church. In the British Period (1763-1784), St. Augustine served as the capital of East Florida. A group known as Minorcans, actually a group of mixed Mediterranean settlers, moved to St. Augustine from a failed settlement at New Smyrna. While many townsfolk departed when

the city changed hands, a few always stayed, and Minorcan heritage in particular has remained strong into the 21st century.

In the mid-1800s, multiple hotels drew winter visitors, and in the late-1880s, Henry Flagler built palatial hotels for wealthy visitors and changed the city forever. After Florida became a U. S. Territory, the city was the capital from 1821 to 1824, when Tallahassee was chosen as the capital. St. Augustine has been the home of the Florida National Guard Headquarters since 1821.

VULNERABILITY

The average grade elevation in St. Augustine is seven feet above mean sea level. Since 1930, 79 hurricanes have been recorded locally, and the city floods at least once nearly every year. Recently, very serious flooding and surge events accompanied Hurricanes Matthew and Irma. During very high tides, underground resources are inundated and during hurricanes and high winds coastal sites are affected by storm surge and wave action. St. Augustine may also be facing the loss of archaeological sites, buildings, streets, and its colonial ambiance due to sea level rise, with a one-foot rise predicted by 2030 and as much as three feet by 2060. While St. Augustine residents may not agree, St. Augustine is not at the top of Sperling's List of areas along the Florida coast most likely to be hit by a hurricane.

CULTURAL RESOURCE MANAGEMENT

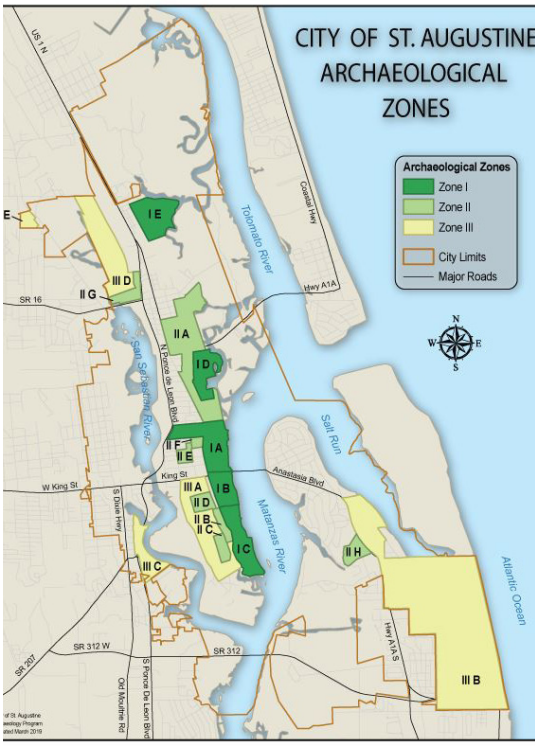
ARCHAEOLOGICAL RESOURCES

The city lies on a strip of coastal ridges separating the Atlantic Ocean from a narrow lagoon system connected by the Intracoastal Waterway. The Tolomato River runs from Jacksonville to St. Augustine, while the Matanzas River reaches from the city south to the Matanzas Inlet. Interconnected waterways support saltwater marshes that provided pre-contact, Timucuan, and historic people with an abundance of food resources, and many archaeological sites are directly adjacent. Prior to the Timucua people, encountered by the Spanish settlers, local populations can be dated back to about 3,000 B.C. Tidal surge and boat traffic affect sites and shell middens along all area waterways, and these continue to erode from tidal surge and wave action. The waters of the Atlantic Ocean, Matanzas Bay, and associated waterways contain both recorded and recorded shipwrecks and other inundated remains that have been affected by erosion and scouring related to storm surge.

Much of the built environment of the St. Augustine Historic District lies over buried archaeological resources from pre-contact times, the Spanish and British eras, and later. Professional excavations began in the 1930s and continue today under the auspices of city government. Since much of the bayfront is currently protected from erosion and wave/wake action by a seawall (itself an historic site), a measure of protection is provided, although strong storm surge is not stopped by the seawall. At this time no archaeological sites within the city limits are eroding but are threatened by rising water tables that disturb strata during hurricanes and times of high water when the downtown area becomes inundated. Significant sites within the city include the Castillo de San Marcos, the

Flooding over the seawall and on grounds of the Castillo de San Marcos National Monument.

Pond feature overtopped and encroaching into St. Augustine's Sacred Acre near La Leche site.



City of St. Augustine Archaeology Zones

RESILIENCY AND CULTURAL RESOURCE MANAGEMENT

Recent preservation planning studies prepared for St. Augustine referencing archaeological resources include:

2015 *Planning for Sea Level Rise in the Matanzas Basin*

2016 University of Florida Resilient Communities Initiative

2017 *Florida Community Resilience Initiative Pilot Project: Adaptation Plan for St. Augustine*

2018 *Historic Preservation Master Plan* (enhanced the support of the archaeology program)

2019 City staff presentation via a 1000 Friends of Florida Webinar entitled *Resilient Heritage in the Nation's Oldest City*, recognized the goal of archaeological site protection.

2021 FPAN produced *Heritage Monitoring Scouts: Assessing Archaeological Sites at Risk*

Mission of Nombre de Dios, Fish Island, and many more. It is important to recognize that, although they may not yet have been sought, subsurface archaeological sites/deposits can be expected in the yards of significant historic structures, especially within historic districts.

PRESERVATION PLANNING

In 1986, St. Augustine enacted the Archaeological Preservation Ordinance to protect and preserve buried resources, and to establish a City Archaeologist position. Eighteen archaeological zones were established, including three Historic Preservation (HP) districts, and regulations for archaeological investigation were included. Since then, all subsurface impacts on private and municipal property requiring permits have been preceded by monitoring, testing and/or excavation by the City Archaeologist with the assistance of the St. Augustine Archaeological Association (SAAA). The city also has a Historic Preservation Officer, a Preservation Planner, a Resiliency Officer, and a second City Archaeologist, hired in 2019.

The *St. Johns County Comprehensive Plan* contains a chapter (A.1.4) on historic preservation that establishes a Cultural Resource Coordinator position, as well as a volunteer Cultural Resource Review Board. The St. Johns County Growth Management Department, Cultural Resource Coordinator is responsible for reviewing all development applications for ensuring the protection of the County's historical and archaeological sites, applying for and managing Cultural Resource grants, and is staff liaison to the Cultural Resource Review Board.

In addition, underwater archaeological staff of the St. Augustine Lighthouse Maritime Archaeology Program (LAMP) survey, record, investigate, and attempt to protect local and regional underwater resources. They also conduct underwater archaeology field schools locally, as does the archaeological faculty of Flagler College. Also, FPAN's HMS program monitors local archaeological sites adjacent to waterways, and the SAAA functions as steward of the city's Fish Island Preserve as well as the La Punta mission site cemetery.

In 2010, the Northeast Florida Regional Council used a grant from the Environmental Protection Agency (EPA) to participate in a nationwide Sea Level Rise (SLR) planning and awareness project. Responding to increased frequency and severity of recent storms, St. Augustine has been the focus of several efforts related to sea level rise and future resilience although most do not specifically address archaeological or other cultural resource preservation.

LOCAL PARTNERS

Agencies and entities solely concerned with archaeology in St. Augustine include: the City Archaeology Program, the St. Augustine Archaeological Association, and the local FPAN Northeast Office. The underwater program at St. Augustine Lighthouse and Maritime Museum (LAMP), is very active with offshore archaeological resources, and employs several full-time archaeologists. Founded in 1999, the LAMP research program conducts research and maritime archaeology to better understand and share 500 years of maritime heritage in the State of Florida.

At the county level, the St. Johns County Office of Historic Preservation Management is staffed by a Cultural Resources Coordinator and supported by a volunteer board.

The St. Augustine Historical Society (SAHS) preserves the archaeological elements present on their properties, as does the Mission of Nombre de Dios. The Friends of Fish Island is a volunteer group concerned with preservation of environmental and archaeological resources at Fish Island Preserve. St. Augustine is home to many preservation professionals who often work together to achieve historic preservation goals and are interested in archaeological matters. Flagler College has an Anthropology Department that offers students an archaeology focus or a cultural anthropology focus. The Tolomato Cemetery Preservation Association and the Huguenot Cemetery Restoration Committee are active volunteer groups.

CURRENT SITE PROTECTION ACTIVITIES

Current site protection activities include survey, site evaluation, and excavation either conducted or overseen by the City Archaeological Program; the monitoring activities of FPAN's HMS program; and any surveys and excavations carried out by consulting archaeologists in cooperation with the City Program and/or St. Johns County. FPAN's HMS program has recently worked together with the St. Augustine Archaeological Association (SAAA), the local chapter of the Florida Anthropological Program (FAS), in their monitoring efforts and as stewards of the National Register-listed Fish Island Preserve. In recent years, the St. Johns River Water Management District has contributed almost 4 million dollars to the St. Johns County resilience effort, approximately matching county funds. However, these monies were used for drainage improvements.

RECOMMENDATIONS

Multiple reports and initiatives were developed within the last 5 years that included identifying risks of climate change to historic properties in the city. An important next step is to develop a mitigation plan for archaeological sites on public lands including terrestrial and submerged sites to establish a prioritized means to document or stabilize sites. In addition, St. Augustine can set another example of preservation best practices by developing a long-term curation plan for existing and future archaeological collections considering the significance of the types of sites that have been excavated.

SHELL BLUFF LANDING- KEY FACTS

Located in St. Johns County

Overview

- Coastal shell midden occupation site with intact Colonial well made of coquina blocks

Time Periods:

- Late Archaic; the Florida Transitional Period; the St. Johns I & II periods; 17th century and early-19th century Spanish occupations; and the American period

Threats:

- Erosion primarily from wave action from boat traffic and wind from tidal fluctuation, and continuing sea level rise

Management

Guana Tolomato Matanzas National Estuarine Research Reserve (GTM-NEER) in collaboration with Florida Department of Environmental Protection (DEP) the National Oceanographic and Atmospheric Administration (NOAA) and the Florida Office of Resilience and Coastal Protection (estab. 2019)

Mitigation Efforts

1985 DEP installed wooden bulkhead

1992 DEP placed riprap and geowebbing

1992 Major storm washed 75% of the stabilization away

1992-2016 Some monitoring conducted

2016-present FPAN has monitored periodically and in 2021 recorded the site using Orthographic 3D imaging

Recommendations

- The soil around the well has completely washed away now and it is recommended that the well be dismantled and relocated
- Living shoreline techniques may be effective in lower portions of the site
- Successful stabilization of the bluff would require consultation with engineering specialists
- Continued monitoring by FPAN is ongoing

Shell Bluff Landing (Glowacki et al., 2000)

SHELL BLUFF LANDING (8SJ00032)

This site is an extensive shell midden containing materials dating from the Late Archaic Period; the Florida Transitional Period; the St. Johns I & II periods; 17th century and early-19th century Spanish occupations; and the American period. It lies on a bluff located along the eastern shoreline of the Tolomato River in Guana River State Park, St. Johns County, and has been listed on the National Register since 1991.

The site is currently managed by the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM-NEER) in collaboration with Florida Department of Environmental Protection (DEP) the National Oceanographic and Atmospheric Administration (NOAA), and the Florida Office of Resilience and Coastal Protection (estab. 2019). Stabilization efforts at the site have been reported in Glowacki et al. 2000 and Miller et al. 2021.

STABILIZATION ISSUES

This site has long been threatened, primarily by erosion from wave action from boat traffic; wind from tidal fluctuation; and continuing sea level rise. Estimates of shoreline loss at the site are as much as 60 meters since 1942 (Miller and Murray 2018). Much of the site is on a high bluff and portions are in low, marshy areas suitable for living shoreline stabilization.

MANAGEMENT APPROACHES

From 1984 to 1985 the Department of Environmental Protection (DEP), Division of Recreation and Parks, built a wooden bulkhead as a temporary measure to protect a 19th century coquina well within the site. In 1987, the U.S. Army Corps of Engineers Waterways Experiment Station initiated an erosion monitoring project, in which the rate of erosion across the western face of the site was measured. Reinforced iron bars (rebar) were installed at the site to measure shoreline loss from a fixed point to aid in documenting the erosion. In 1992, the DEP placed riprap and geo-webbing along the shoreline of Shell Bluff to control erosion.

OUTCOME

Shortly after completion of that work, a major storm washed out roughly 75% of the erosion-protective material. Periodic maintenance was required to keep the stabilization intact, and once the methods started to fail, they soon crumbled completely and were not replaced. Since many of the last documented site visits occurred, storm-related impacts, greater wave action, higher tidal surge, global sea level rise, and general habitat loss, have continued to remove the bluff at 8SJ00032. In recent years Hurricanes Matthew in 2016 and Irma in 2017 have been the worst to hit the area in decades. Photographs taken by FPAN during 2016-2021 illustrate the amount of land loss along the bluff in the vicinity of the coquina well.

RECENT APPROACHES

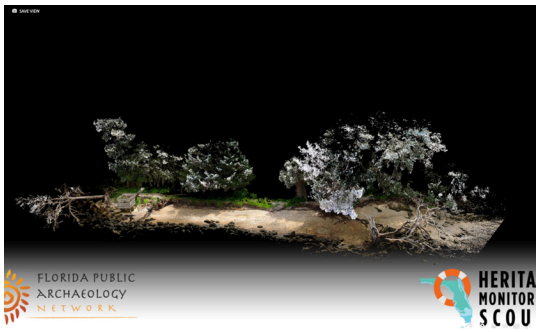
As part of the HMS Program initiated by FPAN, Shell Bluff landing has been periodically monitored, with all updated results documented. Additionally, FPAN has documented the site using terrestrial 3D laser scanning, with deliverables including point clouds, measurable images, and topographic maps. (Miller et al. 2021:272-276).

RECOMMENDATION

Because the soil around the well has completely washed away since the photograph from 2016 was taken, it is recommended that the well be dismantled and relocated somewhere where it will be safe. Living shoreline techniques may be effective in lower portions of the site. Successful stabilization of the bluff would require consultation with engineering specialists. Continued monitoring by FPAN is ongoing.

Shell Bluff photos 2016-2021. (Florida Public Archaeology Network)

Shell Bluff Landing showing well off shore, December 2021.



Sketchfab, Point cloud by Emily Jane Murray 2021, from Miller et al. 2021)

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U.S. Geological Survey. National Hydrography Dataset: https://www.usgs.gov/core-science-sys- tems/ngp/national-hydrography

FUNDING SOURCES

FEDERAL

- **The U.S. Department of Agriculture's Natural Resources Conservation Service** has funding opportunities related to land conservation that could be used to protect archaeologically sensitive land, provided it also serves environmental conservation needs and meets the criteria of eligibility.
- **The U.S. Fish & Wildlife Service's National Coastal Wetlands Conservation Grant Program** could be used to protect, restore, and enhance coastal wetlands and their associated uplands. This could potentially be used to protect archeological sites in these areas or to restore and enhance wet- lands that provide protection for upland areas where sites are located, depending on whether the project meets eligibility criteria.

USEFUL LINKS

- **Advisory Council on Historic Preservation** - achp.gov
- **Florida Division of Historical Resources, Florida Department of State** - flheritage.com
- **Florida Department of Transportation** - fdot.gov
- **Florida Forever land acquisition program** - dep.state.fl.us
- **Florida African American Heritage Preservation Network** - faahpn.com/faaphn
- **Florida Public Archaeology Network** - flpublicarchaeology.org
- **Florida State Parks** - floridastateparks.org
- **Florida Trust for Historic Preservation** - floridatrust.org
- **National Alliance of Preservation Commissions** - napcommissions.org
- **National Park Service, National Register of Historic Places** - cr.nps.gov/nr
- **National Park Service, Southeast Archeological Center** - nps.gov/seac/
- **National Park Service, Links to the Past** - cr.nps.gov
- **National Park Service, Heritage Preservation Services** (Preservation Planning and Tax Act Programs) - cr.nps.gov/hps
- **National Trust for Historic Preservation** - nationaltrust.org
- **National Trust Main Street Center** - mainstreet.org
- **1000 Friends of Florida** - 1000friendsofflorida.org
- **University of West Florida Next Exit History Program** - uwf.edu/nextexit/
- **National Park Service Gullah/Geechee Cultural Heritage Corridor** - gullahgeecheecorridor.org

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