

2018

MUCH ADO ABOUT A CANOE MANASOTA KEY ARCHAIC AGE BURIAL POND

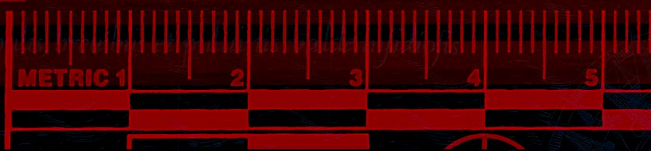
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ADVENTURES

IN FLORIDA ARCHAEOLOGY

3D MODELING OF ARTIFACTS... AND MORE!



EDITORS' NOTE



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Archaeology in Florida has a long history beginning in the late 1800s with such pioneers as C. B. Moore, who plied the rivers of Florida in his steamboat, *The Gopher*, excavating shell middens to understand who were Florida's first inhabitants, where they came from, and how they lived. As a professional archaeologist, I am often asked, "What is left to discover?" As you will see in this edition of *Adventures in Florida Archaeology*, there is a lot both onshore and underwater. The articles herein are written by a variety of individuals—professional archaeologists working for government agencies tasked with protecting Florida's cultural heritage, those who work for consulting firms and perform surveys and excavations prior to development, professors who have devoted their careers to understanding a certain region or culture in Florida, avocational archaeologists who volunteer on excavations in their free time, and university students who are just starting their careers—all of them devoted to increasing our understanding of the prehistory and history of Florida.

The past year has witnessed discoveries that change the way we think about the history of our state. Although we have known that, with sea level change over the past 10,000 years, there should be many submerged

prehistoric sites, the discovery of an Archaic prehistoric burial site off the west coast of Florida provides new avenues for research, offers for the application of new technologies, and emphasizes the need to identify, study, and protect these sites. Storms and droughts have uncovered historic shipwrecks and prehistoric canoes. Recent excavations throughout Florida have changed our understanding of early inhabitants and the extent of their interaction with faraway groups. New technologies, such as 3D scanning, are being used to document artifacts that allow them to be studied by researchers who may not have access to the physical object. Review of historic maps drafted by the earliest Florida surveyors show landforms and the locations of shipwrecks, settlements, and other features that inform our archaeological inquiry. The latest research on these topics is discussed in the articles contained in this edition of *AFA* and show that there is still a lot to discover.

We hope you enjoy this edition of *Adventures in Florida Archaeology*. Prior editions are available online at myfloridahistory.org/fhsai. Thanks to all who work to protect and promote Florida's cultural heritage.



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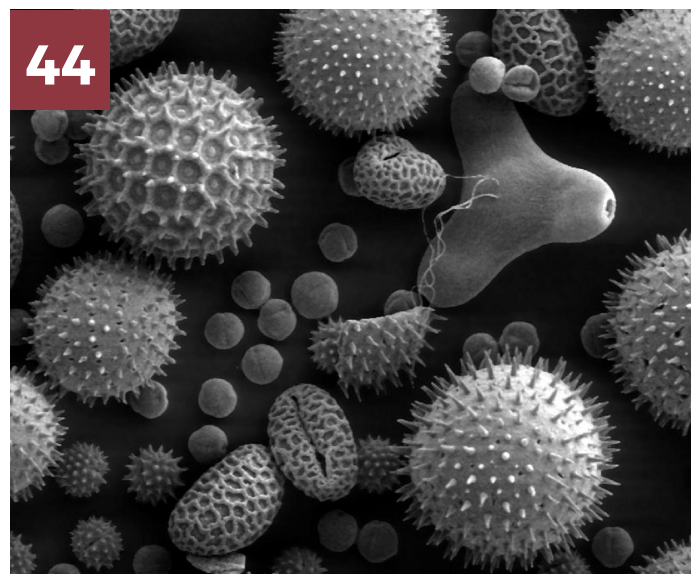
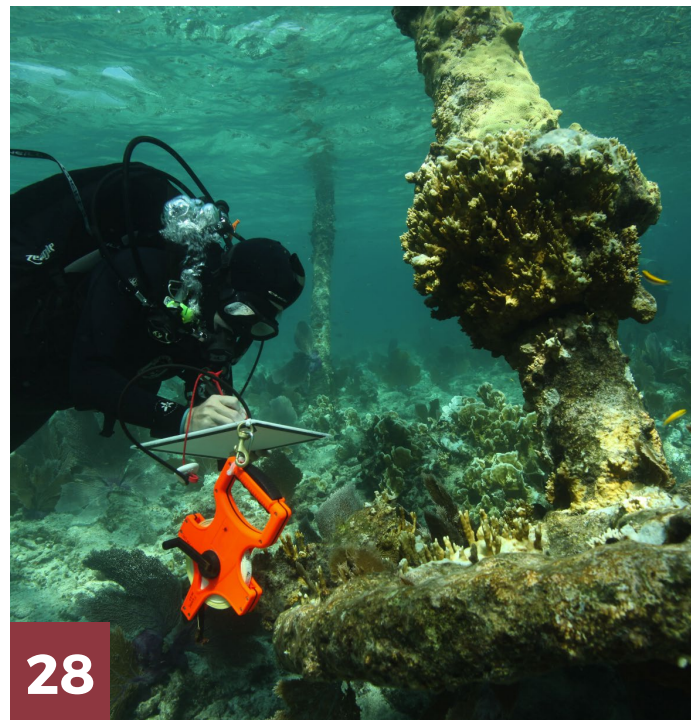
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In the forefront of research and public education

On the Covers:

A Community Effort: Director of Educational Resources Ben DiBiase with the Florida Historical Society and Cultural Programs Manager Molly Thomas with the City of Cape Canaveral were among those who helped to load an enigmatic canoe—washed ashore in north Cocoa by Hurricane Irma in September 2017—for transport to the state conservation lab in Tallahassee. Photo by Mike Hallberg.

Wild Eye: A natural feature in the wood gives the bow of the Cocoa canoe an eerie, animalistic appearance. Photo by Mike Hallberg.



MANASOTA KEY OFFSHORE SITE

A 7,000-Year-Old Archaic Submerged Burial Pond

Adapted from a Department of State press release,
February 28, 2018



Nicole Grinnan of the Florida Public Archaeology Network measures the test unit's depth with a laser level and a folding ruler. Photo courtesy of the Florida Division of Historical Resources

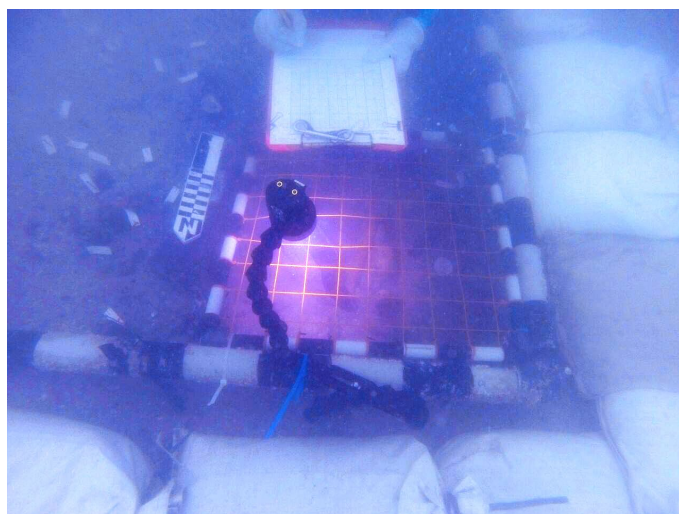
After months of careful, quiet research, the Florida Department of State (DOS) announced that archaeological investigations had confirmed the existence of a 7,000-year-old Native American ancestral burial site in the Gulf of Mexico near Venice. Experts say the Manasota Key Offshore (MKO) archaeological site is unprecedented. Located on the continental shelf in offshore waters, it is preserved in what appears to have been a peat-bottomed freshwater pond thousands of years ago.

Reports of the MKO archaeological site began in June 2016, when divers identified possible human skeletal material just off Manasota Key. The find was reported to DOS's Division of Historical Resources (DHR), Bureau of Archeological Research (BAR), which has protective authority over unmarked human remains more than seventy-five years old. After months of onsite investigations, BAR confirmed that a submerged prehistoric site, measuring roughly 0.75 acres, existed along the shoreline near Venice during the Middle Archaic period, seven millennia ago.

BAR Underwater Archaeology Supervisor Dr. Ryan Duggins, who is leading the research, said, "Seeing a 7,000-year-old site that is so well preserved is awe-inspiring. We now know that this type of site exists on the continental shelf, [which] will forever change the way we approach offshore archaeology. As we continue to learn as much as possible from the site, we look forward to sharing that knowledge with the people of Florida."

During that ancient time period, when sea levels were much lower, a small, inland freshwater pond was present, and ancestors of Florida's indigenous people interred their deceased there. As sea levels rose, the pond was covered by the Gulf of Mexico; despite the flooding, the peat bottom of the pond remained intact. Peat slows the process of organic decay, which allowed the site to stay well preserved.

BAR's geophysical survey work, sediment sampling, and site testing have helped to



Archaeologists use a grid to facilitate mapping a section of a test unit. Photo courtesy of the Florida Division of Historical Resources

identify the site's soil composition and provided information on the past environment and nature of the cultural deposit. It is using these data to reconstruct the prehistoric environment when the site was in use. The agency also is developing a long-term management plan that focuses on protection and preservation.

The MKO site demonstrates that submerged offshore archaeological sites have survived natural occurrences, such as erosion and hurricanes. Submerged offshore prehistoric burial sites are exceedingly rare, with some of the only other examples located in Israel and Denmark. Continued documentation and research of the site will lead to a deeper understanding of Florida's early history and its inhabitants.

Out of respect for individuals buried there and their living descendants, divers and other interested individuals are prohibited from disturbing the site. It is protected under Section 267.13, Florida Statutes, which makes it a first-degree misdemeanor to remove artifacts from an archaeological site without authorization, and Section 872.05, Florida Statutes, which makes it a third-degree felony to knowingly disturb, destroy, remove, vandalize, or damage an unmarked human burial. The site is patrolled frequently by law enforcement, which is monitoring suspicious or unusual activity.

DHR Director and State Historic Preservation Officer Dr. Timothy Parsons said, "The

MKO archaeological site is a revelation for the world of archaeology. As important as it is archaeologically, it is crucial that the site and the people buried there are treated with the utmost sensitivity and respect. The individuals are the ancestors of America's living indigenous people. Sites like this have cultural and religious significance in the present day."

Dr. Paul Backhouse, Tribal Historic Preservation Officer of the Seminole Tribe of Florida, added, "We are happy to be working with the Bureau of Archaeological Research and the residents of Manasota Key to identify a preservation plan that will allow the ancestors to continue to rest peacefully and without human disturbance for the next 7,000 years."

Archaeological endeavors have been assisted by Florida Gulf Coast University, the National Park Service, Florida Public Archaeology Network, Sarasota County Historical Resources, and the National Oceanic and Atmospheric Administration. Law enforcement partners include the Sarasota County Sheriff's Office and the Florida Fish and Wildlife Conservation Commission. Venice-based Gulf Coast Community Foundation has helped to engage numerous local partners to involve community stakeholders, assist in site protection, and plan for educational opportunities. DHR has conducted every step of the project and planning process in concert with the Seminole Tribe's Office of Historic Preservation to ensure that tribal beliefs and customs relating to the ancestral resting place are honored.

Parsons also noted that, "The discovery and ongoing efforts to research and preserve the MKO site would not have been possible without the support and commitment from the local community. Everyone from the dive shops to the nearby homeowners to the local organizations and county government played a critical role in this project."

Additional information about the Manasota Key Offshore archaeological site is available at dos.myflorida.com/historical/archaeology/projects/manasota-key-offshore/.





One of the stakes excavated at the MKO site was notched, but the purpose of the cut is not yet known. Photo courtesy of the Florida Division of Historical Resources

MUCH ADO ABOUT A CANOE

Hurricane Irma's Gift and Florida's Legacy of Canoe Research

KC Smith



"Industry of the Floridians in Depositing Their Crops in the Public Granary." Jacques Le Moyne de Morgue's illustration, published in 1591 by Theodor de Bry in *Grands Voyages*, provides an early image of a native canoe. Image courtesy of the State Archives of Florida, Florida Memory

In the early hours of September 11, 2017, Randy Lathrop was riding his bike along Indian River Lagoon in north Cocoa, inspecting the damage left by Hurricane Irma's nighttime transit through the neighborhood, when he spied a large log by the side of the road.

"As soon as I saw it, I knew exactly what it was," he later told reporters.

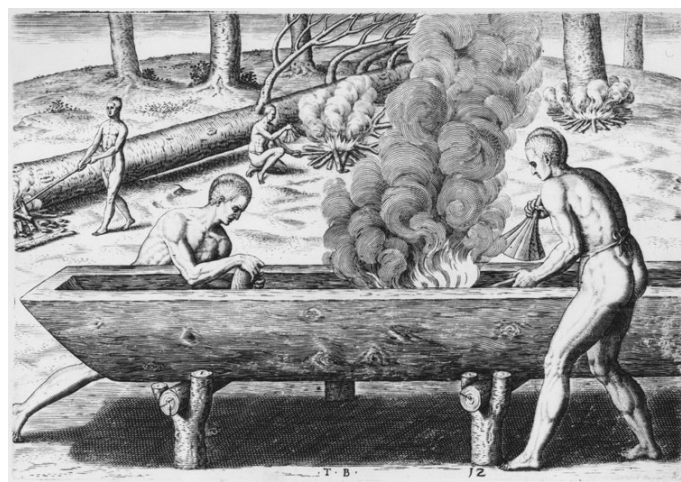
Lathrop quickly sent cell phone photos to an archaeologist friend, who confirmed that he had, indeed, found a wooden canoe. It looked old, but it also looked odd. Unlike most examples of prehistoric dugouts, which typically were hollowed out from bow to stern, this vessel appeared to have three compartments, some iron nails, and possible traces of paint.

With the storm cleanup crew a mere block away, Lathrop drafted a buddy with a truck to help move the boat to a safer site. The two wrestled the waterlogged watercraft, about 15 feet long and weighing, by Lathrop's estimate, about 700 pounds, onto the bed of the truck and transported it to the friend's home nearby, where they parked it in the front driveway and covered it with a tarp. Because there was little doubt the canoe had come from the lagoon, which is state-owned land, the archaeologist friend reported the find, as required by law, to the Division of Historical Resources (DHR) in Tallahassee, an agency of the Florida Department of State. Meanwhile, Lathrop posted photos and comments on his Facebook page, which prompted a tsunami of media attention.

Two days later, a well-known local archaeologist contacted DHR and offered to make an initial assessment of the artifact; the agency agreed. Lathrop took him to the canoe location on September 14, where he made detailed measurements and photos, recorded his observations, and removed a sliver of wood to submit for radiocarbon dating analysis. Concerned about the adverse effects of letting the wood dry out—it had been out of water four days, he asked Lathrop to move the boat to a nearby fresh-

water pond. Lathrop later removed it temporarily when University of South Florida researchers arrived to take photos for a 3D image and model. Soon after that, DHR staff arrived to transport the canoe to the state conservation lab in Tallahassee to begin preservation and study.

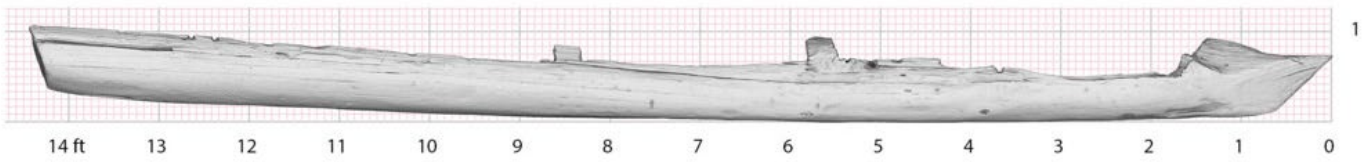
The canoe's discovery prompted plenty of speculation about its origin and antiquity—



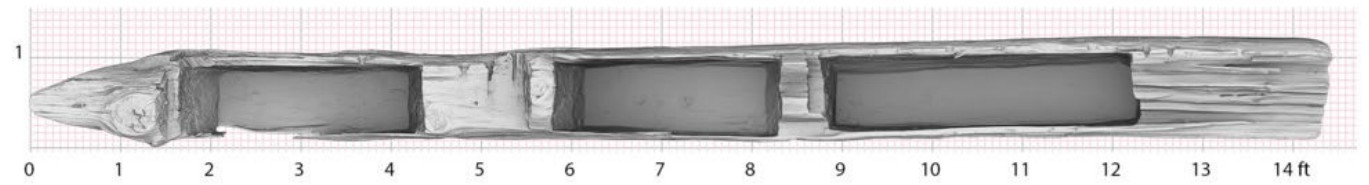
"How They Build Boats." John White's illustration and description, rendered as an engraving in 1590 by Theodor de Bry, offers a clear image of the burning-charring-scraping process used by natives of North Carolina to make a canoe. Image from *The New World. The First Pictures of America* by Stephan Lorant, 1946

from native peoples thousands of years ago to Seminole Indians within recent centuries. On September 15, DHR released an official summary of known details on its Facebook page. The agency confirmed that the construction was atypical but not unique and said the presence of a few barnacles suggested a history in saltwater. Referring to its possible age, the agency said, "Initial assessments suggest the canoe is over fifty years old, which makes it historic in age, but the approximate age is not yet confirmed ... Its appearance and the presence of a cut nail suggest it is not a pre-contact canoe. In other words, it is maximum several hundred years old and minimum several decades old."

STARBOARD VIEW



TOP VIEW



PORT VIEW



Canoe Found After
Hurricane Irma
Brevard County, FL

Total Long: 14.46 ft
Total Width : 1.23 ft
Total Height : 1.26 ft

Working with state and local archaeologists, staff at the University of South Florida Libraries used 3D and specialized imaging to document the Cocoa canoe. This image shows starboard, top, and port views. Image courtesy of the Digital Humanities and Heritage Collection, USF Libraries, <https://sketchfab.com/models/2dd54a47268142928f576c6ffdaf10fd>

The Facebook post also addressed the issues of ownership and possible disposition: “Per Chapter 267 of the Florida Statutes, artifacts from state-owned lands belong to the state, with the title vested in the Division of Historical Resources.” Within DHR, the Bureau of Archaeological Research (BAR) is responsible for the study and protection of archaeological remains and public education. Regarding the canoe’s fate, DHR said, “If it is determined to be historic, [it] will be stabilized, preserved, and hopefully it ultimately will be displayed locally for the public to enjoy and learn from.”

Chapter 267 specifies the procedures for dealing with archaeological and historical sites and properties on lands owned or controlled by the State. However, beyond the Statutes, the basis for Florida’s ownership of the Cocoa

canoe rests in a principle of Constitutional law that dates to the US colonial era and ensures a state’s sovereignty over submerged lands. Florida acquired these rights when it joined the Union on March 3, 1845. When the Cocoa canoe washed ashore from the Indian River, a state submerged land, it became public property. This policy applies to all watercraft that are lost, wrecked, or abandoned in state waters within three miles offshore from the usual high water mark.

These arcane details were a footnote to the real facts that Cocoa canoe-watchers awaited—i.e., the radiocarbon dates. When the test results were released in early October, they did little to pinpoint the boat’s date and origin. They suggested a 50 percent probability that the wood used to make the vessel died or was cut down between 1640 and

1680; a 37.2 percent probability that it dated between 1760 and 1818; and an 8.6 percent chance that it dated to 1930 or later. BAR Archaeologist Julie Duggins, who specializes in the study of canoes, said the radiocarbon results are exciting and interesting because they add to the canoe's mystique and the concomitant research questions.

The Cocoa canoe may not have been Hurricane Irma's only floatable gift. Up the road near St. Augustine, a marine scientist at the Guana Tolomato Matanzas National Estuarine Research Reserve (NERR) encountered a dugout embedded in creek muck in late October that may have been uncovered by this storm or other rough weather. Word of the discovery reached the Lighthouse Archaeological Maritime Program based at the St. Augustine Lighthouse and Maritime Museum. After LAMP Director of Archaeolo-

gy Chuck Meide inspected the 17-foot-long, nearly intact canoe, he called it "a beautiful specimen." Unlike the Cocoa example, it has the classic profile of a prehistoric watercraft, with a shaped bow and stern and hollow interior, and charring and stone tool marks confirm the traditional burning-chopping-scraping method of construction. Radiocarbon tests gave a firm date of 898 years old, plus or minus 30 years, and paleoethnobotanist Dr. Lee Newsom of Flagler College identified a wood sample as cypress.

This vessel is significant because it is the first prehistoric canoe found in Flagler or adjacent St. Johns counties, the heartland of native Timucua territory. Its precise location is being guarded because it's literally "stuck in the mud," with one end exposed, especially at low tide, which renders it vulnerable to people and natural elements. Like the Co-



BAR Archaeology Supervisor Julie Duggins prepares the dugout for transport to the BAR conservation lab in Tallahassee. Initially dubbed the "Irma canoe" by the media, it is known locally as the "Cocoa canoe." Photo by Mike Hallberg



Professional photographer Randy Lathrop, who found the Cocoa canoe, takes a few final shots before the dugout is loaded on the truck. Photo by Mike Hallberg.

coa canoe, it is state property, but recovering and conserving it would be expensive, and it is too large to be treated in LAMP's conservation facility. "We have a real dilemma because there are no easy options for its preservation," says Meide. "It is such a fine example; we'd really hate to lose it." For the present, it will remain in place, with LAMP monitoring the condition of its finely crafted but exposed portion.

In a state known more for historic wrecks and abandoned watercraft, the Cocoa and NERR canoes are hardly anomalies. According to DHR, "Florida has the highest concentration of archaeological dugouts in the world, with more than 400 from the state." Archaeologists point out that wooden artifacts are only preserved in constantly wet or constantly dry conditions, so the state's perennially soggy environment has been conducive to the preservation of canoes. Perhaps because of its atypical unearthing and mysterious ancestry, the Cocoa canoe prompted an unusual amount of state, na-

tional, and international media attention. Lathrop says he received at least 90,000 online hits, not to mention a slew of phone calls from folks offering to buy the boat.

Actually, interest in New World watercraft dates to the time of Christopher Columbus. In one of his first diary entries, the Admiral described how natives approached his ship in "dug-outs ... fashioned like a long boat from the trunk of a tree, and all in one piece, and wonderfully made ..., and so big that in some came 40 or 50 men... They row with a thing like a baker's peel and go wonderfully, and if they capsize all begin to swim and right it and bail it out with calabashes that they carry." Likewise, early Europeans in Florida, including Jean Ribault, Pedro Menéndez de Avilés, and Jonathan Dickinson, recorded observations about native watercraft. Although LAMP's Chuck Meide now specializes in historic shipwrecks, he has studied the evolution, use, and distribution of canoes in the Americas based on ethnographic and archaeological evidence.



The Cocoa canoe is on display in the Bureau of Archaeological Research Conservation Lab lab while archaeologists conduct research and conservation. Photo by Ben Brotemarkle

He points out that, because of their vital roles in prehistoric and historic trade, travel, foodways, and warfare, as well as the development of regional networks of transportation, communication, and sociocultural interaction, “The very nature of this watercraft and its integral part in social development makes it a unique way for the archaeologist to view communities through time.”

The oldest canoe found in Florida is nearly 7,000 years old, and most of the examples listed in the state’s database are prehistoric—that is, predating the recorded arrival of Europeans in 1513. In a saturated landscape with interconnected systems of marshes, creeks, rivers, lakes, and coastlines, canoes were all-terrain vehicles that could be poled or paddled to carry people and loads in all depths of water. Large villages were located near inland watercourses or the coast, and some groups constructed canoe canals that linked important waterways. After explorers and settlers overran the peninsula, they chronicled native variations and uses of ca-

noes and quickly adapted the deft watercraft for their own purposes.

Florida archaeologists began to focus research on canoes in the 1970s and '80s as examples increasingly were found during seasonal droughts, including one cache of nineteen boats in 1977. In a seminal article in 1990, Barbara Purdy and Lee Newsom, then anthropologists at the University of Florida, wrote that “the largest number of prehistoric and early historic canoes in the world”—nearly 200 vessels dating from 5,120 BP to the 19th century—existed in Florida. Most examples had not been radiocarbon-dated and ranged in condition from fair to extremely poor. Calling them a “maritime heritage ... that deserves to be investigated and preserved,” the women promoted a multiphase project to record, date, study, preserve, and exhibit known examples. Their Florida Canoe Project laid the groundwork for systematic research and interpretation of these wooden artifacts. They developed a typology of canoe

styles—three prehistoric and three historic—based on form, manufacture, and chronology and described diagnostic characteristics of each. They also noted general construction trends—for example, most boats in the collection were made of pine, except for a small sample of Seminole canoes made of cypress; most were made with some degree of fire-hollowing; and stylistic features were affected by the use stone versus metal tools. They also broached cultural impacts of canoes, such as the efficiency of transporting goods over water rather than land, and the likely role of watercraft in expanding the subsistence base of prehistoric Floridians to include more aquatic resources.

Purdy and Newsom noticed two inexplicable trends during their study—the type of opaque details that cause researchers to have intense, late-night conversations. First, they wondered why relict canoes in Florida often were found in groups. Second, evidence suggested that watercraft in the state and most of North America did not

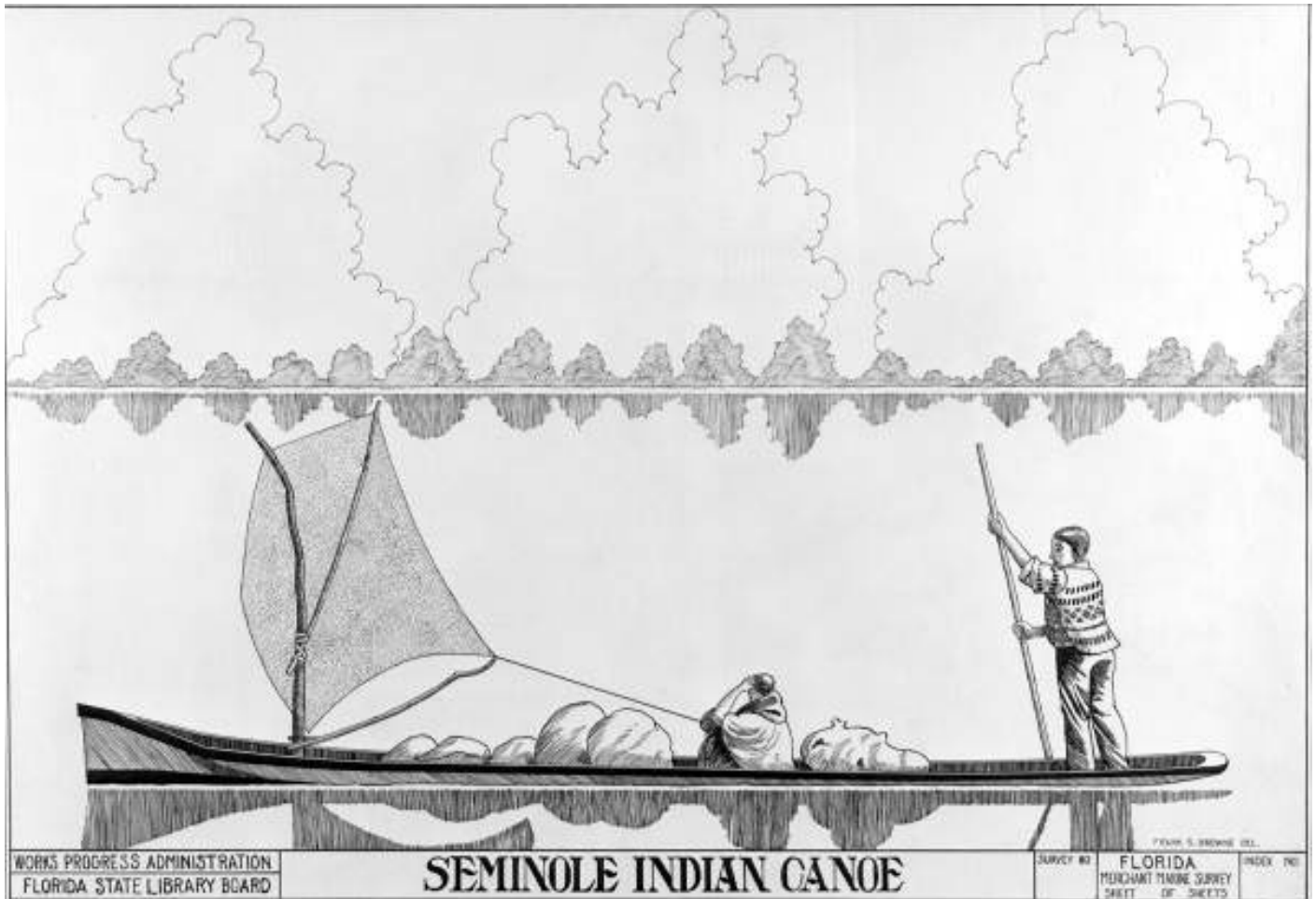
evolve beyond hollowed-out canoes in a few predictable forms into more complex vessels. Based on accounts from other areas, they speculated that, because of the time and energy involved in canoe manufacture, people may have sunk unattended watercraft intentionally—for example, if the vessels were used only seasonally—to prevent their destruction by natural or enemy forces. As for canoe evolution, the researchers wondered whether the basic dugout form, with modest adjustments in size and design, was sufficient to navigate the types of waterways that Florida natives traversed. Light was shed on both questions with the Newnans Lake canoe find near Gainesville in April 2000.

After a regional drought caused lake levels to fall appreciably, reports of exposed watercraft flowed into the state archaeologist's office, especially from a local high school teacher who was using Newnans Lake as a natural lab for his environmental science students. The state's plan to investigate actually involved the young scientists, who were quite good at sleuthing finds. When they spotted a canoe, they marked it with stakes and flags. Teams of archaeologists and volunteers traversed the lakebed, excavating, recording shape and dimensions, and taking wood samples at each location, although the watercraft often were quite deteriorated. The students ultimately located 101 canoes, primarily on the northern lakeshore, of which fifty-five were recorded in detail. Principal investigator and BAR Bureau Chief Dr. Ryan Wheeler decided that each vessel should be listed as a discrete site in the Florida Master Site File, the state's database of recorded archaeological and historical sites, which was a significant change in policy. Previously regarded as isolated discoveries, canoes now could be plotted geographically and assessed for similar patterns vis-à-vis other entries in the database.

As with the Cocoa canoe, radiocarbon dates from Newnans Lake—also known by its pre-contact name of Lake Pithlachoco—surprised researchers. The boats fell into two age groups—thirteen were from 500 to 1,300 years old and forty-one from 2,300 to 5,000 years. The latter represented some



Archaeologist Ryan Wheeler excavates a canoe during the Newnans Lake project. Photo courtesy of the Florida Division of Historical Resources



Seminole Indians developed a distinctive dugout style, with a prominent cutwater (bow) and a forward mast step that enabled sailing, especially along coasts. This drawing by Frank S. Browne was created as part of the Works Progress Administration's Historic American Merchant Marine Survey in 1936-37. Image courtesy of the State Archives of Florida, Florida Memory

of the oldest canoes in Florida and North America. Also unexpected was the lack of chronologically distinct characteristics in form. The common notion, inspired partly by Purdy and Newsom's typology, was that older canoes would be short, crude, and stumpy-looking, and the younger models would be longer and more finely built and elegant. According to Wheeler, the oldest Newnans canoes looked remarkably like the youngest, suggesting that prehistoric "dugout canoe design characteristics already were well-developed during the Archaic Period and persisted with few innovations throughout the ensuing seven or eight thousand years."

Static design elements do not characterize the nearly fifty historic-era watercraft in the state's collection, making them a challenge to evaluate. Five or six general categories have been established, based on criteria such as obvious derivation (Seminole canoes), technology (sailing canoes),

or perceived origin (West Indian canoes). In addition, vessels with hybrid traditions have shown up, exemplified by the unusually long and sturdy dugout hauled out of the Apalachicola River by loggers in 2006. Fifty feet in length, clearly made with metal tools, and dating to the 19th century, the cypress logboat combines Native American and European construction techniques. Archaeologists believe the unique craft, called the Apalachicola Trader, likely was built to carry large loads of cargo over long distances.

As part of its 2018 Florida Archaeology Month events, the Bureau of Archaeological Research coordinated a special conference, prompted in part by the Cocoa canoe discovery, to discuss research techniques that are being directed at Hurricane Irma's enigmatic gift. An array of specialists discussed sophisticated methodologies that are available, and increasingly used, to identify diagnostic traits in wooden artifacts and to refine

the depth and accuracy of their interpretation. Among these are high-resolution 3D scanning, radiocarbon dating, dendrochronology, and portable x-ray fluorescence, all of which apply known scientific principles to answer anthropological questions. To any non-archaeologist in the audience, the litany and lessons were heady and impressive. BAR's Julie Duggins, who has spearheaded research on the Cocoa canoe, presented the summary explanation of how these techniques have been applied to answer questions about this particular vessel. Her well-stated conclusion was clear to all: "The legacy of the Irma canoe is that, as questions and information arise, new hypotheses and methods are created and applied."

Archaeologists such as Duggins who specialize in canoe research are passionate about the important cultural information that can be derived from canoes. For that reason, they encourage public awareness and interest, but they also remind folks that prehistoric canoes are extremely fragile. Waterlogged wood suddenly exposed to air will deteriorate at a breathtaking rate, regardless of its size or apparent sturdiness. If an embedded, exposed canoe is encountered, it should be kept wet, although if it's already dry, it should not be wetted again. No attempt should be made to move it. Archaeologists can learn a great deal about bygone people, even if the craft is quite deteriorated, when it is in its original location. With proper conservation and study, and a lot of patience, these ancient artifacts will tell their own story.

KC Smith is a member of the Florida Historical Society board of directors and formerly the curator of education at the Museum of Florida History, Tallahassee.

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A CANOE SUCCESS STORY

The well-preserved Munson Lake canoe in Tallahassee was exposed in 2010 when the lake was drawn down intentionally. Nearby resident Dennis Jones reported its presence to staff at the Museum of Florida History, noting that it appeared that someone had tried to remove it from the mucky substrate. Florida Department of State archaeologists responded immediately, first recording the artifact in situ, then transporting it to the DOS conservation lab for preservation and study. Made from pine or cypress, it was constructed using fire and stone tools by prehistoric inhabitants of the Fort Walton cultural period. Approximately 500 to 800 years old, it has platforms on either end on which a person could stand to pole or paddle it along. The fully preserved canoe is now on display in the R. A. Gray Building in the capital city.



Dr. Ryan Wheeler documents features of the Munson Lake canoe. Note the 2x4 timbers that were found when archaeologists first arrived—evidence of someone's earlier attempt to remove the embedded boat from the lake bed. Photo by KC Smith



Archaeologists and volunteers remove the Munson Lake canoe to take it to the State of Florida conservation lab. Photo by Roy Lett; image courtesy of the State Archives of Florida, Florida Memory

FHSAI MEMBERSHIP



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Established in 1856, the Florida Historical Society was the first statewide organization dedicated to preserving state history and prehistory. More than 160 years later, it still fulfills that mission by collecting and archiving documents, books, and images; publishing scholarly research; and educating the public through projects and programs.

But did you know ...

In 1905, FHS became the first statewide organization to preserve Native American artifacts, promote archaeological research, and publish findings dating to the early 1900s. Archaeology enthusiast Clarence Moore, who joined the Society in 1907, donated his papers to the FHS Library of Florida History. In the 1940s, FHS helped to create the Florida Anthropological Society and the position of State Archaeologist, and the *Florida Historical Quarterly*, the Society's professional journal, has included articles by leading archaeologists for decades. From 2010 to 2013, FHS hosted the East Central Region of the Florida Public Archaeology Network (FPAN), and in 2014, it established the Florida Historical Society Archaeological Institute, based at the Brevard Museum of History and Natural Science in Cocoa. FHSAI's mission is to educate the public about Florida archaeology through research, publication, educational outreach, and by promoting complementary work by other organizations.

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SEARCHING BETWEEN THE LINES

Florida's Archaeological and Historical Sites as Recorded by the United States Coast Survey

James Delgado, John Cloud, Matthew Lawrence,
Deborah Marx, and Brenda Altmeier



The mouth of the Miami River at Biscayne Bay, with the Old Fort Dallas occupied by Col. English, was sketched by Ferdinand Gerdes in 1849. Courtesy of the National Archives and Records Administration, Textual Records Division, Record Group 23, Records of the Coast and Geodetic Survey (hereafter NARA II, RG 23)



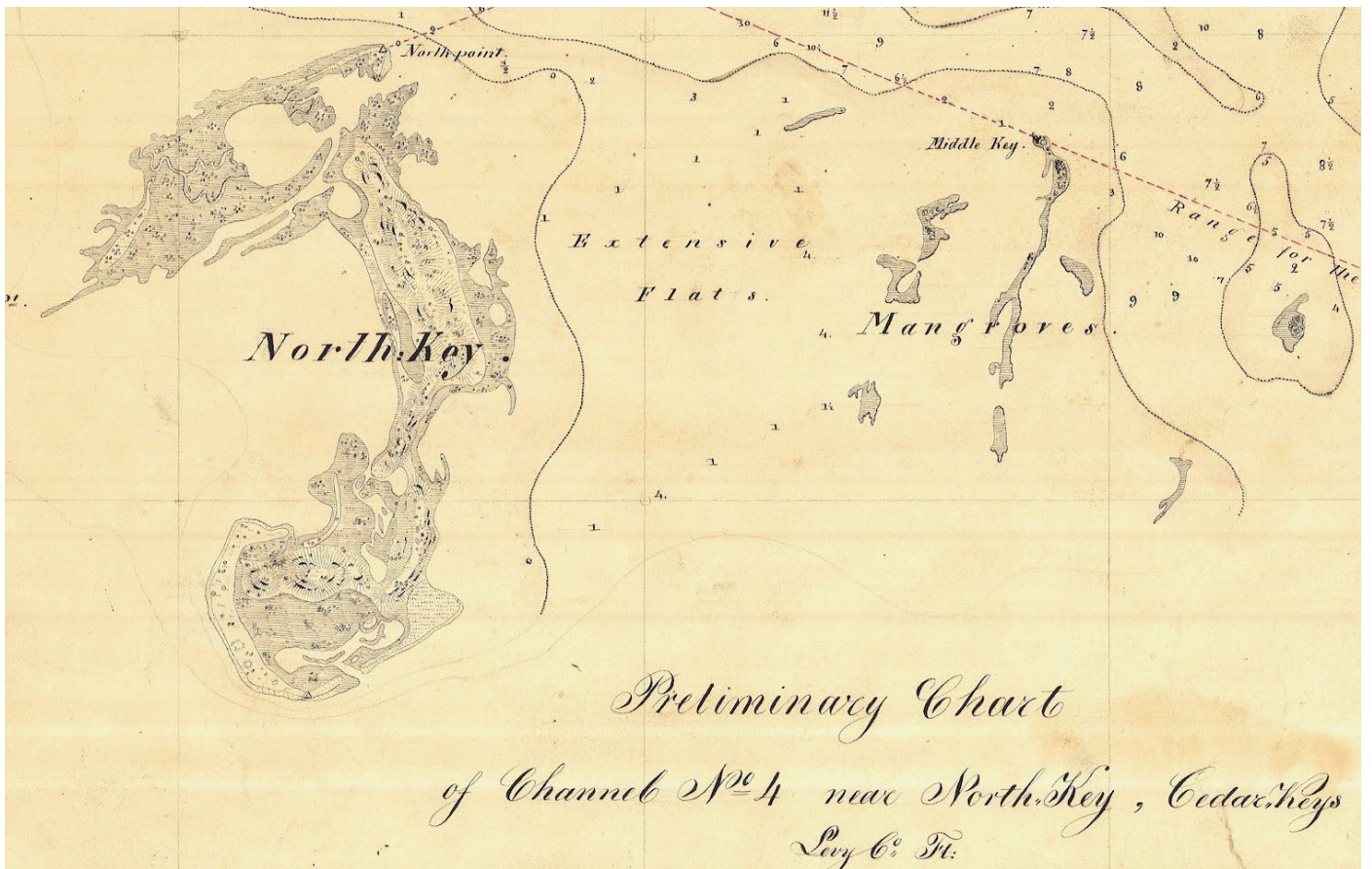
In 1849, Ferdinand Gerdes made this watercolor sketch of the Cape Florida lighthouse in context. The raked masts in the background belong to *Gerdes's* surveying ship—the *Gerdes*. Courtesy of NARA II, RG 23

Archaeologists working on historic sites, including shipwrecks, make discoveries not only out in the field. We also make them in the archives. Archaeology and history go hand in hand, with each offering evidence about the past. We compare, contrast, and sort through all of the evidence to share what we can learn about the past. And then there are times when a discovery in the archives leads to an archaeological discovery. It's not exactly like finding an old pirate map, but what we've found, working together, is that when the pioneer surveyors of the United States Coast Survey did their work, they left behind a treasure trove of maps and charts. Those charts, maps, their notebooks, and the art they created have sent us and other archaeologists to buried and sunken sites, including shell mounds, early settlements, forgotten camp sites, and wrecked ships.

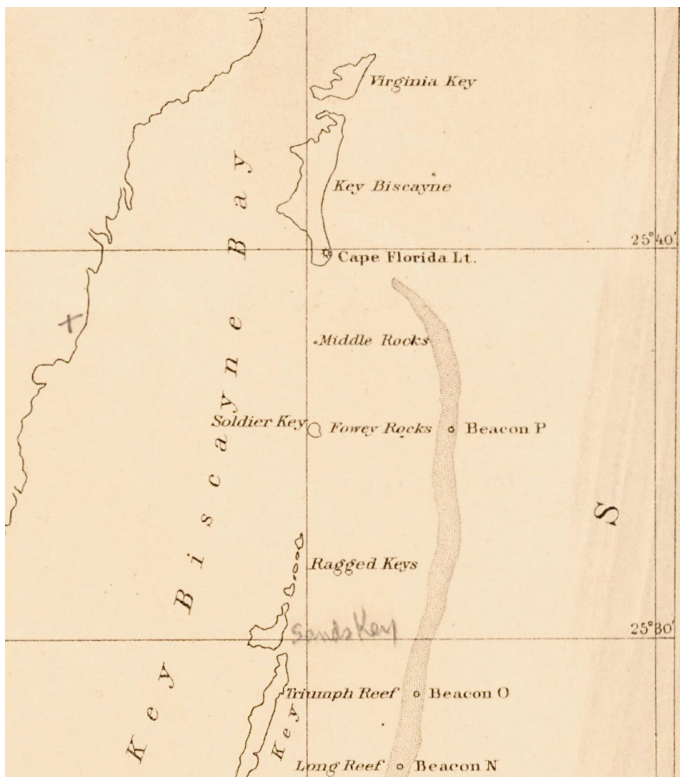
Established in 1807, the Coast Survey—today known as NOAA's Office of Coast Survey—is the oldest scientific organization in the US

government. Its responsibilities, like those of NOAA today, were the navigable waters of the United States. The Coast Survey ships, boats, and teams meticulously surveyed offshore and along the coast, documenting inlets, bays, cays and keys, reefs, and river deltas. They did not venture far up rivers, for that was the responsibility of the US Army Corps of Engineers, just as it is in modern times.

In July 1832, Congress appropriated \$20,000, then a large sum, for surveying the coast of Florida, but work did not begin until the mid-1840s. This was a time of incredible expansion for the Coast Survey, which earlier had struggled to find resources to do the time-consuming and, at times, dangerous work. For example, the first surveyor sent to Florida drowned in a shipwreck off the mouth of the St. Johns River in 1836. The first priority for the Coast Survey were the reefs and keys of south Florida. In 1849, Lieutenant James B. Totten, an army assistant with the Coast Survey, surveyed the coast and began placing a series of beacons along the



This cropped image was taken from the H sheet H-304 ("H" for hydrography) that mapped North Key, but concentrated on the keys and reefs and depths of the channel between North Key and its neighbors. Courtesy of NARA II, RG 23, Cartographic Records Division; Digital image NOAA National Ocean Service



Beacon A marks the site of Eastern Sambo Reef in this section from the Coast Survey's chart of the Totten beacons installed along the Florida reefs in the 1850s under direction of Lt. Totten. Courtesy of the American Geographical Society Library, Milwaukee, WI

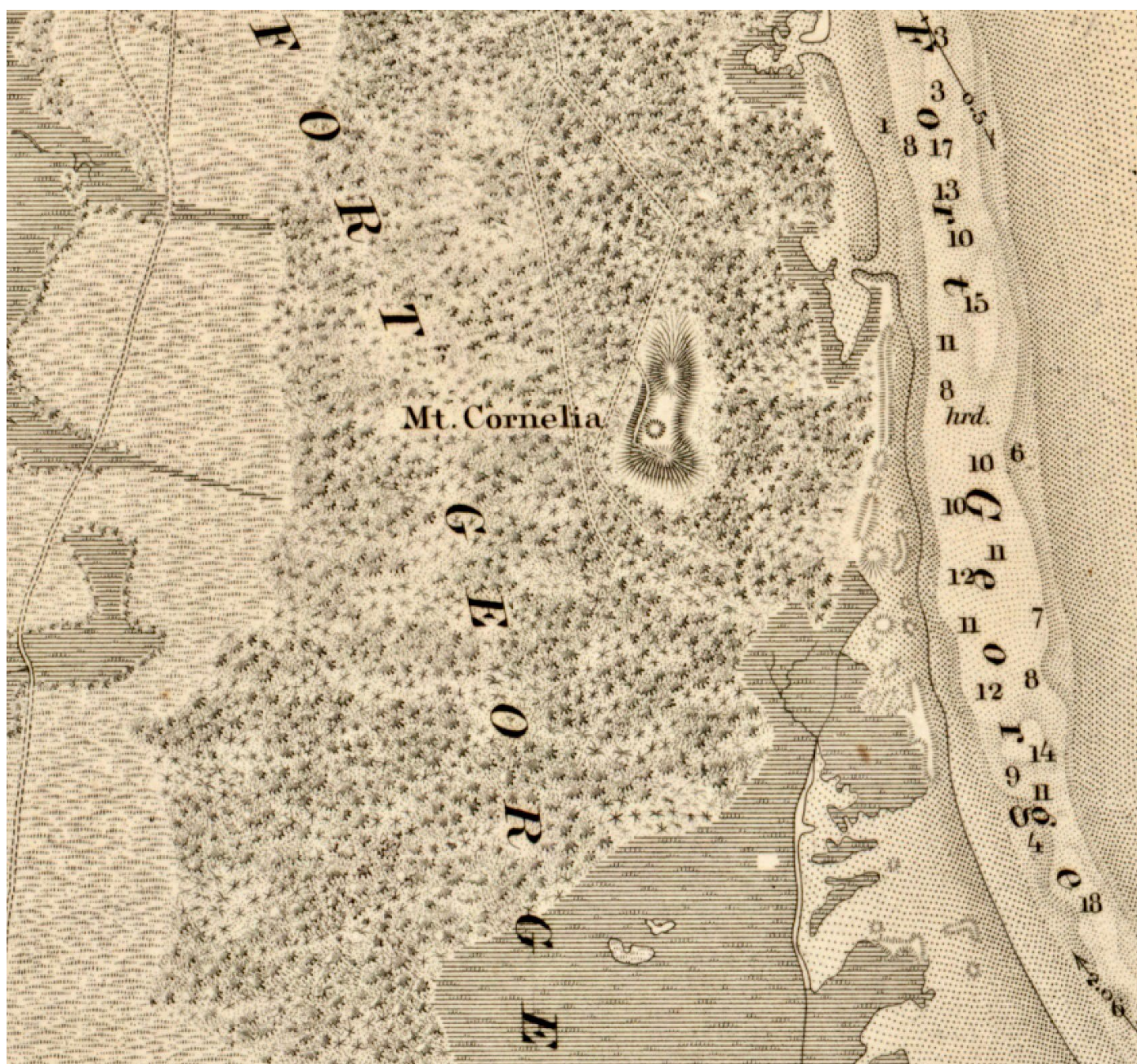
shallow coral reef. A centuries-old maritime passage, these uncharted waters continued to be the ruin of many ships. As that work progressed, the Coast Survey turned its attention to Florida's Atlantic coast in 1849 and Gulf coast in 1852.

To accurately survey and create precise charts, the Coast Survey teams had to create baselines—points for triangulation—to develop local triangulation networks. The work in the Florida Keys is a great example of this. Eventually, the local networks were "tied" into the national network (see attached triangulation diagram).

In an age of GPS navigation through our mobile phone, it is important to recognize the laborious process used to map the United States and the exhausting, decades-long efforts that ultimately made GPS possible. Satellites did not map the United States and its coastal waters. People did that work starting nearly 200 years ago. In Florida, for example, that work included surveying from Fernandina Beach to Cedar Key, which started with a twenty-one-day march for 429 miles in late 1856. The work involved in that type of survey involved cutting and clearing a straight line through forests, crossing swamps, rivers, and any other obstacle. In 1859, a US army

captain working on the survey reported that, "The section of country through which they pass is more or less densely timbered, and the lines forming their sides had to be opened foot by foot with the axe. When it is considered that thick pine woods offered the most favorable cutting required in carrying the work forward, the remainder and about an equal portion being through the swamps and matted bogs of the south the extent of the labor may be judged of."

There were different but equally difficult problems surveying the waters of the Florida Keys. In 1855, surveyor Samuel A. Wainwright

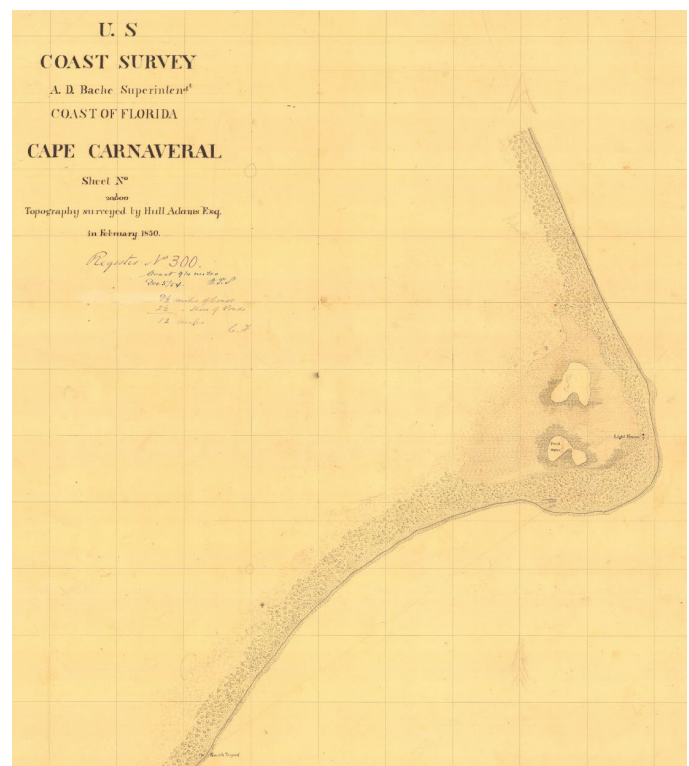


A section from the Coast Survey's chart no. 454, published in 1856, shows the Indian mound complex named "Mount Cornelia," north of the mouth of the St. Johns River. Courtesy of NARA II, RG 23, Cartographic Records Division; Digital image NOAA National Ocean Service

reported, “The difficulties presented in its execution are almost insuperable. Operations on foot are in many places impossible, and in others the water is so shallow for miles in the coves that boats cannot be got through them... It is often impossible to procure any suitable station, owing to the softness of the bottom, and to the thick growth of bushes on the shore.” When the survey teams walked in the mud flats, they often sank two feet deep at “every step.” Even when on a ship or a boat, the work was strenuous and tedious. To make a hydrographic map of the water’s depth, crews slowly rowed in straight lines, repeatedly dropping a measured line weighted with a sounding lead. A small cup on the bottom of the lead, filled with animal fat, collected samples of the bottom, which was examined and noted.

In its long tenure, the Coast Survey left behind a vast archival record, scattered in various repositories. This record includes manuscript reports, art, photographs, and manuscript topographic charts known as T-sheets. There are thousands of surveyor’s notebooks, which include sketches, hand-drawn maps, and in some cases, water colors. For the most part, the full extent and range of these records is unknown, and only a handful are available online. They represent a largely untapped resource for locating, assessing, and documenting human activities in Florida’s coastal and riverine environments.

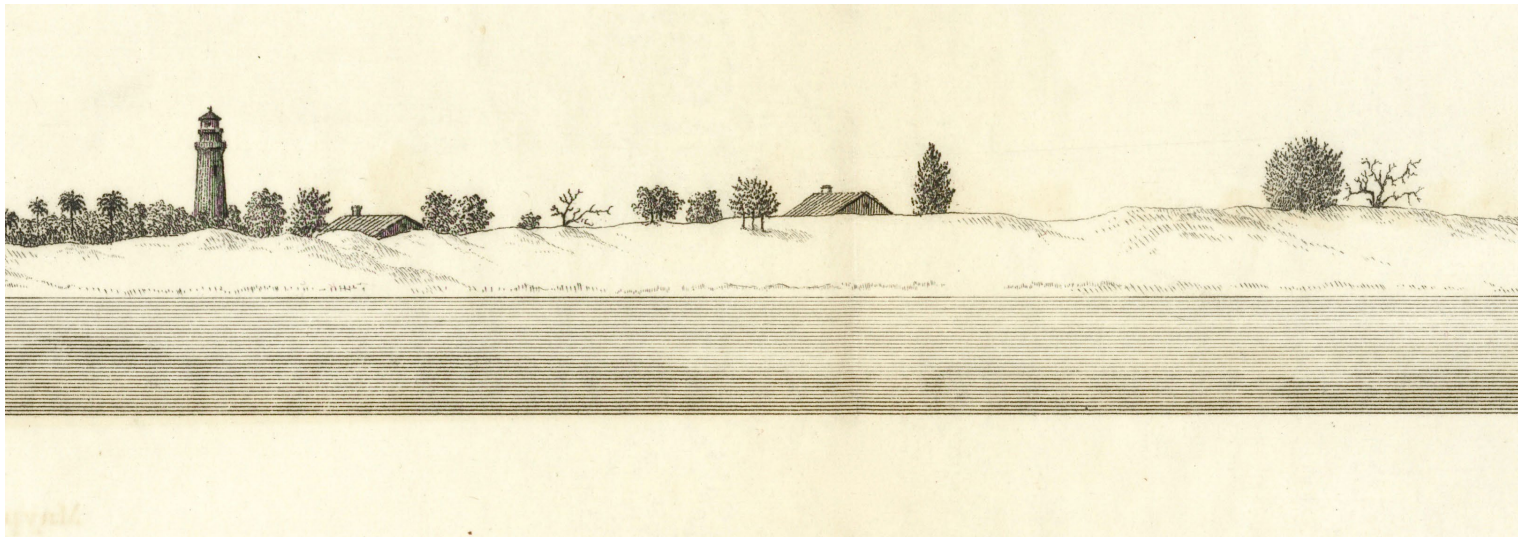
Coast Survey records also represent a highly accurate and scientifically determined and mapped record of Florida’s coast, coastal rivers, and keys prior to 20th-century development. Using the T-sheets as an example, they accurately document features such as shell mounds, earthworks, lighthouse stations, early coastal communities, fortifications, and the locations of shipwrecks observed by the Coast Survey field teams. When surveyor Ferdinand Gerdes and his assistants from the Coast Survey began mapping the Florida coast near the Suwannee River in the 1840s, they triangulated from the highest points of the local landscape, which were shell mounds. They positioned various shell mounds geodetically in their notebooks as well as on the T-sheets. The earliest T-sheet and accompanying H (hydrographic) sheet



This image of Cape Canaveral was cropped from the T sheet T-300 (“T” for topography), mapped in 1850 by a Coast Survey crew under Sub-Assistant Hull Adams. Courtesy of NARA II, RG 23, Cartographic Records Division; Digital image NOAA National Ocean Service

for North Key of the Cedar Keys begins with reconnaissance mapping of the main shell mound in 1849 to triangulate elsewhere, later mapping through 1854 even more mounds. Similarly, the T-sheets for the coast near Jacksonville show, in 1856, the “Mount Cornelia” mound complex north of the mouth of the St. Johns River. Those mounds had “disappeared” by 1924 in the Survey’s mapping of the intracoastal waterways, which was based on aerial photography.

The initial survey of Cape Canaveral, done by surveyor Hull Adams in February 1850, outlined not only the shoreline, but also the natural landscape, with dunes, scrub and fresh water ponds, and then the solitary form of the Cape Canaveral Light. Geo-rectifying that map with a modern Google Earth image, centered on that lighthouse, dramatically underscores the changes the Space Age brought to the site and 168 years of shoreline change.

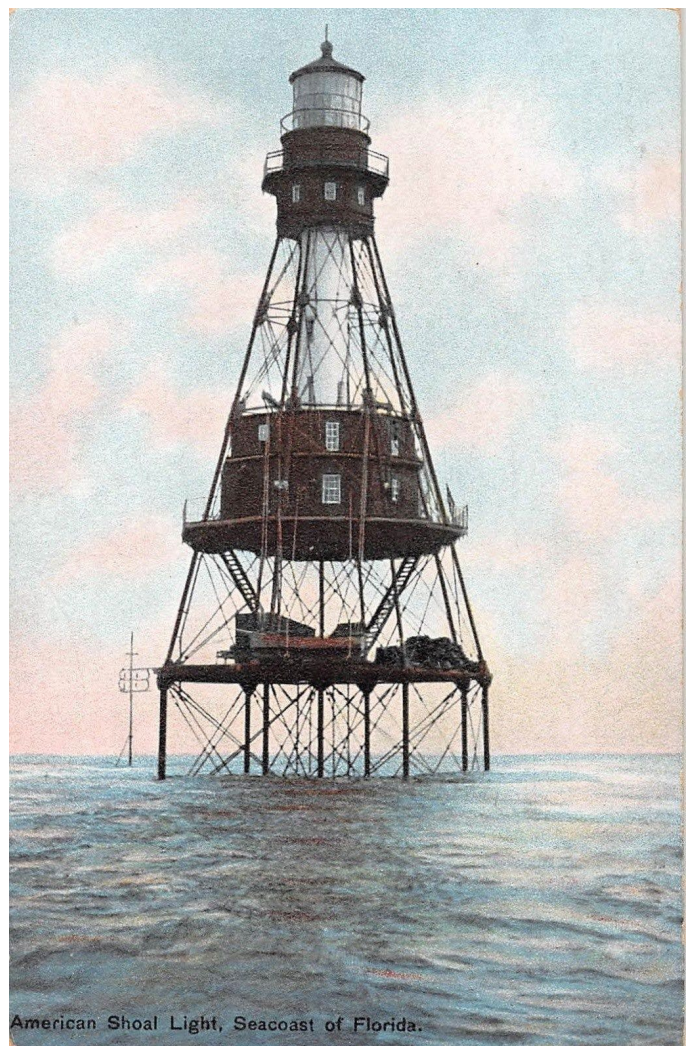


At roughly the same time, field crews working with surveyor Ferdinand Gerdes in 1849 charted the Miami River from the upper rapids in the Everglades to the river's mouth in Biscayne Bay, with a separate chart for the latter. The river's mouth sketch has been known to historians for some time, and it shows, in properly mapped scale, the landscape and the human features on the shore and along the river. Among them are Fort Dallas, established by the US Navy in 1836 and occupied by the Army from 1838 to 1841 during the Second Seminole War. By the time of Gerdes's survey, the fort was part of Colonel William F. English's plantation.

The sketch lays out the fort, English's buildings—some complete, others “commenced,” and others uninhabited. The earliest detailed map of this portion of what is now Miami, Gerdes's sketch not only captures the historic structures' placement, orientation and dimensions, but also places them in a landscape that we now know was inhabited thousands of years earlier by the Tequesta, with subsequent and more recent archaeological work at sites DA00011 and DA00012, the latter known as the Brickell Point Site.

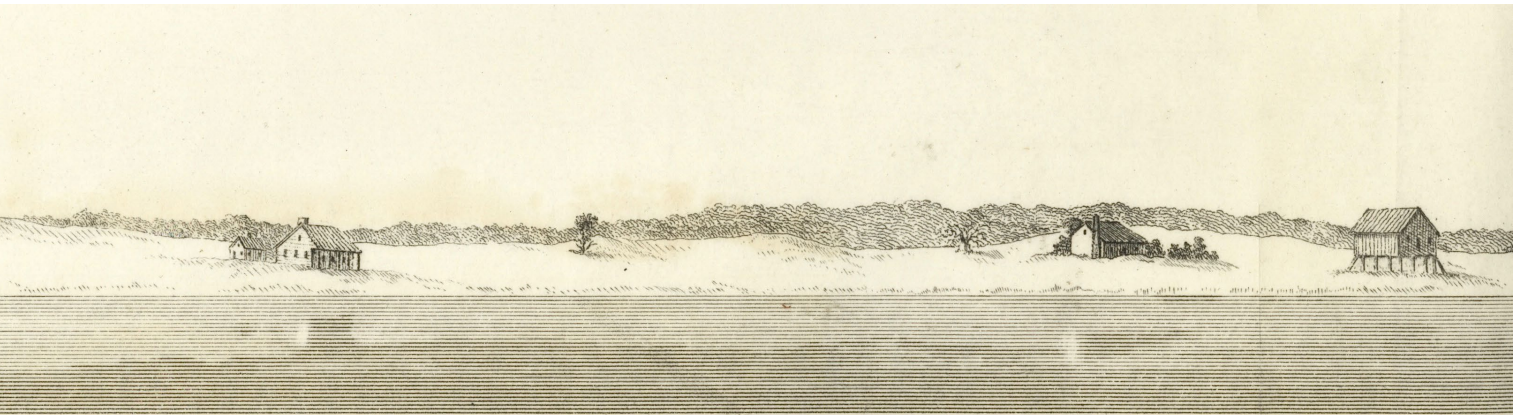
During the Civil War, the records and the knowledge of Coast Survey veterans were important information for both sides. Some former Navy officers assigned to the Coast Survey joined the Confederacy, but most Coast Survey surveyors were attached to Union naval and army commands. One contribution, vital for a rapidly expanding navy with hastily assembled ships and newly

minted officers and crews to blockade the more than 3,000 miles of the Confederate coast, was to summarize what they knew about that coast, but in a way that would not be shared with the Confederacy. In 1861, key members of the Coast Survey prepared a set of secret memoirs for US military forces, called “Notes on the Coast.” The memoirs



American Shoal Light, Seacoast of Florida.

This American Shoal Light postcard from ca. 1910 depicts a tri-vane reef beacon. Courtesy of Corey Malcom, Mel Fisher Maritime Heritage Society



Mayport Mills, St. John's Lt. Ho. S.E. $\frac{1}{2}$ S, distant $\frac{3}{8}$ Miles.

A coastal view of Mayport Mills and the St. Johns River lighthouse was drawn and engraved by John Barker and published in 1887 in the Coast and Geodetic Survey's Local Atlantic Coast Pilot, Section 19. Courtesy of the NOAA Central Library, Silver Spring, MD

are succinct, informed summaries of the basic information that Union forces unfamiliar with the Confederate coast needed vitally to know.

The memoirs are lithographic texts, but written in cursive. At the beginning of the war, Washington, DC, was filled with spies, including in the Government Printing Office. The Coast Survey had its own lithographic studio, where staff could prepare the memoirs in secret. Only one complete set is known to survive, but a number of incomplete sets of the twelve original memoirs exist in various institutions. The lithographed texts, sewn in signatures, are reasonably robust and can be scanned. The memoirs' folded lithographic maps are fragile or lost, but most of them are lithographic transfers from immediately pre-war engraved Coast Survey maps, most of which still exist in various archives, and many of which have been scanned. It is easily conceivable to reconstruct the entire set of memoirs digitally.

Accustomed to hardship and able to work with scientific accuracy in difficult conditions, Coast Surveyors joined Civil War actions on the coast, and their charts and maps, whether hand-drawn or systematically laid out, provide accurate delineation of temporary defensive works such as earthwork forts, rifle pits dug into the soil, and permanent

and temporary buildings. Among the manuscript charts are the positions and layout of Confederate and Union earthworks on the St. Johns River and surrounding Jacksonville area during the Civil War. Another provides a plat of the coast, layout, and buildings of Palatka in March 1864. Yet another is a hand-drawn chart that documents the naval attack by US gunboats on Bay Port, Florida, on April 4, 1863. It lays out Confederate rifle pits, troop positions, and the movements of US gunboats during the action.

After the Civil War, the Coast Survey responded to an ever-changing Florida coastal landscape with ongoing surveys that continued to fill in the gaps left from the pre-war surveys. Those T-sheets show a pre-Flagler, largely undeveloped Florida becoming the Florida we know today. As we said earlier, many of these remain buried in various archives. Among them are more recent archival documentation of shipwrecks. World War II charts, marked "RESTRICTED," map the locations of ships sunk by German U-boats off Florida's coast during the ongoing Battles of the Atlantic and the Gulf. Not all of these ships have been relocated in modern times, and some are a concern, not only as historic sites, but also due to the oil trapped inside—in some cases, in the tens of thousands of barrels—that might pose an environmental risk.



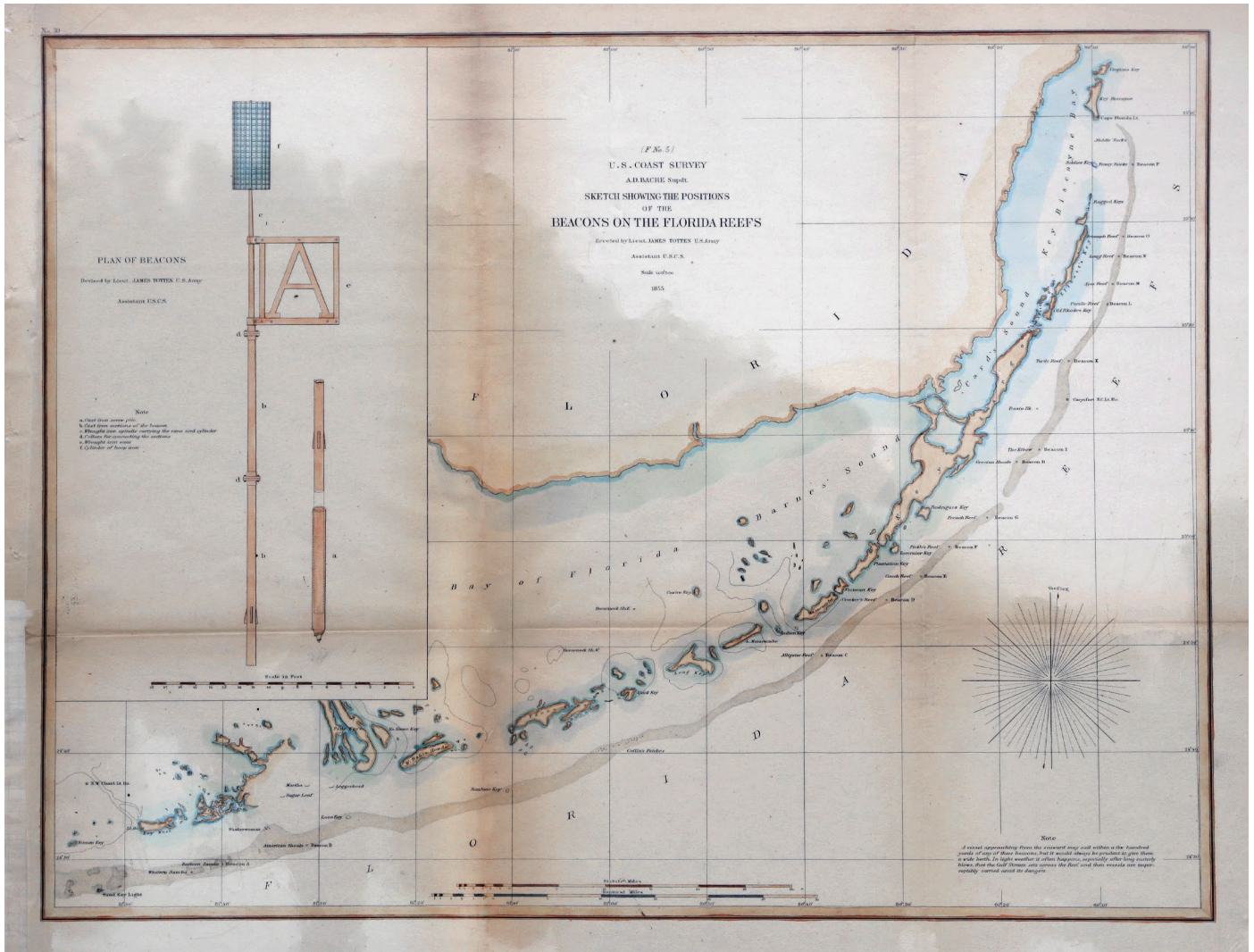
The beacon at American Shoal was bolstered by three stakes and a system of turnbuckles that helped it withstand storm wind and waves. Photo by Matthew Lawrence, NOAA

In 2014, a NOAA team working with sanctuary volunteers surveyed the waters of Florida Keys National Marine Sanctuary to compare the records of the Coast Survey's placement of beacons on the reefs with archaeological evidence. The first beacons, mangrove logs placed inside nine-foot-long iron piles and topped with a barrel that had been painted black, were replaced with more permanent markers starting in 1853. These iron screw-pilings were topped with large iron letters, labeled alphabetically "A" through "P." Lieutenant James Totten, on loan from the US Army, supervised the survey and the construction of the beacons, thus they were known as the "Totten beacons."

Following Totten's work, storms and hurricanes battered the beacons. Some remained standing for only a few years, while others lasted decades. The US Lighthouse Board took over responsibility for the beacons' maintenance and, by the 1870s, had developed more substantial beacons that

used stakes, tie rods, and turnbuckles to provide additional support to a beacon's mast. Historical research suggests that the beacons were maintained until the 1920s, serving an important role protecting lives and property.

Following more than a decade of ad hoc investigation into the "Totten Beacons," Office of National Marine Sanctuaries archaeologists and cultural resource managers received a grant in 2014 through NOAA's Preserve America Initiative to undertake a comprehensive survey of the beacons and develop interpretive material to convey the importance of the US Coast Survey's efforts to protect life and property in the Florida Keys. While some beacon locations were known, using the 1855 Coast Survey plot of the beacons and tying it into modern maps helped guide the team. Five sites were documented at Eastern Sambo, American Shoal, Pickles, French, and Turtle reefs. Although only the iron pilings remained at some sites, others were remarkably intact.

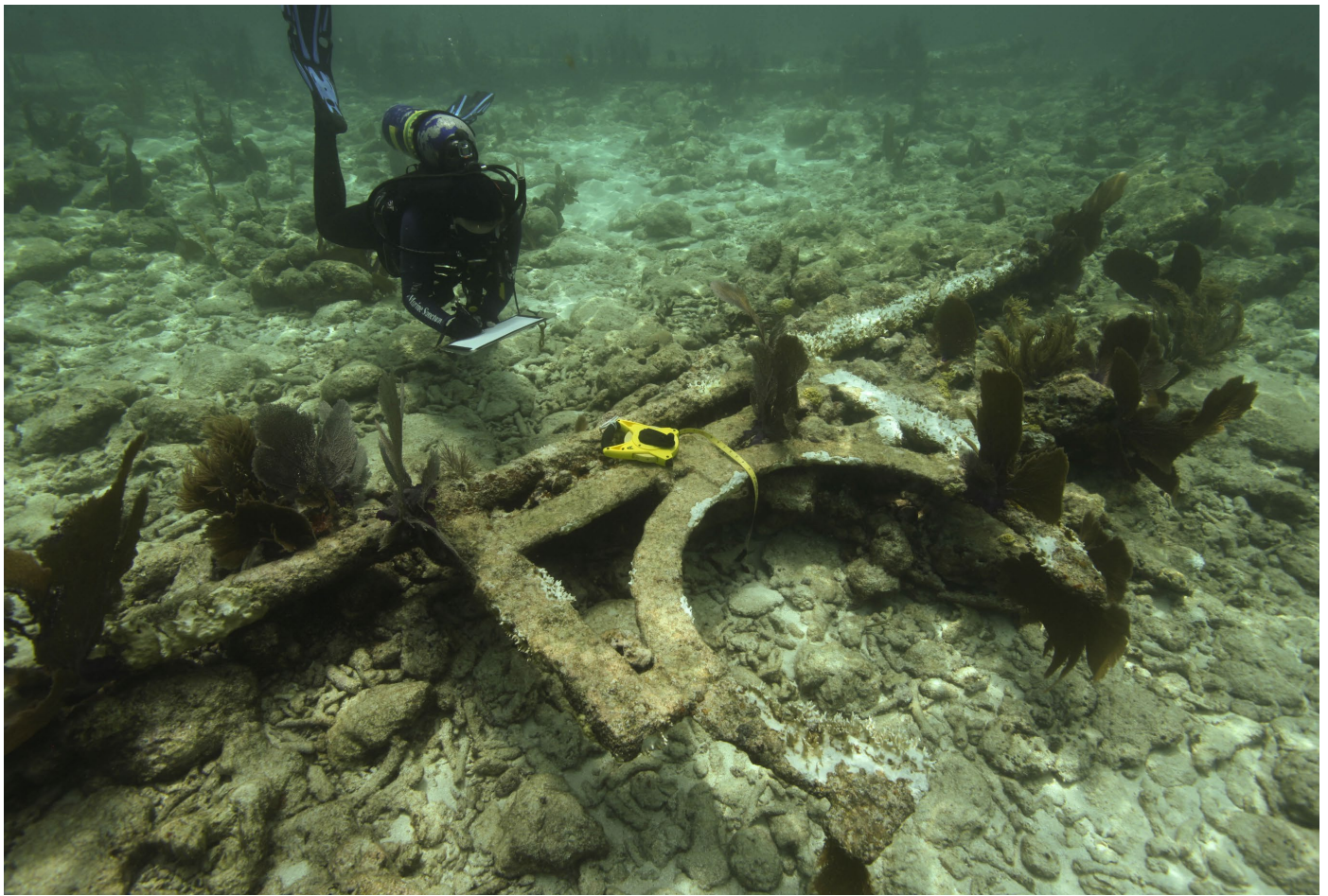


This 1855 colorized map provided mariners with the information they needed to determine their position off the Florida Keys in conjunction with the reef beacons. Courtesy of the Islamorada Branch of the Monroe County Library, Florida History Collection

At Eastern Sambo Reef, the iron vane and rectangular frame that mounted the large letter “A” was found flush to the seafloor. Archaeologist Corey Malcolm from the Mel Fisher Maritime Heritage Museum created a three-dimensional model of the vane and letter, as well as other artifacts at this and other beacon sites. The team also found that the vane from French Reef had the remains of the letter “G” and located the broken frame and fragments of the letter “K” at Turtle Reef. The Totten Beacons Project was a reminder for the team members, who have worked with Coast Survey records to locate and survey other sites in the United States, that these records are powerful references and tools for archaeology.



Shallow surging water made it difficult for NOAA divers to document the beacon frame at Eastern Sambo Reef. Photo by Matthew Lawrence, NOAA



What this means for Florida sites is that much more can be found using the records of the Coast Survey. There are doubtless many more details on other sheets not yet scanned or studied in the archives of the Coast Survey. What is needed, perhaps project by project or ideally with support for a comprehensive effort, is to dig into those archives before we dig into the soil or venture into the water. As we said at the start, with these records, sometimes “X” does mark the spot—or in the case of the Totten Beacon for Eastern Sambo Reef, it also could be the letter “A.”

While it no longer projects above the water, the French Reef beacon retains the greatest number of original components, including portions of its “G” symbol. Photo by Matthew Lawrence, NOAA



Archaeologists sketch and measure the beacon’s screw pile base on Pickles Reef that has become encrusted with corals and sea fans. Photo by Matthew Lawrence, NOAA

Dr. James Delgado is senior vice president of SEARCH, Jacksonville, Florida. Dr. John Cloud is a geographer, writer, and editor for the NOAA Central Library, Washington, DC. Matthew Lawrence is a maritime archaeologist with the Florida Keys National Marine Sanctuary, Key Largo, Florida. Deborah Marx is a maritime archaeologist with NOAA’s Office of National Marine Sanctuaries, Silver Spring, Maryland. Brenda Altmeier is the maritime heritage program coordinator at the Florida Keys National Marine Sanctuary, Key Largo, Florida.



Throughout the 19th century, several beacons were placed at Turtle Reef in water twelve feet deep. Photo by Matthew Lawrence, NOAA

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FHSAI - EDUCATIONAL
TRAILS MAP
 AT THE BREVARD MUSEUM
 2201 MICHIGAN AVENUE, COCOA, FLORIDA.



LEGEND
 Paved ———
 Unpaved - - -
 Water ~~~~~

TRAIL DISTANCES

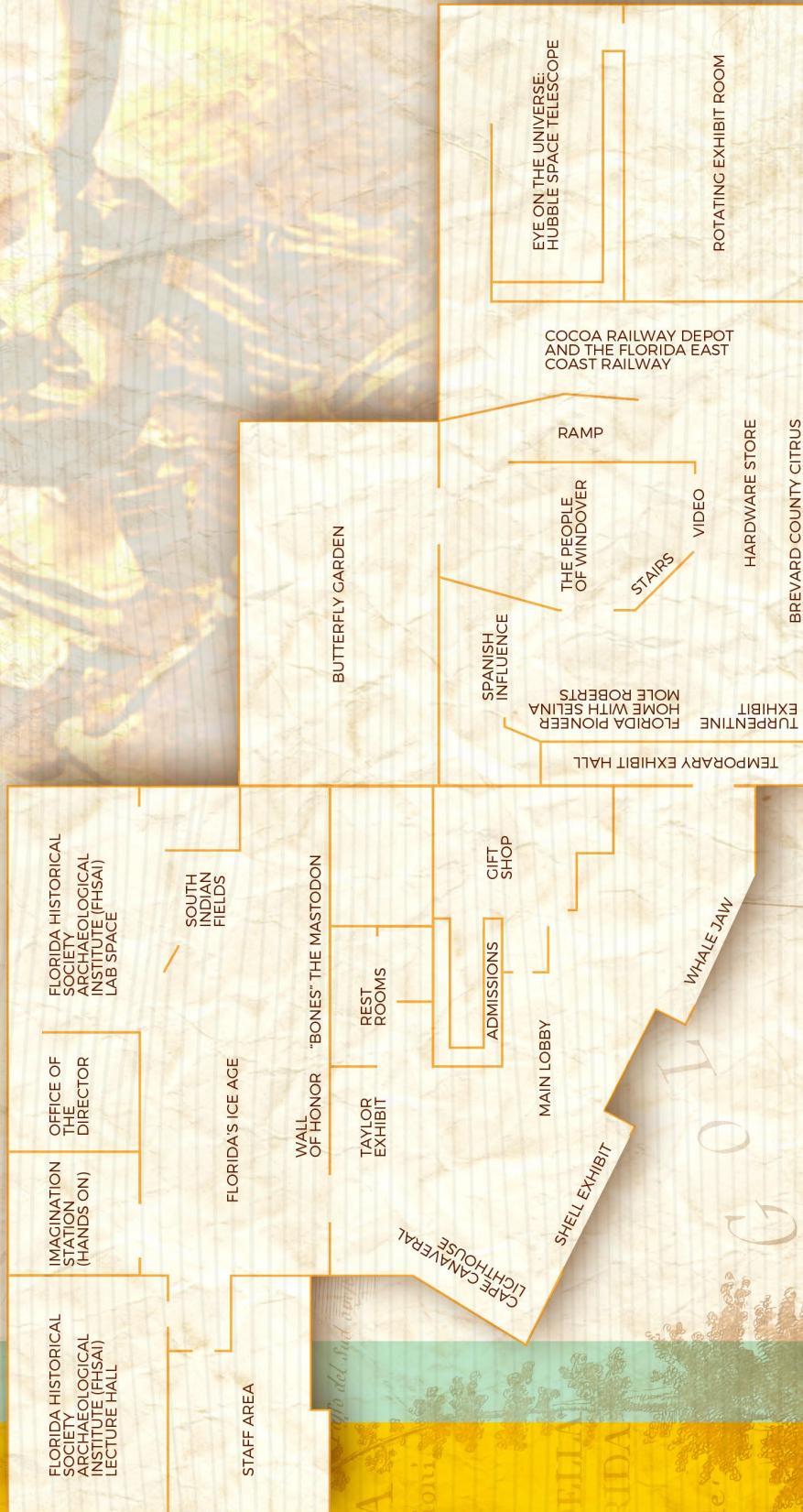
(1) Planetarium Tr.	0.1
(2) Indian Tr.	0.07
(3) J. Johnson Tr.	0.04
(4) Swamp Tr.	0.15
(5) Hammock Tr.	0.1
(6) Clear Lake Tr.	0.2
(7) Travis Tr.	0.2
(8) Scout Tr.	0.02





EXHIBIT MAP

BREVARD MUSEUM OF HISTORY & NATURAL SCIENCE
2201 MICHIGAN AVENUE, COCOA, FLORIDA



3D MODELING OF ARTIFACTS

The State of Florida's Archaeology Collection

Steven Karacic, Marie Prentice, Kathryn Miyar, and Jeremy Vause



Figure 1. BAR staff use this photography setup for photogrammetry, here capturing the image of a colono ware bacín found at the site of Mission San Luis (8LE4). Courtesy of the Florida Division of Historical Resources

Innovations in 3D modeling are changing the nature of museum studies and collections management. 3D models can provide an institution with a highly precise and accurate rendering of an artifact as a means of creating a digital record. The public and researchers can engage with the 3D model in ways that are not possible when looking at artifacts in photographs or museum displays. The Florida Department of State, Bureau of Archaeological Research (BAR), has initiated an ambitious 3D modeling program with the aim of putting the past in the (digital) hands of the public.

The State of Florida's Archaeological Collection

The State of Florida's archaeological collection originated in 1965 with the appointment of the first State Archaeologist. BAR, a program of the Division of Historical Resources, is responsible for the preservation and promotion of archaeological materials found on state-owned lands and waterways. These artifacts—and the sites from which they were recovered—are clues and often serve as our only insights into what life in the past was like in Florida. The State acquires artifacts through a combination of state-sponsored research, permitted archaeological projects (Chapters 1A-31 and 1A-32 of the Florida Administrative Code), and private donations (pursuant to Chapter 1A-40 of the Florida Administrative Code).

The position of State Archaeologist was created to oversee salvage archaeological projects conducted in advance of new construction. Florida State University's Gunter Building was the first home of the offices of the State Archaeologist, and the site of the former Leon County Jail, now called the Firestone Building, became the home of the first conservation laboratory. As construction projects continued to expand to meet the needs of a growing population, the state archaeological collection increased, and the need arose for more storage space. In 1973, ground was broken for the R. A. Gray Building, located in downtown Tallahassee. Completed in 1976, it became the home of the

offices of the Florida Department of State, which administered the Division of Archives, History, and Records Management. The R. A. Gray Building initially housed not only the state archaeological collection and a modern conservation facility, but also the Museum of Florida History and the State Library and Archives. Florida's archaeological collection continued to grow through the end of the 20th century and the beginning of the 21st century. In 2012, the collection was relocated to the archaeology building on the site of Mission San Luis in Tallahassee. The collection's move to Mission San Luis allowed the State to create a space that could accommodate growth for many years while maintaining standards of security and accessibility.

Each artifact added to the state archaeological collection is entered into a comprehensive database, a process that was initiated in the 1990s. This software assists in the management of the collection, allowing BAR staff to locate and track specific objects in the state collection, which presently includes more than 600,000 groupings of artifacts. These artifacts span more than 14,000 years of human history in Florida and range in size from beads no larger than the head of a pin to cannons and canoes.

BAR strives to share the state archaeological collection through research and museum loans. Research loans facilitate scholarship that advances knowledge of Florida's past, while museum loans lead to the display of artifacts so the public can see these objects of history that collectively belong to every Florida citizen. In total, BAR has loan agreements for more than 85,000 artifacts that can be found in more than 100 institutions within Florida and the broader United States.

In an increasingly digital age, it is now possible to share access to the state archaeological collection through 3D models. The creation of 3D models has been a tool used by museums for more than a decade, but recent improvements in photogrammetric technology have made the production process more cost-effective and less time-intensive.

Creating 3D Models

Automated photogrammetry uses software to identify and stitch together overlapping surface points photographed from a variety of orientations. The model can then be rendered to scale if several points in the model have known distances from one another. The result is a highly accurate representation that can deviate from the original in size by as little as 0.01 percent.

The first step in the process of creating a 3D model is to photograph the artifact in a light-controlled environment (Figure 1). It is particularly important that the background of the photograph is of a uniform color that differs from the color of the artifact; this enables the software to separate the background from the subject of the model. To gather photographs from as many angles as possible, the camera is mounted on a tripod, and the artifact is rotated on a turntable. At least sixteen

photographs are taken per rotation. After a rotation, the height of the camera is changed, and an additional rotation is conducted. Generally, it is necessary to take photographs from three or four different heights. Of course, this leaves the bottom of the artifact excluded from the photographs, so it is necessary to shoot most artifacts twice—the first time with the object right-side-up and the second with the object upside-down. The result is typically 100 to 150 photographs per model. It is important to minimize both glares and shadows on the surface of the artifact because these will have an adverse impact on the final model. To control for these potential problems, we situate the object in a photography tent, which helps to diffuse light, and we adjust the exposure and clarity of the photographs using photo editing software.

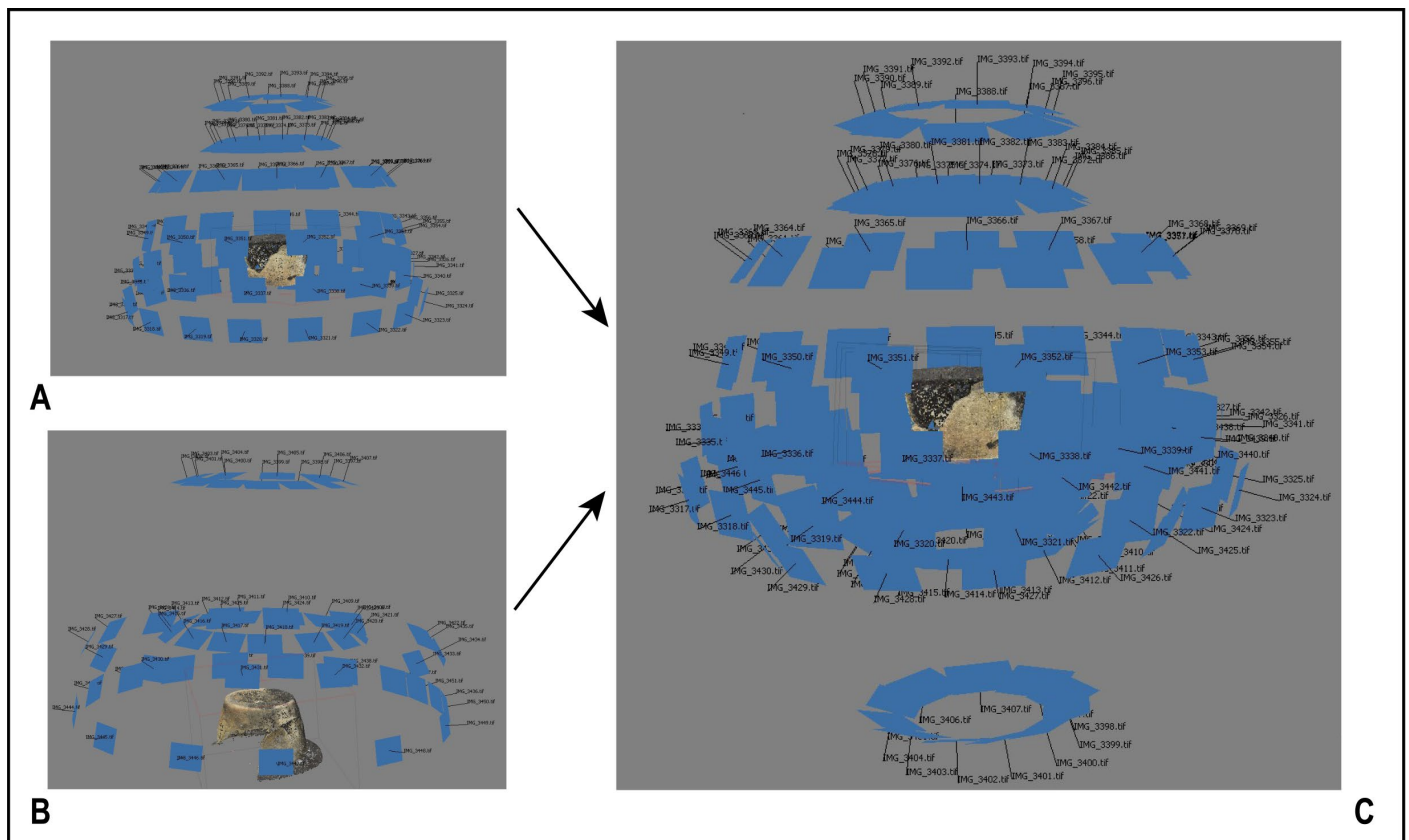


Figure 2. Right-side-up (A) and upside-down (B) point clouds are created. Once these two models have been edited, it is possible to merge them into a single model (C). The blue boxes indicate the angles from which the original photographs were taken. Courtesy of the Florida Division of Historical Resources

Many artifacts have relatively homogenous surfaces that reduce the accuracy of the model. We can mitigate this risk and reduce the processing time required by the software by including “targets” in the photographs. Targets are easily recognizable points in the photograph that are not part of the artifact itself. These targets must rotate with the artifact and, therefore, are placed on the stage. When creating the model, the software will align the photographs by the targets. Assuming the targets are a known distance from one another, it is possible to use this information to scale the model.

The software aligns the photos to create point clouds (Figure 2). It is necessary to create one point cloud per orientation of the object. Because we typically photograph an artifact right-side-up and upside-down, this requires two point clouds. Since the software is not able to separate 100 percent of the background from the artifact in every picture, each point cloud requires editing. Once the point clouds have been edited, they then are merged into a single model (Figure 3a). The software then builds a mesh that provides the model with its geometry (Figure 3b). The final step is to add the texture, which overlays surface information taken from the photographs onto the mesh (Figure 4).

BAR regularly photographs objects in the state collection as part of a documentation process. This is an important step because it provides a record of what the object looked like when it came into the State’s possession. The 3D models function as an extension of photography, with the added advantage of providing the viewer with a wider range of angles than would be possible through photography alone. Researchers can examine these models from a variety of orientations and take accurate measurements directly from the models.

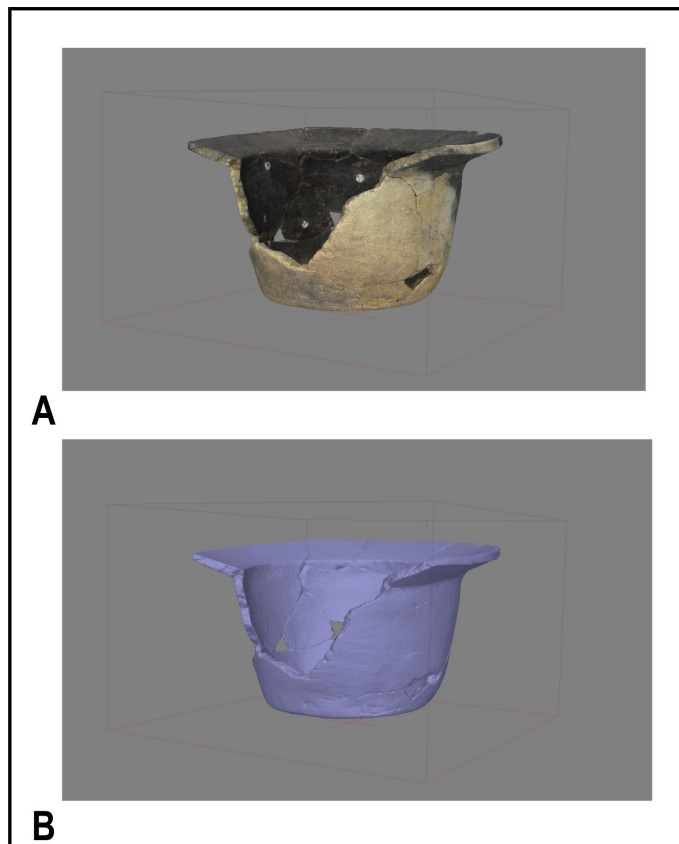


Figure 3. Image A represents the final dense point cloud, and image B is the mesh for the model. Courtesy of the Florida Division of Historical Resources

Online Exhibit of 3D Models

3D modeling is a powerful tool for public outreach. The Division of Historical Resources has developed the website, floridahistory-in3d.com, to display the 3D models created by BAR. The current exhibit focuses on daily life aboard the Spanish Plate Fleet, which brought goods from colonies in the New World to Spain. In 1715 and in 1733, storms sank ships from the Spanish Plate Fleet off the coast of Florida. These artifacts provide a snapshot of life on a ship in the early 18th century. Eighteen artifacts are shared on the website. 3D models of these artifacts provide viewers with the unique experience of inspecting objects that were used by the sailors on these ill-fated ships in greater detail and from more angles than would be possible in a museum. BAR plans to develop additional exhibits using this innovative technology.



Figure 4. This shows the completed model after the addition of the texture (A). The white box drawn on the interior wall of the model is expanded (B), where it is possible to examine the surface of the model in detail. This surface compares favorably to the high resolution photograph of the same location (C). Courtesy of the Florida Division of Historical Resources

3D Models and the Future

Three-dimensional technology is revolutionizing conventional museum practices by allowing interaction with artifacts that previously has been limited to very few people because of legitimate concern for preservation. In contrast to museum displays, 3D models can be viewed from anywhere with internet access at any time. This combination of engagement and access has the potential to change the “when,” “where,” and “how” of experiencing Florida’s past.

The authors are staff members with BAR’s Research and Conservation Laboratory. Steven Karacic and Marie Prentice are senior archaeologists; Kathryn Miyar is the conservation and collections supervisor; and Jeremy Vause is the collections technician.

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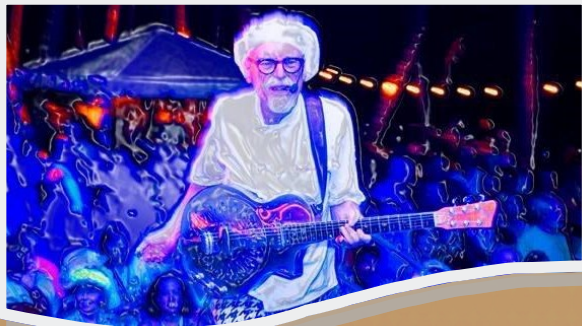


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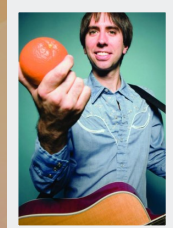
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POLLEN AT GARDEN PATCH

Pollen as an Indicator of Landscape Modification and Plant Use on the Northern Gulf

Paulette S. McFadden and Neill J. Wallis

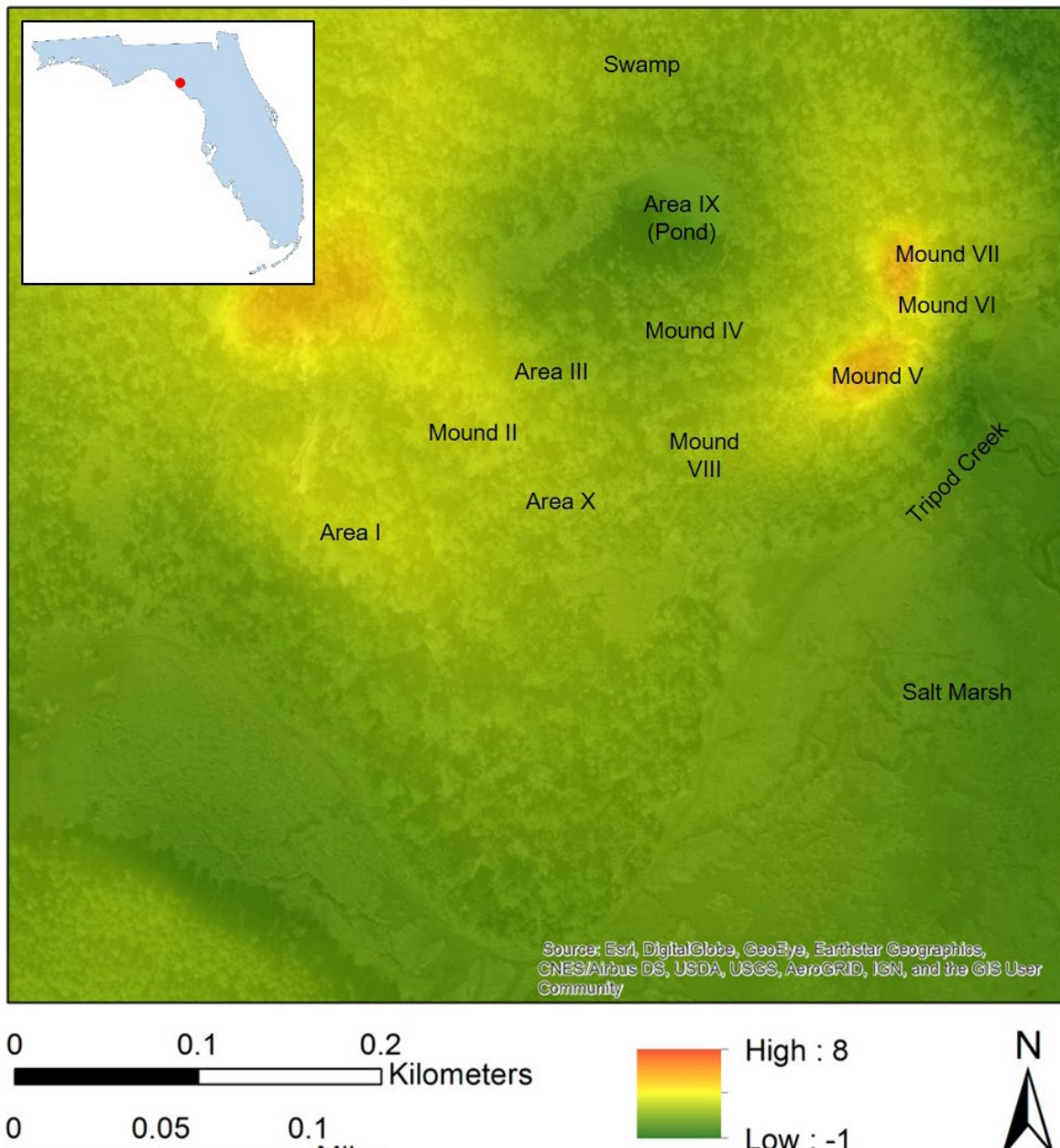


Figure 1. Garden Patch site with LiDAR overlay and locations of designated areas of the site. Map by Paulette S. McFadden

The pleasant warming temperatures and longer days of spring bring with them millions of pollen spores, those tiny plant reproductive bodies that fill the air and frustrate seasonal allergy sufferers. Much of the pollen released into the air by plants eventually falls to the ground, and when it is blown or washed into a pond or lake, it settles to the bottom, where it is covered by sediments. Luckily, pollen spores have a tough outer coating that enables them to remain preserved in these sediments, sometimes for thousands of years. Because of that remarkable preservation, and because each type of spore has a unique shape, pollen collected from sediment cores can be identified by a palynologist.

In 2012 and 2013, we collected cores from a shallow, freshwater pond at the Garden Patch site on the northern Gulf Coast of Florida. Pollen from sediments in the core, which dated to the time of the Late Deptford/Early Swift Creek occupation (ca. AD 100–650), indicates that the residents of Garden Patch modified the plant community to suit their needs by eliminating or significantly reducing some species while fostering, and perhaps introducing, other desirable ones.

Garden Patch Site

Garden Patch is a village-mound complex located on the northern Gulf Coast of Florida that was occupied as early as the first century AD and inhabited throughout the Middle and Late Woodland periods by people associated with the Deptford, Swift Creek, and Weeden Island cultures (Wallis et al. 2015). The site is listed on the National Register of Historic Places and represents one of the most significant Woodland Period sites on the northern Gulf Coast (Kohler 1975; Weisman et al. 1990). Despite its importance, minimal archaeological research had been conducted prior to 2012 when we began an extensive research project at the site.

Clarence B. Moore (1902:346–348) was the first to report on the site and described his excavation of three mounds. John Goggin

revisited the site in 1948 and identified three distinct areas, a natural sand ridge topped with a midden, a sand mound, and a village midden (Willey 1949:306). More intensive excavations were conducted by Timothy Thompson in 1969 and Timothy Kohler in 1974, both of whom were graduate students at the University of Florida. Thompson never completed a report on his excavations; however, partial results of those excavations were reported by Kohler (1975) and by Wallis and McFadden (2015).

Kohler's mapping of the site and comprehensive survey by Wallis and McFadden resulted in the identification of ten distinct areas, including three midden areas, seven mounds (two of which are designated as Mound II), and a shallow freshwater pond (Kohler 1974, Wallis and McFadden 2014) (Figure 1). The middens form an arcuate pattern at the central portion of the site with the seven mounds placed around the perimeter. This midden configuration is similar to Swift Creek and Weeden Island sites throughout George and Florida (Russo et al. 2014; Stephenson et al. 2002), and the incorporation of the mounds into the site plan indicates that Garden Patch was an important ceremonial complex much like McKeithen in north-central Florida and Kolomoki in southwest Georgia (e.g., Milanich et al. 1997; Pluckhahn 2003).

Pond Samples

Initial activities at the site centered on the freshwater pond and those activities that affected the composition of the sediments in the pond over the course of the occupation. The pond is less than 60 cm deep and presently is covered with common duck weed (*Lemna minor*; see Figure 2). Analysis of an initial core collected in 2012 from the center of the pond revealed that the pond became a permanent water feature by about 400 BC, with initial human occupation occurring along the shore a few centuries later, by about AD 64 (Wallis et al. 2015:512). A lens of light gray sand of terrestrial origin bisects a portion of the black, organic-rich sediments

in the upper portion of the core. Radiocarbon dates bracketing that lens (cal 40–370 BC to cal AD 680–880) encompasses the entire Deptford and Swift Creek occupation of the site (Figure 3). Additional cores collected from the pond in 2013 all contained this same layer of terrestrial sands (Figure 4). Human practices, including mound construction, in the vicinity of the pond disturbed these sandy sediments, and they were transported to the pond, either by wind or erosion, where they were trapped. These trapped sediments have the potential to offer significant information about the impact of human occupation on the local environment.

Three sediment samples, one each from the base, center, and top, of the terrestrial sand deposit from one core were sent to Mark Bush at the Florida Institute of Technology for pollen analysis. These three samples represent snapshots of the plant community at the time of initial occupation (base), during the height of occupation (center), and at the end of the occupation (top). Overall, the pollen from all three samples is indicative of a fairly typical wetlands and mesic woodlands environment, with no evidence of domesticated crops. However, shifts in the pollen frequencies of various species between the samples are notable.

Pollen Analysis Results

Evidence of land clearing, pond modification, and selective fostering of plants can be seen in the changes in frequencies of pollen in several species (Figure 5). Toxic plants such as sparges and aggressive plants that outcompete other species, such as pondweed, declined during the occupation. Other plants, such as ferns, club moss, water parsnips, elder, and guava, increased during occupation of the area. All of the species that increased have been documented as utilized in some way, either as food, medicine, or building material (and sometimes all three) by Native Americans. After the site was abandoned, pine increased significantly, and sparges and pondweed returned. With the exception of elder, all of the increased species associated with the occupation declined to pre-occupation levels.

During the height of the occupation, maple decreased slightly, but the major shift was in sparges and pondweed. The toxic sparges declined significantly, and pondweed, an aggressive ovate-leafed plant that covers the surface of shallow-water ponds, disappeared during the height of the occupation. The cleared area near the pond likely allowed more light to reach the ground, and as a result, grasses increased significantly.

Ferns, specifically leather fern (*Acrostichum* sp.) and royal or cinnamon fern (*Osmunda* sp.) either colonized the area or were introduced by the residents. Leather ferns prefer a wet environment and have a high toler-



Figure 2. Field school student Charly Lollis collects sediments from the Garden Patch pond. Photo by Neill J. Wallis

ance to salt, making the environment on the northern Gulf Coast a perfect place for them to thrive (FNPS.org). The young leaves of the leather fern, called fiddleheads, can be boiled or steamed and eaten when they emerge in early spring (Ellison et al. 2010). Cinnamon and royal ferns, like the leather fern, are native to Florida, both preferring wet, boggy environments, but prefer freshwater and are less salt tolerant than the leather fern (Figure 6). In addition to the edible fiddleheads, the roots and fronds have traditionally been used to treat wounds and ease pain (Matchutadze 2014). Whether these plants colonized the cleared areas around the village or were introduced, they were certainly useful and perhaps desired plants and thus were not removed.

Club moss is a native plant that prefers sandy or peaty margins of freshwater lakes or ponds and readily colonizes disturbed areas (Landsdown 2014). There are many documented uses of the plant. The spores have an oily coating that repels water, making it useful as a powder, and it also is used to stop bleeding and to treat wounds (Foster and Johnson 2008:110). In some Native American cultures, the oily spores, which create a bright flash of light when thrown into a fire, are used for ceremonial purposes (Lobstein 2018). A tea can be made from the leaves to treat urinary and digestive tract problems and alleviate headaches (Lobstein 2018, Web MD 2018). Along with the ferns, this useful herb likely colonized the area once it was cleared and that colonization was not discouraged by the residents.

The samples from the height of the occupation and the end of the occupation contain pollen from several plant species, including water parsnips (*Sium* sp.), elder (*Sambucus* sp.), and guavas (*Psidium* sp.), that were not present in the environment prior to human occupation, indicating these plants may have been introduced to the area. Water parsnips grow in and around ponds and swampy areas and prefer full sun. The roots can be eaten roasted, raw, or fried, and the aromatic foliage can be used as a relish (Dexter et al. 2014). Ethnographic accounts of the Chippewa, in the northeastern United States and southern Canada, and the Cree and other tribes in Montana document this plant as an important food resource across a large area of North America (Dexter et al. 2014; Fernals and Kinsey 1958).

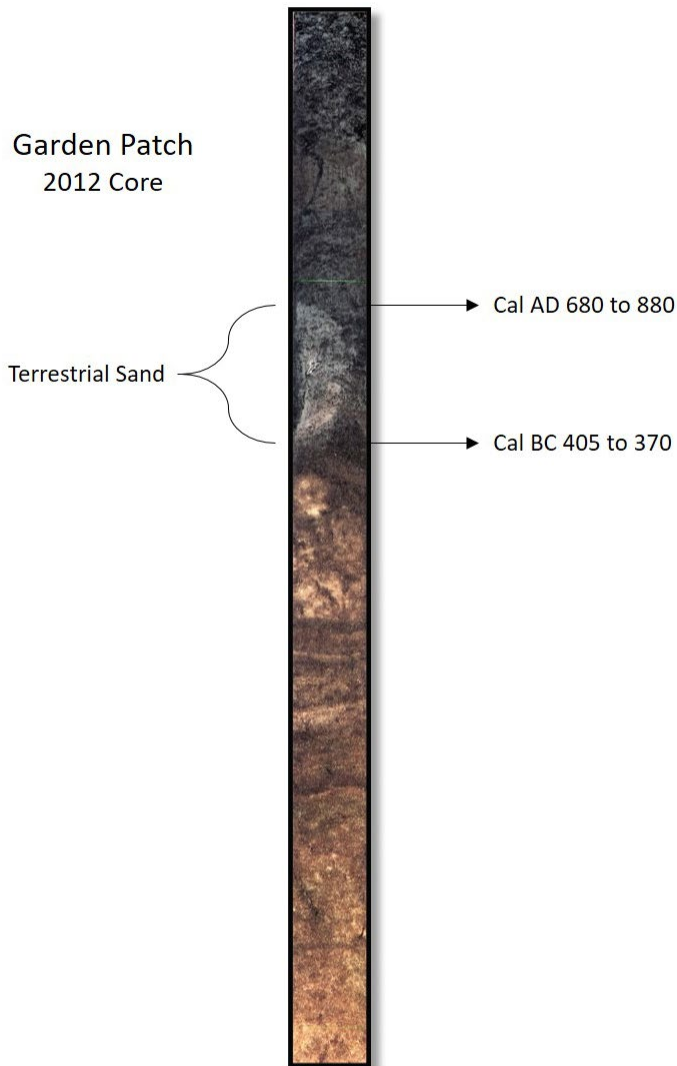


Figure 3. Photograph of the initial Garden Patch Pond core, collected in 2012, showing the location of the terrestrial sand and locations of radiocarbon dates. Courtesy of Paulette S. McFadden

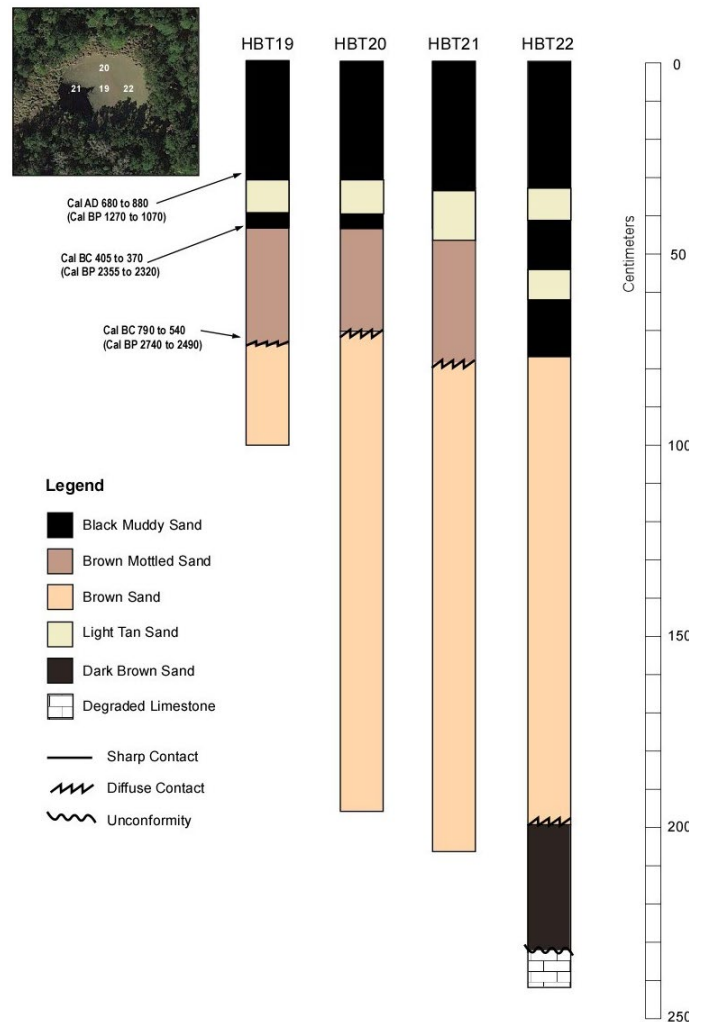


Figure 4. Schematic representation of the cores collected from the Garden Patch pond with radiocarbon dates. Courtesy of Paulette S. McFadden

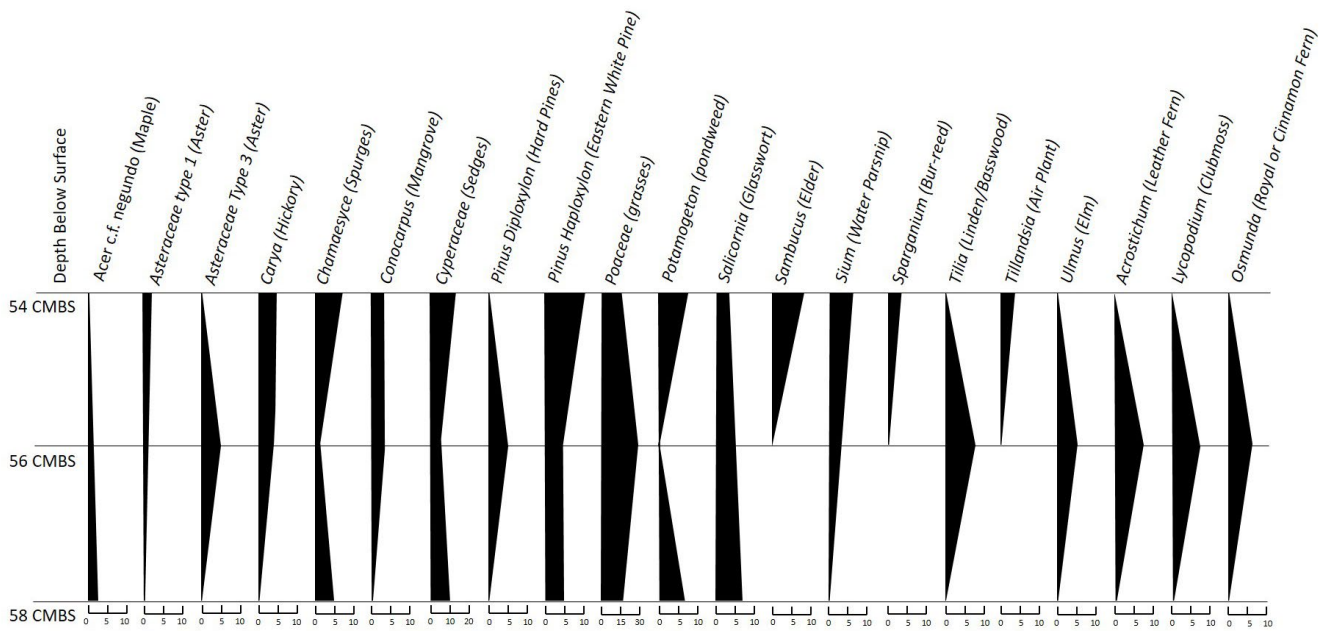


Figure 5. Chart of pollen frequencies for select plant species at Garden Patch. Courtesy of Paulette S. McFadden

Elder, or common elderberry, flourishes in well-drained, moist, sunny areas and tends to populate areas during the early stages after land clearing (Stevens 2001). Both the flowers and berries of elder are edible (Figure 7). Documented uses of the flowers include treatment of diarrhea, nasal congestion, and as a topical treatment for inflammation (Merica et al. 2006). The fruit is particularly useful for medicinal purposes because of its anti-inflammatory and anti-oxidant properties. It is used to treat stomach ache, sore throat, and rheumatism (Novelli 2003, Uncini Mangenelli et al. 2005). The small purple berries are particularly high in vitamins A, C, and B6 and are high in iron (Charlebois 2007). At the Early Archaic Windover site in east-central Florida, elderberries were found in the stomachs of several well-preserved burials, including an adult female in her early sixties who had consumed an estimated 550 elderberries just prior to her death from advanced bone cancer (Newsom 2002).

Guavas (*Psidium* sp.) are native to the New World, and the types of fruits produced by these tropical and subtropical species were an important food resource for pre-Columbian groups in the Americas (Gutierrez 2008; Morton 1987). In addition to its value as a food, the guava fruit and other parts of the tree are widely documented as being utilized for medicinal purposes, including

as an antibiotic, anti-inflammatory, antidiarrheal, and astringent (Gutierrez 2008; Smith and Nigel 1992). The qualities of the wood lend themselves to uses as construction material, and the bark can be processed and used as a dye or stain (Gutierrez 2008).

Another notable shift in pollen frequency occurs in pine (*Pinus* sp.). Two types of pine pollen are represented in the pollen chart (Figure 3-2), *Pinus diploxylon*, or hard pine, and *Pinus haploylon*, soft pine. Three major species of hard pines grow in the Big Bend region of Florida—loblolly pine, longleaf pine, and slash pine. Of the three major species, only the loblolly pine appears to be ill-suited for the environment at Garden Patch, preferring soils that are moderately to poorly drained, with a firm subsoil—rather than the sandy soils preferred by the longleaf and slash pines (Gaby 1985). Hard pines increase slightly in the middle sample before decreasing again by the latest sample. In contrast, soft pines appear to remain stable before substantially increasing in the latest sample. Only one species of soft pine is native to the southeastern United States—the eastern white pine, and this relatively fast-growing tree is a pioneer species at cleared or disturbed sites (Carey 1993). The marked increase in eastern white pine pollen appears to indicate recolonization of previously cleared areas.

Discussion

Putting the pollen into context with the archaeological data collected during excavations at the site in 2013, along with twenty-three radiocarbon dates obtained from different areas of the site, enables us to create a chronology of activities associated with human occupation at Garden Patch, and how those activities affected the plant community. Around AD 100, the first residents of Garden Patch settled on an elevated ridge (Mound IV) near the southern shoreline of the small pond (Wallis et al. 2015:512). They immediately impacted the plant community around them as they harvested building materials, cleared underbrush, and gathered plants for food and medicine.

Two centuries later, Mound IV was densely populated, and structures had been built at what would become Mound II and Mound V, followed shortly thereafter by mound construction at both locations (Wallis et al. 2015). By about AD 400, the village was fully established, with the placement of mounds, residences, and middens creating a circular village with a central plaza (Wallis et al. 2015). By that time, the plant community at Garden Patch had been altered significantly to better suit the residents. Much of the area had been cleared of undesirable plants, such as spurges and sedges. Tree removal created a space for grasses and asters to thrive. Pondweed had been cleared from the pond, eliminating competition and allowing duck potato and water parsnips to flourish.

New plants either were introduced or the residents created conditions that were favorable for the colonization of desirable plants. Ferns and club moss took advantage of the human alterations to the landscape and colonized newly disturbed areas, and presumably, these plants were allowed to proliferate because of their usefulness. Water parsnips took advantage of the removal of the pondweed and were fostered as a food source. Although elder is a native plant in Florida, there was no evidence of the presence of elder near the pond prior to the occupation at Mound IV. Like the ferns and club moss, elder is an opportunistic plant and will readily colo-

nize disturbed areas, and this may explain the advent of the species at the site. However, given the importance of elder, it is also possible that it was intentionally introduced.

The circular village-mound area of the site was abandoned sometime in the early seventh century AD (Wallis et al. 2015), and the plant community reacted to this abandonment by shifting to near pre-occupation conditions. Eastern white pine quickly colonized previously cleared areas, along with spurges and sedges. Pondweed once again grew in the shallow water pond. Ferns, club moss, grasses, and aster all declined. Elder continued to



Figure 6. Cinnamon fern fiddlehead. Courtesy of the US Fish and Wildlife Service

grow—perhaps the only species to continue to take advantage of the human landscape modifications after the site was abandoned. Finally, a Weeden Island village was established on the western edge of the site, approximately 200 m from the pond, about a century after residents left Mound IV. The near absence of cultural materials associated with that occupation in the preceding Late Deptford/Swift Creek village-mound complex suggests that they largely avoided utilizing the original village area (Wallis et al. 2015). The lack of sandy terrestrial deposits in the pond that date to the time of the Weeden Island occupation also supports this.

The Deptford- and Swift Creek-period residents at Garden Patch significantly altered the landscape by constructing a village and mounds and depositing midden materials. They also modified the plant community to



Figure 7. Ripe berries on an elder tree. Photo by Maigh-each-gheal, licensed for reuse under Creativecommons.org/licenses/by-sa/2.0

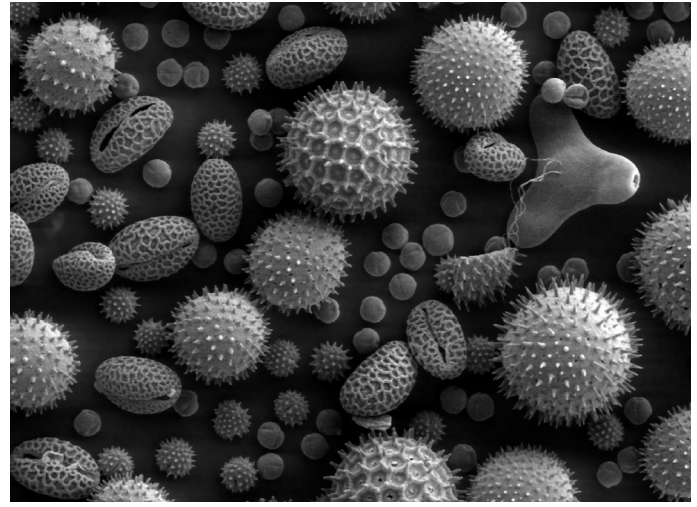


Figure 8. Pollen under the microscope. Photo by Skeeze

suit their needs by intentionally removing or discouraging certain species and fostering or introducing desirable ones. Although the mounds and middens persist, the plant community returned to its pre-occupation conditions, and without analysis of the pollen trapped in the sandy deposit in the pond, we would not know the extent to which that community had been altered. The pollen analysis also provides information about the types of plants associated with the people who lived there. Comparative studies at other contemporaneous sites could offer significant insight into the suite of plant species that were utilized during the Woodland Period in Florida.

Dr. Paulette McFadden is a senior archaeologist with the Bureau of Archaeological Research, Division of Historical Resources, Florida Department of State. Dr. Neill J. Wallis is associate curator in archaeology, Florida Museum of Natural History, University of Florida, Gainesville.

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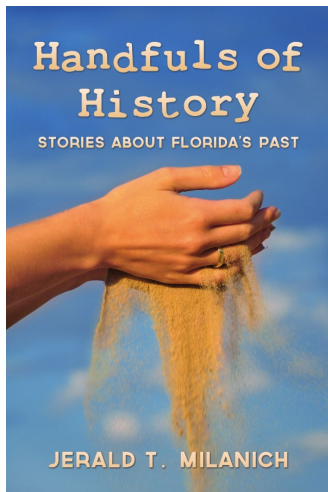
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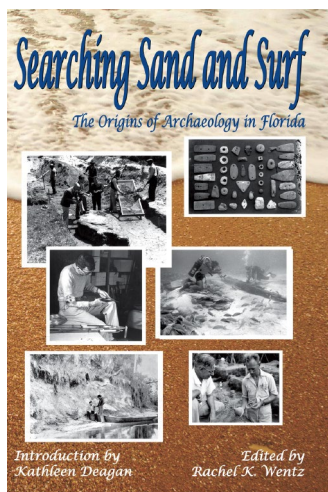


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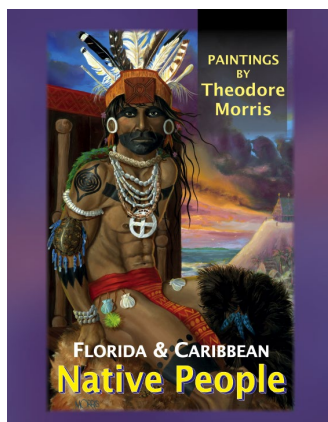


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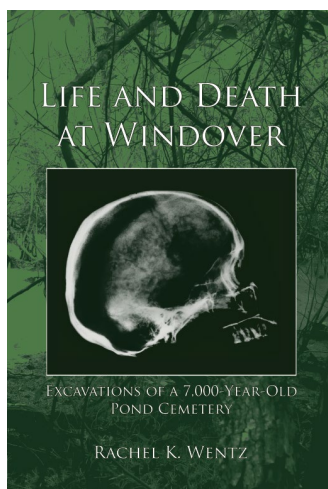
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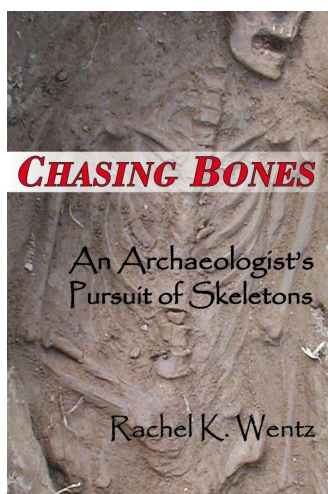


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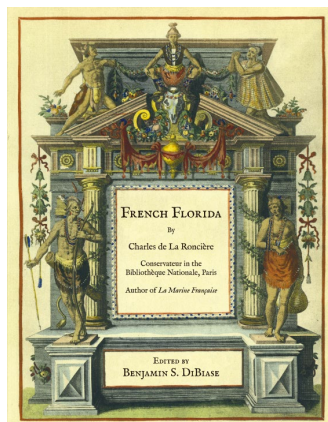


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Keith Ashley



The Mill Cove Complex is situated in a Jacksonville neighborhood along the lower St. Johns River. Many of the test units were excavated in residents' yards. Photo by Keith Ashley



One thousand years ago, the interior southeastern US was on the brink of a new world order. Cahokia rapidly morphed from a small mound center into an urban and cosmopolitan city that straddled the Mississippi River near St. Louis. Smaller political centers arose in favorable river valley locations, as their growing populations adopted floodplain maize agriculture. Some groups continued to live in the same locale as their ancestors, while others migrated elsewhere. Political relations intensified, and dormant long-distance exchange networks reanimated, as materials moved across a vast landscape known today as the Mississippian world. Among the Florida communities intimately involved in these interactions was the Mill Cove Complex.

The Archaeology Lab at the University of North Florida (UNF) has undertaken a long-term study of Native American life in northeastern Florida during the period A.D. 900–1250. At that time, the indigenous people of present-day Jacksonville lived off the natural bounty of the rich salt marsh-estuary ecosystem. They placed their villages and camps in locations that afforded ready access to fish, shellfish, turtles, and land mammals. They also collected wild plants, nuts, and fruits when seasonally available. These Floridians were not farmers but fisher-hunter-gatherers.

The centerpiece of our research is the Mill Cove Complex, a large Native American ceremonial center and village site currently located in residential yards in the Fort Caroline area of Jacksonville. This archaeological site lies across rolling relict dune fields that form high bluffs along the south bank of the St. Johns River, bringing contours to a part of Florida often stereotyped as low and flat. The Mill Cove Complex consists of 1,000-year-old household garbage accumulations, special event or ritual middens, earthen causeways, and two sand burial mounds.

Grant and Shields mounds were first brought to the attention of archaeologists in the 1890s by Clarence B. Moore, a now infamous mound excavator from Philadelphia.

From these mounds, he retrieved numerous small copper plates along with pieces of mica, galena, and other minerals. Ground stone celts totaled more than 150, including two unique spatulate forms. Among the most high-profile artifacts were a unique pair of copper, long-nosed maskettes and a copper-covered wooden earspool, all likely manufactured at Cahokia. The materials from Grant and Shields are strikingly similar to what Moore recovered from Mt. Royal along the middle St. Johns near Welaka.



UNF field students and volunteers excavate the portion of the site along the river. Photo by Keith Ashley

UNF's initial work at the Mill Cove Complex was limited to salvage testing by Robert Thunen in 1989, as house builders leveled most of Grant Mound. Excavations near Shields Mound began in 1999, with the most intensive investigations occurring over the past decade. To date, we have excavated 130 square meters and uncovered more than 25,000 Native American artifacts. During this time, hundreds of UNF students and alumni, local residents, and volunteers have participated in fieldwork. Sixteen radiocarbon dates anchor the site firmly to A.D. 900–1250.

Excavation of a series of middens has yielded varying amounts of discarded animal bone, estuarine shell, pottery, and other artifacts. Notable among these is Kinzey's Knoll, a shell midden that holds the remains of ceremonial feasting, burial preparation and sanctification, and ritual artifact production.



Numerous features such as this pit within a shell midden were recorded during the excavation. Photo by Keith Ashley

Mixed among countless pieces of shell and bone is an extraordinary assortment of domestic and ritual items that include ceramics, decorated bone pins, shell beads, shark teeth, arrowheads, and fragments of nonlocal stone and copper. This was no mere pile of garbage.

While daily life centered on the nearby brackish river and tidal marshes, the inhabitants' broader world extended well beyond Florida. These fisher-hunter-gatherers actively engaged in social relations that brought exotic minerals to their community from far-flung areas such as the Great Lakes, Ozark Mountains, and Appalachian Mountains. Compelling evidence also exists for direct connections between locals and Cahokians. Ceremony required securing materials from distant lands coupled with acquiring and ritualizing "pieces" of the ancient past in the form of Archaic bannerstones, projectile points, and ground stone pipes and beads. During the tenth through twelfth centuries, Mill Cove was one of the

prime Native American communities in Florida, making it among the most important archaeological sites in the state.

Beyond scholarly research, the Mill Cove Complex project is committed to public education and outreach. The public deserves to know the rich and vibrant story of Native Americans who once thrived in the sunshine state. Archaeological research over the past decade has challenged conventional thinking about indigenous cultures of northeastern Florida and altered the way we interpret many aspects of their lives. The UNF Archaeology Lab is sharing this new information with the general public through a traveling exhibit displaying various artifacts and an educational booklet highlighting Native American life at Mill Cove.

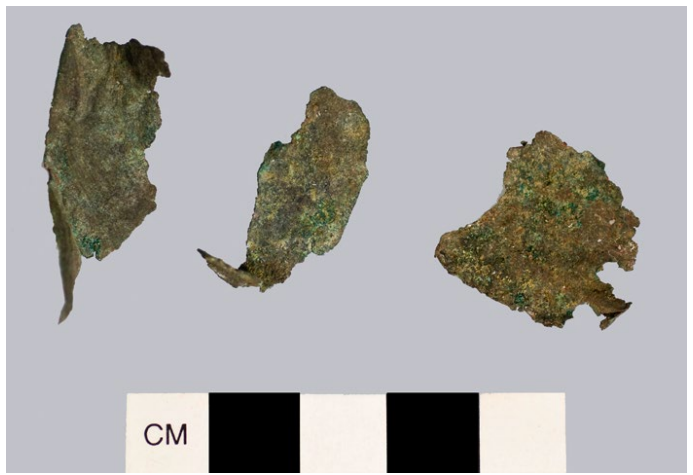
Finally, the archaeological work at Mill Cove would not have been possible without the support of the original landowners, Kinzey and Betty Reeves, and the current landowners, John and Ramona Reeves.



These Cahokia points are made of chert, possibly non-Florida Burlington chert, but a final determination awaits the results of an ongoing raw material-sourcing study. It is believed that this point type originally was manufactured at Cahokia, or at least in the American Bottom region of the Midwest, and brought to northeastern Florida. Photo by Keith Ashley

They, along with the Sares, Simmons, and Masucci families, have been stalwart stewards of the past. In John's words, "We are pleased to allow Professor Ashley and his crew to continue their efforts in this ongoing dig. I grew up on this site as a youngster and spent many days looking for relics from a bygone era, and we have learned a great deal as a result of his ongoing exploration into the past. It truly is a significant site." Only through a combined effort, can we protect and preserve Florida's past for future generations.

Dr. Keith Ashley is Assistant Professor in the Department of Sociology, Anthropology, and Social Work at the University of North Florida. Information on the exhibit, field school, and other project resources can be found on the UNF Archaeology Facebook page, www.facebook.com/pages/UNF-Archaeology-Lab/189192697784752.



These thin copper fragments were brought into Florida either from the Appalachian Mountains or the Great Lakes region. Their bent and crimped condition likely is due to their use as foil, in which the thin metal is wrapped around locally made objects of wood, shell, or bone. Photo by Robert Thunen



Various shell tools and ornaments were recovered from Mill Cove, including this whelk columella gouge or chisel and drilled disk shell. To the right are disk-shaped shell beads formed from the outer whorl of whelks and barrel beads cut from modified sections of whelk columella. Most of these artifacts were produced on site. Photo by Robert Thunen

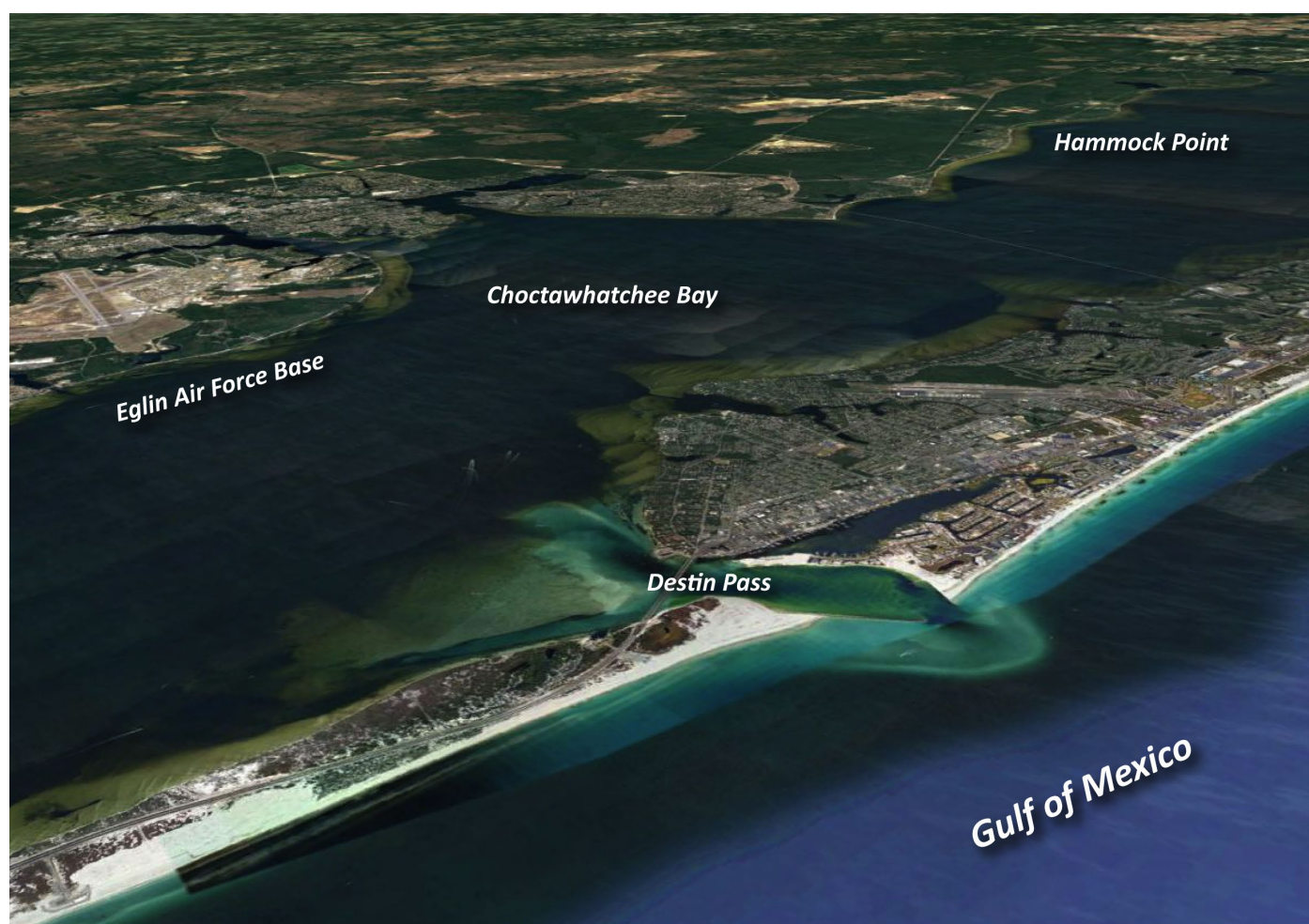


Numerous decorated and undecorated bone pins, pendants, and awls have been found at Mill Cove. Pictured here are fragments of an incised deer bone pendant. Notches cut into the lower part of the specimen on the right suggest attachment points for suspension. The eye motifs and ladder designs evoke images of southeastern Indian cosmology. Photo by Robert Thunen

TARGET PRACTICE, WORLD WAR II STYLE:

Historic Maritime Remains in Choctawhatchee Bay, Florida

Alex J. DeCaro



An aerial view of Destin Pass which connects the Gulf of Mexico to Choctawhatchee Bay. Image by Ryan Shears

The water of Florida's panhandle is renowned for its emerald color. Often forgotten though is the vast amount of American history resting below the surface. Some of the oldest shipwrecks in the country lie beneath these waters, dating as early as 1559, and recent wrecks also are present that have their own stories to tell.

From a maritime archaeologist's perspective, the beauty of shipwrecks is their time capsule-like quality. Shipwrecks embody the time period or historic setting associated with their sinking. Two well-preserved wrecks dating to the World War II era recently were documented in Choctawhatchee Bay by SEARCH, Inc. and the Eglin Air Force Base (AFB) 96th Civil Engineer Group. Marine remote-sensing technologies used for this investigation captured detailed imagery of two shipwreck sites. Research revealed that the wrecks are deeply intertwined with the history of the Air Force and relate to military weapons testing activities.

The Eglin AFB property borders Choctawhatchee Bay. Throughout the 20th century, the air base used the bay for testing and evaluating USAF air-delivered weapons, navigation, and guidance systems in support of war efforts. During WWII, weapons research and development was of pivotal importance to the US Army Air Forces, the predecessor of the USAF. With the rapid introduction of deadly weapons such as tanks, submarines, anti-aircraft artillery, and lethal gases, American scientists of the 1940s were driven to keep the United States on the cutting edge of weapons technology.

Choctawhatchee Bay was an ideal place for these tests because it is the southern boundary of the Eglin AFB's 724-square-mile property. Numerous test ranges in the bay were designated for over-water bombing and air-to-water gunnery tests. Operations at Test Range 54, located in waters south of Hammock Point, began in 1943 (Weitze 2007). This test range was operational for nearly thirty years and was essential to the development of one of America's early progressive weapons, the VB series bombs.

VB bombs were the first American vertical bombs with guidance. The initial bomb series included the VB-1 and VB-2, the same general-purpose bomb in 1,000- and 2,000-pound options, and they were the first bombs to utilize an Azimuth Only (AZON) radio-controlled steering tail fin. The AZON tail was radio operated, with a movable rudder that allowed bombardiers to steer the bomb as it fell to the earth, which made them thirty times more accurate than standard bombs. The VBs were employed effectively against bridges, particularly in Burma, where more than 1,350 AZONs were dropped with the intent of disrupting Japanese supply lines. While the VB-1 and VB-2 were the only bombs in this series to be used during WWII combat, development of the VB line and guidance technology continued at home (Blackwelder 1993).



VB-6 "Felix" on display at the United States Air Force Museum. Photo courtesy of National Museum of the Air Force www.nationalmuseum.af.mil

A later VB prototype, VB-6, was the only one in the series tested at Range 54. Eglin began testing the heat-seeking VB-6 in 1947. This 1,000-pound vertical bomb was a precursor for anti-ship missiles with an infrared sensing (heat-seeking) device in its nose. Large, high-heat signatures, such as blast furnaces and reflective metal roofs of factory buildings, were the ideal targets for this explosive. The honing action of this missile allowed for bombing in less than clear conditions, a first for the USAF in the 1940s. In fact, the VB-6 was nicknamed the "Felix," after the popular Felix the Cat cartoon, for its cat-like ability to see in the dark (Blackwelder 1993).

In 1947, Eglin positioned a large derelict iron vessel of unknown origin, *Atwater*, within Test Range 54 to test the Felix. To ensure *Atwater* produced a sufficient heat signature for Felix's infrared detection, range personnel secured forty drums of oil on her main deck and ignited them. Although large vessels were not the anticipated target of the VB-6 bomb, the manufactured heat signature resembling intended targets and the safety of the setting warranted open-water testing.

Seventy years after her sinking, SEARCH maritime archaeologists captured high-resolution side-scan sonar acoustic imagery of *Atwater's* remains while conducting a maritime survey of Test Range 54. Analysis of the sonar imagery leads archaeologists to believe a majority of the remains are intact. Resting on the bay floor in roughly fifteen feet of water, a small part of the stern is visible above the surface. The acoustic imagery illustrates that the submerged structural remains of *Atwater* measure 265 x 48 feet, with debris scattered in close proximity (DeCaro et al. 2018). Although only *Atwater* was anticipated to be here, further review of the high-res underwater image identified fragments of a second vessel directly east of the *Atwater* wreck site. Imagery depicts vessel-like skeletal remains measuring 28 feet long and 41 feet from port to starboard.

Archival documents attribute this secondary wreckage to another target vessel placed in the bay by Eglin. In 1943, during the inaugural year of Test Range 54, Eglin positioned a 311-foot silhouette target ship at the exact location where *Atwater* would be anchored four years later. A silhouette target is not a vessel but an assemblage of materials—in this case wood and wire mesh, creating the outline of the desired target. This silhouette, sporting a 56-foot smoke stack and a 98-foot tower, resembled a Japanese tanker, common during WWII in the Pacific (Weitze 2007). This target trained Army Air Force pilots on the appropriate size and shape of such targets. Targeting oil tankers was a combat tactic adopted during WWII because oil was critical for use in trucks, tanks, airplanes, and TNT explosives and the lubrication of guns and machinery (Blackwelder



Aerial view of *Atwater* while moored in Eglin Test Range 54. Photo courtesy of Air Force Historical Research Agency, Maxwell AFB, Alabama (IRISNUM 103279)



Atwater while in commission at Eglin Test Range 54. Photo courtesy of Air Force Historical Research Agency, Maxwell AFB, Alabama (IRISNUM 103279)



Stern portion of *Atwater* remaining above the surface of Choctawhatchee Bay. Photo courtesy of SEARCH Inc.

1993). The United States' ability to limit oil supply to the Japanese military was vital to the Allies' victory, especially in the Pacific.

The sonar imagery collected by SEARCH, along with written history of the ship's placement, leads archaeologists to believe the remaining intact skeletal structure is the bow of the silhouette target. In addition to the bow, similar skeletal-like remnants are scattered throughout the area around the *Atwater* wreck. Multiple pieces of debris, possibly associated with the explosive events, were identified in a wide surrounding area; however, further archaeological investigation is needed to confirm any association (DeCaro et al. 2018).

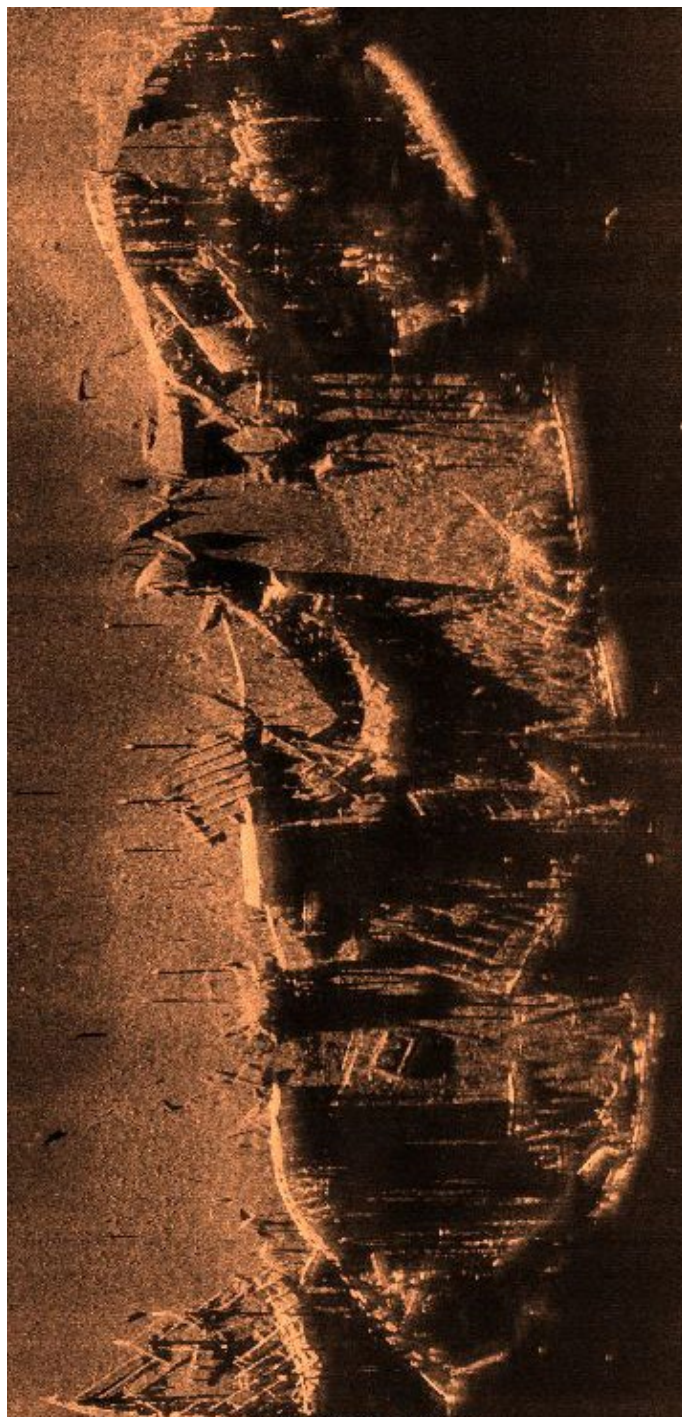
Over the years, locals have forgotten the historic lore of these wrecks, despite their popularity among fishermen, as documented in local newspapers and confirmed by local informants. Not only are these wrecks prized fishing locations in the bay, but they also are beacons of the frantic pace of the Arms Race and serve as a reminder of the Florida Panhandle's role in its early stages. The importance of the VB series bomb to the United States' advanced weapons technology cannot be overstated. The technology introduced in these bombs can be traced through every American conflict from World War II to the present. The guidance technology, though seen in its infancy in the VB series, has made accuracy and efficiency possible across all aspects of defense. The fundamental events carried out by Eglin Air Force Base, including the use of the *Atwater* and tanker silhouette target vessels, warrant recognition for the important role they played in the development of national defense.

Alex J. DeCaro is a maritime archaeologist with SEARCH, Pensacola, Florida.

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Sonar imagery collected by SEARCH maritime archaeologists of the *Atwater* and Silhouette target vessel remains. Image courtesy of SEARCH.

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A MILLENNIUM ON ORANGE LAKE

Seven Sisters Site: New interpretations on the Alachua Tradition

Matt Lyons



University of Florida students excavating the Seven Sisters Site during a field school in 2015. Photo by Jeff Hall

For the past forty years, little research has delved into the Alachua Tradition, a period in north-central Florida prehistory that extends between AD 700 and AD 1500. Five sites from the region provide chronological and material cultural data that have shaped conventional understanding about these early Floridians. From these sites, archaeologists know that early Alachua peoples rapidly succeeded Cades Pond peoples around AD 700. Alachua peoples are believed to have been migrants to the region, likely from the southern extremes of Georgia. Their pottery and settlement practices clearly distinguish them from their predecessors. Abandoning plain wares, the Alachua decorated their pottery using cord-wrapped paddles and by pressing corn cobs along the surface. Rather than the wetland locations of Cades Pond villages, Alachua sites are situated in upland areas well-suited to agriculture. The Seven Sisters site, on the eastern shore of Orange Lake, was excavated in 2015 during a field school led by Dr. Neill Wallis of the University of Florida and offers new avenues for Alachua research.

Clearly stratified and virtually undisturbed, Seven Sisters includes an Early to Middle Alachua tradition component that overlays a well-preserved Cades Pond period habitation area. Post and pit features dating to the 6th century AD place the intense occupation of the site toward the end of the Cades Pond period at approximately AD 500, but lower strata date to 300 years earlier. These posts are arranged in a roughly circular fashion, with the pit features placed on the outside periphery of the structure. Pits contained a mix of scant ceramic and lithic debris alongside charred plant remains. No faunal material was found in features, suggesting that these large pits were for storage rather than waste disposal. Overlying this occupation is a band of dark midden dating between AD 800 and AD 1300. This stratified midden is a perfect snapshot of the Early to Middle Alachua tradition and falls in the roughly 500-year gap missing from the five sites that have shaped our knowledge of these peoples.

The in-progress ceramic analysis from this assemblage hopefully will demonstrate how ceramic styles changed throughout this time, opening the door for understanding the cultural interaction and exchange processes of the Early Alachua.

The Seven Sisters site has potential for re-examining the early formation and development of Alachua period cultures. Soils at the site have been untouched by historic or modern land use. St. Johns variety are the dominant diagnostic ceramics, which are much less common in other Alachua ceramic assemblages. This anomaly in Alachua pottery construction warrants research into the interactions between peoples of north-central Florida and inhabitants along the St. Johns. Extra-regional artifacts, such as a tool from the midwestern United States and pottery from the Florida panhandle, imply far-reaching exchange networks that extend farther than previously known. The site's location within a stone's throw of Orange Lake is atypical of other Alachua settlements, which traditionally are situated in upland environs. The Seven Sisters site appears to have been occupied during transi-



In this excavation unit, a Cades Pond pit feature can be seen to the right of center. Photo by Dr. Neill Wallis

tion between the Cades Pond and Alachua periods, providing a snapshot into the cultural shift between these two periods. This point in time is critical to archaeologists' understanding of whether the Alachua peoples developed from the Cades Pond culture or were migrants from south Georgia who moved into the region just before AD 700. Ceramic types show an abrupt shift during the Cades Pond/Alachua transition, with cord-marked and fabric impressed pottery appearing in the place of check-stamping. Plans for future work include testing the earliest ceramics to understand their place of origin and to shed light on whether they were produced locally or brought to the site from outside regions.

Matt Lyons is a graduate student at the University of Florida, Department of Anthropology.



This view of the east wall of an excavation unit clearly shows a post feature contemporaneous with a pit feature. Photo by Dr. Neill Wallis

BREAKING NEW GROUND AT WEEDON ISLAND

**In the Forefront of Research
and Public Education**

Robert J. Austin and John W. Arthur



Liz Southard Razzouk, vice-president of AWIARE, gives excavation instructions to USFSP field school students. Photo by Lou Claudio

Hugging the Tampa Bay shoreline of Florida's most densely populated county, Pinellas, Weedon Island Preserve is a 3200-acre natural area comprised of aquatic and upland ecosystems that are home to numerous species of native plants and animals, making it a favorite spot for hikers, kayakers, and fishermen. It also contains one of the best-known prehistoric archaeological sites in the southeastern US, with evidence of indigenous occupation spanning at least 6,000 years.

In 2007, local archaeologists Brent Weisman, Phyllis Kolianos, and Robert Austin co-founded the nonprofit Alliance for Weedon Island Archaeological Research and Education, Inc. (AWIARE), with the goal of promoting and facilitating long-term archaeological research, scientific exploration, and public education at the Weedon Island Preserve and the adjacent Gulf coast region. Over the succeeding decade, AWIARE has conducted field work, supported outside researchers, and partnered with the University of South Florida-St. Petersburg (USFSP), the Florida Public Archaeology Network (FPAN), and the Central Gulf Coast Archaeological Society (CGCAS) to conduct field schools and educational programs for the public. As a result, we are learning more about the indigenous people who occupied Weedon Island while also educating county residents about the area's rich cultural heritage.

Weedon Island was first brought to the attention of archaeologists in 1923 when J. Walter Fewkes with the Smithsonian Institution began excavation of the site's burial mound. Fewkes recovered elaborately decorated pottery that archaeologist Gordon R. Willey later used to define the Weeden Island culture, a mortuary-ceremonial complex that extended along Florida's Gulf coast and into southwestern Georgia and southeastern Alabama between AD 200 and AD 1000. (The alternate spelling of the site name is due to a misspelling in the original Smithsonian excavation report.)

The importance of Weedon Island to southeastern prehistory was recognized in 1972 when it was listed on the National Register of Historic Places. During the last half of the twentieth century, Weeden Island research proliferated almost everywhere except at the culture's type site. Ironically, this research demonstrated that the origins of the Weeden Island mortuary complex were in southwest Georgia, gradually spreading outward to be adopted by local native cultures along the Gulf coast. In Tampa Bay, the local Manasota culture adopted Weeden Island mortuary customs by AD 400. By AD 900, influences from Mississippian cultures in the Midwest began to filter into Florida, contributing to more complex social and political arrangements. In Tampa Bay, the Mississippian-influenced manifestation is referred to as the Safety Harbor culture, characterized by large civic-ceremonial centers, a more stratified society, and a hierarchical political structure. Identifying the exact causes of this transition in the Tampa Bay area has become a focus of current research at Weedon Island.

To gather baseline information on settlement layout, stratification, and artifact content, archaeology students from USF's Tampa campus performed a systematic survey of Weedon Island under the direction of Dr. Brent Weisman in 2004 and 2005. A study of the site's geomorphology also was conducted to better understand the development of various landforms through time. Additional archaeological sites dating to the Manasota, Weeden Island, and Safety Harbor periods were identified during a survey of the larger Weedon Island Preserve in 2008.

Intensive research soon followed. In early 2007, Dr. John Arthur, current AWIARE president and associate professor of anthropology at USFSP, began conducting field schools to investigate the site's domestic sphere. Dr. Arthur's excavation, which just completed its sixth field season, has exposed part of a structure, identified activity areas where people made shell tools, and obtained information on the foods people ate, which were dominated by marine fish and mollusks as well as terrestrial animals such as deer, alligator, and turtle.

In 2013, University of Michigan doctoral candidate Christina Perry Sampson conducted magnetometer surveys near the USFSP excavations in an attempt to identify buried features or households. She identified five discrete clusters of positive magnetic anomalies, which excavation revealed to be refuse pits of various sizes and areas of in-situ burning. These were further investigated during two seasons of large-scale block excavations. Sampson currently is analyzing her data and writing her dissertation with funding support from a National Science Foundation grant.

One of the more interesting results of these projects has been the recognition that Weedon Island also contains a significant Safety Harbor-period occupation. In fact, the southeastern part of the site was occupied almost exclusively during this post-Weeden Island period with a total of fifteen radiocarbon dates ranging between AD 895 and AD 1428.

A major discovery was made in 2001 when a 40-foot-long dugout canoe was found along the shoreline of Tampa Bay within the Weedon Island Preserve. After several years of planning and fundraising, AWIARE excavated and preserved this unique find, and with the financial aid of the Florida Humanities Council, the Friends of Weedon Island, the Hough Family Foundation, and private donors, developed a permanent exhibit featuring the canoe at the Weedon Island Cultural and Natural History Center. Radiocarbon dating indicates that the dugout and an associated pole date to between AD 780-1015, during the transitional Weeden Island-Safety Harbor period. The canoe, which may be one-half of a catamaran or outrigger, probably was used for fishing in the open waters of Tampa Bay or for transporting goods between communities around the bay and along the Gulf of Mexico.

AWIARE's headquarters is a former ranger's house on the Preserve, which provides students, established researchers, and AWIARE volunteers with a lab, offices, a library, and dormitory space. The research station also houses curated collections for use by undergraduate and graduate students who wish



AWIARE archaeologists and volunteers excavate a 40-foot dugout canoe on Weedon Island Preserve. Photo by John Arthur

to engage in independent research. Some of these projects have included geochemical analyses of Weedon Island pottery; developing allometric formulae for estimating meat weight from crown conch (*Melongena corona*) shells; stable isotope analysis of oysters to determine salinity, climate, and sea level variations through time in Tampa Bay; and analysis of the production sequence of shell beads to determine whether the artisans were producing beads in a standardized fashion. AWIARE researchers and volunteers also are involved in documenting sites and artifact collections in the bay area while conducting field work and data collection at Weedon Island and Safety Harbor sites along Boca Ciega Bay and the Anclote River.

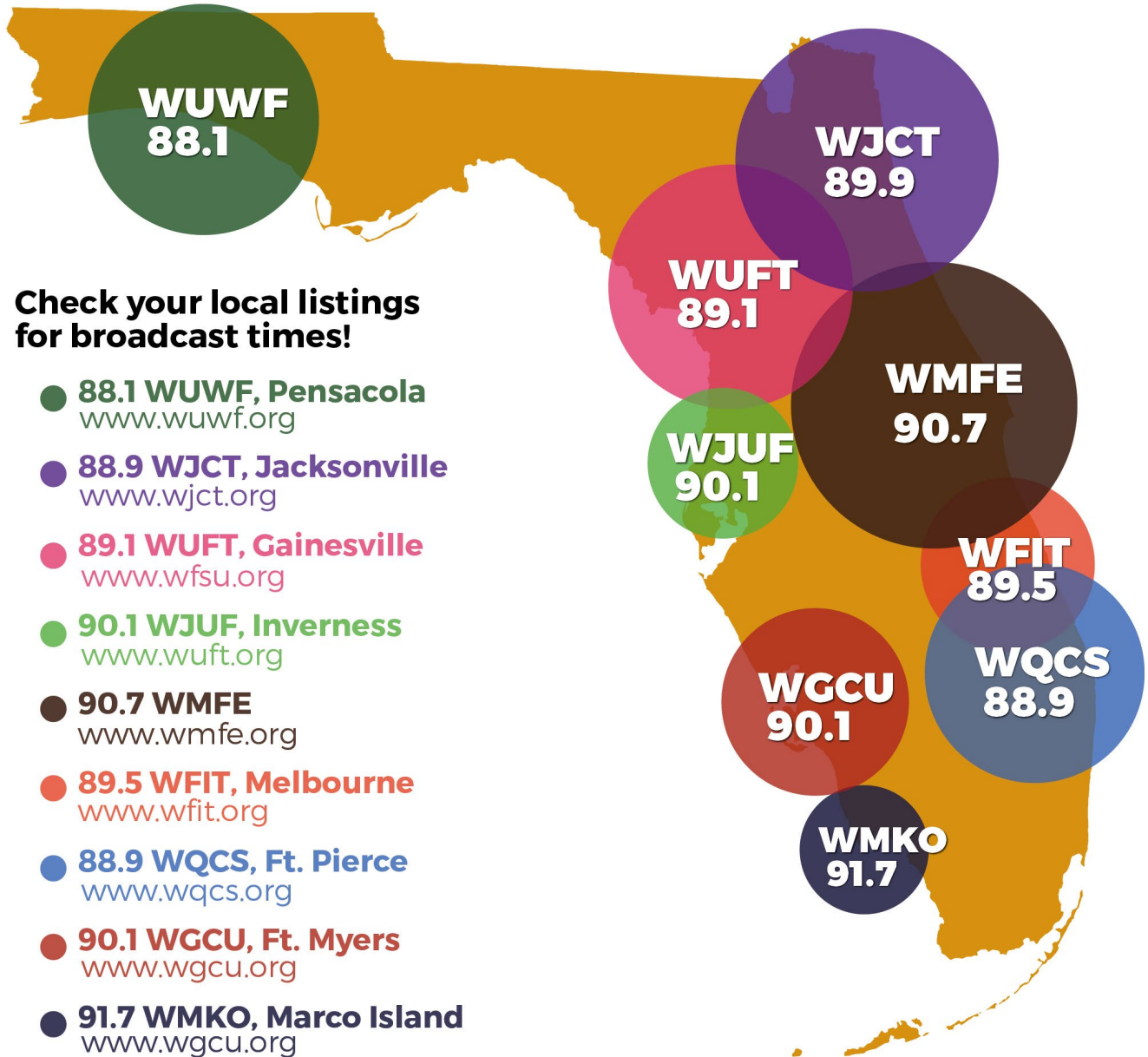
Along with its partners, AWIARE is dedicated to disseminating the results of these research efforts through publications, symposia, public lectures, and volunteer opportunities in the field and lab. One of its more popular programs, conducted in cooperation with FPAN, is a Junior Archaeology Camp. The camp, which is offered every summer, exposes youth ages seven to eleven to the basics of doing archaeology and aims to instill an ethic of responsible conservation.

Looking forward, AWIARE intends to continue its public archaeology mission by providing opportunities for research and public outreach regarding Florida's intriguing past.

Dr. Robert J. Austin is treasurer and co-founder of AWIARE. Dr. John W. Arthur is the president of AWIARE and associate professor of anthropology at University of South Florida.



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