GTM Research Reserve Technical Advisory Group (TAG)
November 8, 2023
Meeting Notes

Focus: Estuaries- The Human Dimension
Objective: The National Estuarine Research Reserve System (NERRS) is seeking to incorporate the people side of estuarine ecosystem research by considering the dynamics of the reciprocal relationship between humans and nature. For this TAG meeting, four experts on the human dimensions of estuarine research shared their methods and findings with the group. Attendees had the opportunity to discuss how GTM Research Reserve can better support the understanding of the reciprocal relationships between humans and estuaries and how this can be applied to management, research, education, engagement, and communications of the reserve.

Attendees:

Name	**Organization/Employer/Affiliation**
Abby Kuhn	GTM Research Reserve
Adam Mengel	Flagler County
Alberto Canestrelli	University of Florida
Allix North	Florida Department of Environmental Protection
Amy Howard	GTM Research Reserve
Anna Braswell	University of Florida
Annie Roddenberry	Florida Fish and Wildlife Conservation Commission
Bailee Porter	GTM Research Reserve, intern
Ben Williams	Wetland Preserve, LLC.
Candace Killian	GTM Research Reserve
Chuck Meide	Lighthouse Maritime Archeological Project
Courtney Hackney	University of North Florida, retired
DaleAnn Viger	Friends of the GTM Reserve
Daniele Pinton	University of Florida
Ely (Marielym) Brooks	GTM Research Reserve, volunteer
Eric Smith	Private Citizen
Hali Barkley	St. Johns County Board of County Commissioners
Jaleigh Pier	Cornell University
Janet Koehler	GTM Research Reserve, volunteer
Jason O'donoughue	Florida Division of Historical Resources
JB Miller	City of St. Augustine
Jeff Finnan	GTM Research Reserve, volunteer
Jenny Hinton	City of Jacksonville
Jessica Cantin	Friends of the GTM Reserve

Jessica Jenkins	Flagler College
Josephine Spearman	GTM Research Reserve
Justina Dacey	University of Florida
Kala Neighbor	GTM Research Reserve
Katie Petrinec	GTM Research Reserve
Kristie Perez	University of Florida
Kyrsten Gage	St. Johns County Board of County Commissioners
Leslee Keys	Keys and Associates, LLC.
Lia Sansom	GTM Research Reserve
Lindsey Cochran	East Tennessee State University
Marilyn Wiles	Private Citizen
Matt Kenworthy	Florida Fish and Wildlife Conservation Commission
Megan Howkins	GTM Research Reserve
Nicole de Venoge	First Coast Surfrider Foundation
Nikki Dix	GTM Research Reserve
Orlando Cordero	University of Florida
Rebekah Keller	Apalachicola National Estuarine Research Reserve
Richard Thomas	Coastal Conservation Association
Rick Gleeson	Private Citizen
Savanna Mathis	GTM Research Reserve
Scott Eastman	Florida Department of Environmental Protection
Shannon Dunnigan	GTM Research Reserve
Shirley Baker	University of Florida
Silas Tanner	Matanzas Riverkeeper
Tom Frick	St. Johns River Water Management District
Tricia Kyzar	University of Florida
Whitney Qualls	Anastasia Mosquito Control District

The field of human dimensions in relation to the environment includes diverse approaches to coastal science to improve environmental policy and practices and understand how human traits and behaviors apply to environmental issues and planning. The Guana Peninsula has extensive archeological history with many opportunities for research that encompasses the intersection of archeology, paleontology, psychology, behavioral economics, and the environment.

Context Matters: Critical Datasets for Cultural Resource Management,
Lindsey Cochran, Ph.D., cochranle@mail.etsu.edu

- There are four sub-disciplines of anthropology: 1) physical/biological anthropology, 2) cultural anthropology, 3) linguistic anthropology, and 4) archaeology.

- **Archaeology-** archaeology is the systematic (global, comparative, and holistic) study of the human past (culture and behavior) through the recovery and examination of its material remains and their context. By understanding culture change from early ancestors through the present day, humans can better understand the past to help address present and future questions. Archaeology is the study of things that were left behind by people from the past and seeks to understand how people used certain things, where they lived, what they ate, and where they obtained their food. Archaeology fundamental questions include: What is archaeology? What policies impact the practice of archaeology? How do we know what we think we know? Archaeology uses subtle aspects of the past to understand the bigger picture. For example, shells, pottery design, and botanical materials scraped from pots, can all help elucidate what the lives of people of the past looked like.
    - **Preservation bias** exists in archaeology because a significant portion of material used by humans does not last through history to present day and there is no direct observation of the object of study (people). Certain things will persist, like jacket buttons, sunglasses, etc., but the archaeological record is imperfect because some things are lost to history. This means that samples are inherently incomplete and that material that is preserved does not represent the full range of activities/material of the past. Dr. Cochran emphasizes that "it's not what we find, it's what we find out". For example, Dr. Cochran and her team are trying to understand how enslaved people lived on Cumberland Island before and after emancipation using a combination of the social, written, and archeological record. Using multiple sources helps paint a more wholistic picture of the past.
- **Cultural resources and management**
    - "Cultural resources should be understood as those aspects of the environment—both physical and intangible, both natural and built—that have cultural value to a group of people" (King, Cultural Resource Laws and Practice (4th edition), 2013).
    - Landscape theory is one of many ways that archaeologists interpret the world around past peoples. Within this paradigm, archaeologists try to understand how past people used, viewed, conceived of, and changed the spaces (culturally insignificant) and places (culturally significant) that they interacted with.
    - Early laws:
        - The Antiquities Act (1906) was the first U.S. law to provide general protection for cultural or natural resources. The law set up penalties for the unauthorized collection or excavation of historic or prehistoric ruins or monuments situated on federal land.
        - The Historic Sites Act (1935) declared the preservation of historic sites, buildings, and objects to be a national policy.
    - Modern Guidance
        - The National Historic Preservation Act (1966) created the Advisory Council on Historic Preservation and authorized grants to states to assist in historic preservation. It also authorized the National Parks System to maintain a National Register of Historic Places (NRHP), which included a requirement that agencies consider the effects of their actions on places included in the NRHP.

        - The National Environmental Policy Act (1970) requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. This intersects with NRHP.
        - The Native American Graves Protection and Repatriation Act (1990) provides a process for federal agencies and museums that receive federal funds to repatriate or transfer from their collections certain Native American cultural items -- human remains, funerary objects, sacred objects and objects of cultural patrimony -- to lineal descendants, Indian tribes, Alaska Native Corporations, and Native Hawaiian organizations.
- **Phases of archaeological site determination**
    - Phase 1- Is there a site? Researchers determine if there is a potential site and will use a shovel testing to determine if the site is feasible. The transect interval changes based on the probability of potentially eligible archaeological sites.
    - Phase 2- Once it is known that a site is there, researchers must consider: is the site eligible or potentially eligible for inclusion in the National Registrar of Sacred Places? Is the site intact? Are there diagnostic cultural materials? Are these materials significant for inclusion? What is the time period of this site? How many people were living there? How long were they living there? How many different groups of people were living there?
        - Problems during this phase: the climate emergency destroys many archeological sites. Wave action can erode sediment and thus artifacts can be lost. In response, the North American Heritage at Risk (https://nahar.hcommons.org/) was created, which is meant to model, monitor, methodize, and mitigate response to the impacts of climate change on archeological sites.
    - Phase 3- This phase is rare and not enacted very often
- **Project Focus**
    - Dr. Cochran and the project team look at shoreline changes over time and identify and monitor sites that were lost, damaged, or destroyed. The researchers determine which known archeological resources are most significant to various communities and do archeological triage assessments to see the difference between known models of Sea Level Affecting Marshes Model, or SLAMM (https://coast.noaa.gov/digitalcoast/tools/slamm.html).
        - Case study: In Butler Island, Georgia, sites that are likely to be damaged or destroyed were identified and it was discussed what could happen to the sites should they transition from dry land to submerged land. On this site, there exists one of the largest plantations in Georgia where 500 people were enslaved, with very little record of their lives. There are some letters from overseers and plantation owners with some historical information, however this is only one perspective. It is important to the Gullah Geechee people to uncover the full story of those who worked on the plantations. The team is hoping to reveal these unknowns using the intersection of the written word, spoken word, and material artifacts to complete the story.
    - Call for Collaborative Science- by creating a scalable approach to assessing coastlines at risk, the human dimension and ecological communities can develop:

        - Radically open and transparent science
        - Development of research that impacts communities more directly
        - Development of standardized data transferability (i.e. NOAA centralized data model)
        - A focus on best practices for data collection and data use
        - Collaborative science accreditation
        - Scalar engagement opportunities for various scientific citizens
    - This can happen by:
        - Modeling areas with a high probability to contain significant cultural and natural resources
        - Monitoring those areas for X (e.g. vegetation monitoring at cultural heritage sites)
        - Methodizing at specific "breakout" sites
        - Enhancing or creating opportunities for citizen science at stable sites and asking local and descendent communities for input, collaboration, and consultation
        - Mitigating the most at risk or significant locales
        - Developing highly collaborative "new science" ethos to leverage base data (i.e. vegetation corrected Digital Elevation Models) while searching for overlapping big picture questions
- **Takeaway**: The overall goal is to reduce bias that is inherent in archaeology and help archaeologists create or refine endangered site lists. Natural resources today are not the same as natural resources that existed in the past, but archaeology provides "time depth". Archaeological policy is directly tied to environmental policy because cultural and natural resources cannot be separated—where one resource ends, another begins.

Extending Oyster Geohistorical Baselines in Guana River, Florida,
Jaleigh Pier, jqp3@cornell.edu

- **Project Overview**
    - Jaleigh Pier's work as a paleontologist spans recent history between present day and the origin of archeological oyster remains. The project site is in the Guana River Marsh Aquatic Preserve in the northern section of the GTM Research Reserve. The aquatic preserve was designated in 1985 and comprises 40,000+ acres and consists of 13 distinct biological communities, including oyster reefs. This work parallels that of the Guana Nutrients: Budgets and Bivalves project which seeks to quantify bivalve water filtration and identify nitrogen pathways from the headwaters of Guana Lake through Guana River. The Guana Estuary is impaired for nutrients, which fuels the need for this research, and the team is looking to recommend remediation strategies. Jaleigh is looking at oyster sizes, densities, and filtration capacity from a historical perspective to inform current studies and water quality remediation efforts.
- **Acquiring oyster records**
    - Typical methods for acquiring oyster records include oyster monitoring (GTM Research Reserve began monitoring in 2014), historical maps, satellite imagery, fishing records, and archaeological shell middens. Due to a lack of historical maps that identify oyster reefs, high quality satellite images, and voluntarily reported fishing records, there is a

gap of oyster information over the past several decades to centuries prior to the GTM oyster monitoring program in 2014. People may observe changes over time, however, a challenge is **shifting baselines syndrome** which can be described as the "gradual loss of environmental history over time and across generations" (Pauly 1995). There have been many changes to the ecological systems since humans arrived. Memory of these conditions can be altered, and each generation has a unique perspective and experience a "new normal", making it difficult to realize the full scope of ecosystem change.

  - Oyster reefs serve as a natural historical record because the oysters preserve well and build on top of each other over time—the deeper down into the reef the older the oysters are. These collections of historical oysters are called **death assemblages**, or mixtures of dead shell and sediment. This project employs the use of conservation paleobiology, which applies paleontological data and methods to prevent species extinction, restore habitats, and sustain the benefits people obtain from ecosystems.

- **Historical Oyster Body Size Project**
  - The Historical Oyster Body Size (HOBS) project, part of the Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR), aimed to address gaps in oyster monitoring records across Florida. This work is a collaboration between the Paleontological Research Institution and Florida Department of Environmental Protection. Within the reserve, HOBS researchers sampled in three locations: Guana River, Matanzas River, and Pellicer Creek. Guana River had one of the best-preserved records from across all Florida sampling sites.
- **Research Methods and Results**
  - **Research questions-** Jaleigh poses the questions: since the aquatic preserve was established in 1985, how have oysters changed in body size and density? How has the oyster ecosystem service of water filtration changed over time?
  - **Coring-** Jaleigh developed a homemade vibracoring device to collect five to ten-foot-long oyster reef cores in Guana River. The project team has taken cores from eleven different reefs across Guana River, with at least three cores per reef. The first 2-3 feet of the cores is well-preserved oyster material that transitions to sandy material with clams, mud snails, and bits of vegetation. Reefs have existed in the same locations in Guana River for a long time, and so far, oysters from the 1980s have been accessible in all the cores. Some cores date to the 1600s and 1700s. Some shells are being sent off for radiocarbon dating to determine when the oyster was alive, which dates the core layer. Due to atomic bomb testing in the 1950s, radiocarbon dating of recent material can provide a false date signature. The HOBS project has created a bomb pulse correction so that samples after the atomic bomb testing (1950-today) can be accurately dated.
  - **Oyster body size-** Body size of whole oyster shells found in the cores can be measured, however there are also a lot of fragmented pieces. If there is a preserved hinge, the hinge size can be extrapolated to estimate oyster body size. Body size is required to estimate filtration rates since the amount of water filtered scales with size.
  - **Oyster density-** GTM Research Reserve staff measure oyster density by digging to a depth of 15 cm within a 25 cm^2 quadrat and count the live oysters greater than 25 mm. Jaleigh is using the same method and also counting the dead oysters. The resulting live to dead ratio can be applied to core death assemblage samples and then extrapolated

to the number of individuals per m^2 to determine past oyster density. Reef surface dead shell layers are being cross validated with GTM Research Reserve monitoring records.
    - **Oyster filtration capacity-** This data can be used to estimate oyster filtration capacity of the past, which can inform how Guana River oysters might have contributed to water quality in the past.
- **Science Communication**
    - The second part of Jaleigh's project includes science communication and a call to action. The goal is to talk with local audiences and stakeholders regarding historical oyster records. If you are interested in getting involved in this project reach out to Jaleigh Pier (jqp3@cornell.edu) or Kaitlyn Dietz (kaitlyn.dietz@dep.state.fl.us).

What Can the Shell Tell: Oysters and Archaeology,
Jessica Jenkins, Ph.D., jajenkins@flagler.edu

- **Project themes**
    - Human and environmental relationships
    - Ways humans impact their environment and resources
    - Anthropogenic landscapes/seascapes
    - Anthropocene (age or period where humans are the dominant factor shaping earth's climate and environment)
    - History of sustainability
- **Case study: Cedar Key project**
    - Dr. Jenkins' research includes an area in Cedar Key on the Gulf Coast of Florida at Shell Mound Campground, where a shell mound exists bigger than two football fields with 1.2 billion oyster shells and sparse soil. The study looks back to about 4,500 years ago and poses the questions: What did oysters look like then? What were the human impacts on the environment in years past? Were humans harvesting sustainably or did they put pressure on the fisheries? Were oysters managed in the past? Were people moving oysters from one area to another? Were people participating in size and age selection? Did they have laws in place that said people can't harvest oysters smaller than three inches so that oysters can live to an adult age and sustain the population? Are there proxies to reveal these unknowns? Answers to these questions are important to present-day issues and can inform management of important ecological, cultural, and economic resources.
- **Potential Project within the GTM Research Reserve**
    - **Goals**- Many sites on the reserve are being lost to erosion, including shell middens. Some sites are potentially eligible for the National Registrar of Historic Places. The time period for the study spans the Archaic to historic period. Dr. Jenkins is working with Jaleigh Pier to create the longest date range of oyster resources ever recorded. The goal of the joint project is to create a record through time of local oyster size and morphology, oyster reef health and environmental conditions (earliest samples obtained by cores, to evidence of prehistoric and historic oyster harvesting [approx. 5,000 years ago–19th c.], to modern samples), and oyster harvesting practices. This will employ conservation paleobiology to inform future avenues of oyster reef sustainability practices at GTM Research Reserve.

- **What's been done**- coring of extant oyster reefs (Jaleigh's project)
- **What needs to be done**- excavation at archaeological shell midden sites
- **Methods**- morphological analysis (height, length, height-to-length ratio, presence/absence of sponge and other bio foul); radiocarbon dating; sclerochronology and isotopic analyses

- **Obtaining information from dead oysters**
  - **Making Dead Oysters Talk: Techniques for Analyzing Oysters from Archaeological Sites** is a book by Bretton Kent that discusses how information can be abstracted from dead oysters about historical environmental conditions and human practices. The book outlines ways to measure the height, length, and general shape of a dead oyster and use proxy evidence to understand what part of the estuary people harvested from and what management practices they used.
  - **Determining where the oyster was harvested from**- notches, markings, and holes in dead oysters can provide valuable clues as to where that oyster was harvested from (intertidal, shallow subtidal, deep subtidal).
    - Sponges sometimes attach to oysters and leave holes in the shells. These sponges can only live in high salinity subtidal waters, which tells researchers that these oysters were harvested from subtidal waters.
    - Some oysters attach to fossils that erode out of the banks onto the shoreline, leaving attachment scars or notches in the oyster shell. These oysters can then be traced back to intertidal areas where they were harvested.
    - Ground truthing- The research team ground truthed these historical oysters with present day oysters to demonstrate what oysters look like from specific parts of the estuary. This involved harvesting, shucking, measuring, and comparing the oysters from different areas to prove what was indicated in the literature was indeed correct.
  - **Determining how oysters were processed**- researchers can distinguish whether oysters were smoked or shucked by identifying burn marks or shucking scars on the oysters.
  - **Determining seasons and age-** oysters can be cut open and mounted in epoxy to look at growth lines which are similar to tree rings. White moon shaped markings in the hinge of the shell demonstrate different seasons and reveals when the oyster was harvested and how old it was when it died. Dr. Jenkins used **sclerochronology**, which is the study of physical and chemical variations in the accretionary hard tissues of organisms, and the temporal context in which they formed.
- **Results**
  - Shell Mound in Cedar Key: Middle Woodland (A.D. 400- 650) was a civic-ceremonial center that included summer solstice feasting and about 150 years of regular and intensive exploitation of 1.2 billion oysters. Oyster morphology revealed that people switched which oyster fishery they were targeting at certain points in time, i.e. intertidal or offshore subtidal reefs. The average size of the harvested oysters gets smaller through time, likely pointing to some overharvesting. It also appears they were doing some size/age selection by culling smaller oysters and putting them back in the water. They were not removing any oysters smaller than three inches. It also became apparent that people were using shell hammers on the oysters.

Archaeology at the Tolomato Bar Anchorage Site,
Chuck Meide, cmeide@staugustinelighthouse.com

- **Location of the site**- The St. Augustine Lighthouse Archaeological Maritime Program (LAMP) is studying an archaeological site along the Guana Peninsula in the Tolomato River, which includes Tolomato Bar, a sand bar that juts out into the river with relatively deep water surrounding it.
- **History of the site**- Governor James Grant, first governor of Florida during British rule, had two plantations in the site area. Grant served as governor from 1763-1771 and in 1771 left his plantations to the control of his overseer when he moved to Scotland. Multiple letters have been documented from Grant that reveal pertinent information about his plantations. 60 to 70 enslaved Africans worked his plantations. Some historical maps indicate past fields, crops, drainage, and locations of buildings. After the British rule there existed Menorcan farmsteads**.**
- **Archaeological remains**
    - The project site has many organic remains from the 1700s such as wooden timbers that were used for walking along the mud in the marsh. The wood is meant to harden the shoreline for unloading boats at low tide. The wooden remains survive to the present day because the mud creates an anaerobic environment. The mud moves around, however, and some days the organic remains are exposed while other days they are covered in mud.
    - One area has a palm log wharf, a pier, and remains of a sailing vessel with bow and center board, and wooden stakes that served as a live well for storing live crabs or turtles. In October 2023, a similar boat was recently found in St. Augustine at King Street near the Bridge of Lions.
- **Study**
    - LAMP researchers revisited the sites from 2007 to 2009 to log artifacts. It was determined that the area was used for unloading cargo during the period when plantations existed in the area. There were many cultural products leaving the area and manufactured goods coming in.
    - LAMP researchers performed an archaeological assessment on land on a site just inland of the maritime site and discovered a coquina structure that might have been a homestead. The team found artifacts that suggested it was occupied in the late 1700s into the 1800s. There was a copper tac or fastener that could have been used for boat building, indicating maritime activities. Barnacles were also found that could have been left behind from boat cleaning. The ground in one area was a little lower and researchers hypothesized that it was a marsh mud trial, where people would store marsh mud to let the saltwater drain out and then use as fertilizer. This serves as an example of how humans have historically altered the landscape.
    - Sonar mapping is another way to cover a large area, look for features of interest, and see changes over time. Sonar mapping of the site revealed some hard remains and showed pilings that extend out to where the boat was found. The matting and timbers can be seen.
    - In 2022, LAMP was awarded a grant to assess hurricane erosion at the Tolomato Bar site.

- **Future efforts include:**
    - Studying the archaeology of the African American maritime experience looking at the plantation period and Fort Mose
    - 3-D photo modeling to determine if there has been erosion damage or loss of artifacts over time
    - Recording and uncovering the boat that was recently discovered at the Tolomato Bar Anchorage site
    - Test excavations of dredged material at Fort Mose
    - Using magnetometer surveys, which is a measure in the variation in earth's magnetic field and can be used to detect anthropogenic features on the seabed or buried on land

Group Activity

Geohistorical records (archaeological, palaeoecological, and historical records) can be used to inform future projects and interdisciplinary collaboration. To help identify the reserve's historical needs and interests, small group discussions allowed for subject matter experts to outline 1) What organisms/habitats/cultural aspects would you want historical information about? 2) If there were access to long-term data, what questions about the organism/habitat/cultural aspects would you want to ask? 3) How far back in time would you need to answer this question? Small group responses are listed below.

Group facilitator: Kaitlyn Dietz
Group members: Richard Thomas, Nikki Dix, Silas Tanner, Allix North, Jeff Finnan

Organisms/habitat/cultural aspect	**Question**	**Time**
Bivalves/gastropods	How have bivalves/gastropods changed over time (size, distribution, filtration)?	Years-centuries
Finfish	How have finfish changed over time (size, species, distribution)? What are the unknowns about finfish?	Years-centuries
Shrimp/crabs	How have shrimp/crabs changed over time (size, species, distribution)? What are the unknowns about shrimp/crabs?	Years-centuries
Oyster rakes	How are oyster rakes formed and how to they change over time?	Years-centuries
Forts	Why are forts placed where they are in relation to estuary/resources?	Centuries
ICW	What is the history of the ICW creation and maintenance? How do the practices of dredging and the placement of sediments impact the ecology?	Years-decades
Oysters (habitat)	What is the historical spatial distribution of oysters through GTM Research Reserve?	Years-decades
Coastal wetlands (habitat)	Why are coastal wetlands distributed how they are? What is the cultural significance of the freshwater wetlands on the Guana Peninsula?	Years-centuries

Dunes	How has dune health (stability, habitat quality) changed with increasing development?	Years-centuries
Similar barrier islands	How similar are the cultural and resource management practices on barrier islands across the southeast (i.e. pond created for indigo at Fort Clinch)?	Years-centuries
Striped newt	How does presence/absence of prescription burns impact striped newts?	Years-decades
Ditches on peninsula	What is the impact of ditches on hydrology, species, and restoration?	Years-centuries
A1A/transportation	What is the usage, development, and future impact of transportation and roads in the region surrounding GTM Research Reserve?	Years-decades
Recreation	How has recreation in the reserve changed over time?	Years-centuries
Seagrass (ex. glass bottom boat)	How has water clarity changed over time?	Years-decades
Linkages	How are all these questions linked together? How did people select sites?	Years-centuries

Group facilitator: Abby Kuhn
Group members: Lindsey Cochran, Rick Gleeson, Rebekah Keller, Candace Killian, Anna Braswell

Organisms/habitat/cultural aspect	**Question**	**Time**
Intersection of organisms/habitats/culture	• Where do/did communities settle? How did they end up in a specific location and how did they interact with the organisms and habitats in the area? • How have ecosystem services changed over time? • How can current technology aid in discovering these interactions between organisms/habitat/culture? (LIDAR, machine learning/AI, drone imagery)	Pre-industrial versus industrial

Group facilitator: Shannon Dunnigan and Kirstin Thompson
Group members: Kristie Perez, Jason O'donoughue, Megan Howkins

Organisms/habitat/cultural aspect	**Question**	**Time**
Marshes	What is the history of sea level rise and marsh formation?	10,000+ years
People/human occupation	When were humans living in the region, how did they live, what did they eat?	Since human establishment
Fisheries	How has fisheries harvest changed over time (what species were harvested, how many, and where)?	Varying historical timeframes

Mangroves	How have mangrove dynamics changed over time (presence/absence, extent, canopy)?	
Oysters	• When did commercial harvest of oysters begin? • Are there sites in GTM Research Reserve similar to Cedar Key's 'shell mound' where communities gathered regionally?	

Group facilitator: Tricia Kyzar
Group members: Jess Cantin, J.B. Miller, Nicole de Venoge, Alberto Canestrelli

Organisms/habitat/cultural aspect	**Question**	**Time**
Bivalves	• How has water quality changed over time? • What caused oysters to die off north of dam? • What is the rate of sedimentation and density accretion?	Pre-dam and post-dam (1950s)
Finfish	Has there been a significant change in fish species?	As far back as possible
Estuarine vs. freshwater at Pellicer Creek	What caused a shift in food resources? (freshwater fish to estuarine fish)	4,000 to 5,000 years
Areas of cultural significance	• What areas are archeological sites dating back to the 1400s at risk? • How can funding be targeted to assess and respond to this?	
Habitat: Pellicer creek seagrass	• What factors influence degradation of seagrasses?	200 years ago

Group facilitator: Jaleigh Pier
Group members: Jessica Jenkins, Lia Sansom, Orlando Cordero, Savanna Mathis

Organisms/habitat/cultural aspect	**Question**	**Time**
Shell rakes	Are the rakes formed naturally? Do rakes recycle archeological midden shells? Are rakes formed as a result of ICW dredging?	Years-millennia
Shell rake oyster size	Why are oysters of different sizes being incorporated into rakes?	Years-millennia
Oyster size	What is the oyster body size of archeological middens?	Years-Millenia
Salt marsh	How has habitat behind rakes changed over time?	Years-millennia
Oyster catcher habitat on Rakes	What are bird/oyster rake relationships? What can be learned about nesting sites on oyster rakes?	Years-decades

Group facilitator: Josephine Spearman
Group members: Not recorded

Organisms/habitat/cultural aspect	**Question**	**Time**
Presence of Gullah Geechee	What were the sustainability practices of the Gullah Geechee? Why were subsistence plots moved?	Centuries
Ditches along Guana Peninsula	• What was the purpose of ditches? Was it irrigation? Transportation? Drainage? • Who built the ditches?	Centuries
Unknowns	• What other artifacts are out there? • What information is missing?	