

**Lee County Board Of County Commissioners  
Agenda Item Summary**

**Blue Sheet No. 20060934**

**1. ACTION REQUESTED/PURPOSE:** Approve by Resolution, amendments to Conservation 20/20 land program initial and secondary review parameters and land selection criteria as revised by Board advisory committee, CLASAC.

**2. WHAT ACTION ACCOMPLISHES:** Clarifies language and adds eco-archeological resources to land selection criteria.

**3. MANAGEMENT RECOMMENDATION:** Approve

<b>4. Departmental Category:</b> <span style="font-size: 1.5em; font-weight: bold;">CIZA</span>		<b>5. Meeting Date:</b> JAN 23 2007
<b>6. Agenda:</b> <input checked="" type="checkbox"/> Consent <input type="checkbox"/> Administrative <input type="checkbox"/> Appeals <input type="checkbox"/> Public <input type="checkbox"/> Walk-On	<b>7. Requirement/Purpose: (specify)</b>	
	<input type="checkbox"/> Statute	
	<input checked="" type="checkbox"/> Ordinance	05-17
	<input type="checkbox"/> Admin. Code	
	<input checked="" type="checkbox"/> Other	Res. 97-06-82; Res. 01-01-35
		<b>8. Request Initiated:</b> <b>Commissioner</b> _____ <b>Department</b> County Attorney <b>Division</b> _____ <b>By:</b> David Owen, County Attorney

**9. Background:**

Environmentally sensitive lands are selected by the Board advisory committee, CLASAC, through a two-step evaluation process previously approved by the Board.

CLASAC recommends that eco-archaeological resources (as defined in Exhibit B) be recognized as a type of environmentally sensitive land eligible for possible acquisition with Conservation 20/20 Program funds. To enact this recommendation, CLASAC has developed amendments to the Initial and Secondary Review Criteria.

CLASAC also recommends text changes regarding market value range in Criterium 1 of the Initial Review Criteria for clarification purposes.

Funding is not required for this agenda item.

**ATTACHMENTS:**  
 Resolution to approve amendments to the Land Program Parameters and Land Selection Criteria  
 Exhibit "A" - Initial Review Criteria and Secondary Review  
 Exhibit "B" - Eco-archaeological Resource Definitions  
 Exhibit "C" - Report written by Dr. K. Walker on "How are Lee County's Coastal Eco-Archaeological Lands Environmentally Significant?"

**10. Review for Scheduling:**

Department Director	Purchasing or Contracts	Human Resources	Other	County Attorney	Budget Services				County Manager/P.W. Director
					Analyst	Risk	Grants	Mgr.	
			<i>Co. Parks</i>	<i>[Signature]</i>	RK/19	WK 1-29-07	1/19/07	1/19/07	<i>[Signature]</i> 1-10-07

**11. Commission Action:**

Approved  
 Deferred  
 Denied  
 Other

RECEIVED BY  
 COUNTY ADMIN:  
 1/18 4:45  
 COUNTY ADMIN  
 FORWARDED TO:  
 1/11 8:25  
 PR

CO. ATTY.  
 FORWARDED  
 TO CO. ADMIN.  
 1/18  
 [Signature]

LEE COUNTY RESOLUTION NO. \_\_\_\_\_

A RESOLUTION OF THE LEE COUNTY BOARD OF COUNTY COMMISSIONERS CONFIRMING CERTAIN AMENDMENTS TO THE CONSERVATION 20/20 LAND ACQUISITION PROGRAM PARAMETERS AND LAND SELECTION CRITERIA AS DEVELOPED BY THE CONSERVATION LANDS ACQUISITION AND STEWARDSHIP ADVISORY COMMITTEE PURSUANT TO THE PROVISIONS OF LEE COUNTY ORDINANCE NO. 05-17; PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Board of County Commissioners (“the Board”) is the governing body in and for Lee County, a political subdivision and charter county of the State of Florida; and,

WHEREAS, the Board has previously adopted Lee County Ordinance No. 05-17, relating to the acquisition of environmentally sensitive or critical lands in Lee County; and,

WHEREAS, pursuant to Lee County Ordinance No. 05-17, the Conservation Lands Acquisition and Stewardship Advisory Committee (“CLASAC”), is charged with the duty to establish the parameters for the Conservation 20/20 Program (“Program”) to include the criteria for land purchases, procedures to implement the Program and processes for ranking purchases; and,

WHEREAS, previously, the CLASAC developed the Program parameters as required by Lee County Ordinance No. 05-17, Section Three, paragraph B., and the Board adopted same pursuant to Lee County Resolution No. 97-06-82 and No. 01-01-35; and,

WHEREAS, the Board now desires to confirm certain amendments to the Program parameters as further developed by the CLASAC.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF LEE COUNTY COMMISSIONERS that:

1. The amendments to the Program parameters as developed by the CLASAC and as set out as a composite "Exhibit A" hereto, are hereby accepted, confirmed and authorized for implementation by the CLASAC.

2. This Resolution shall take effect immediately upon its adoption.

Commissioner \_\_\_\_\_, made a motion to adopt the foregoing Resolution, seconded by Commissioner \_\_\_\_\_. The vote was as follows:

BOB JANES	_____
A. BRIAN BIGELOW	_____
RAY JUDAH	_____
TAMMY HALL	_____
FRANK MANN	_____

DULY PASSED AND ADOPTED this \_\_\_\_ day of \_\_\_\_\_, 2007.

ATTEST: CHARLIE GREEN  
CLERK OF COURTS

BOARD OF COUNTY COMMISSIONERS  
OF LEE COUNTY, FLORIDA

By, \_\_\_\_\_  
Deputy Clerk

By: \_\_\_\_\_  
Chairman

APPROVED AS TO FORM:

By: \_\_\_\_\_  
Office of County Attorney

**CONSERVATION 20/20 PROGRAM**  
**INITIAL REVIEW CRITERIA**

In general, nominations to the Conservation Lands Acquisition Program must be able to answer "yes" to a minimum of four out the following seven questions to be eligible for further consideration for potential acquisition. Applications may or may not be considered if the asking price is significantly higher than ~~staff's estimated market range~~ current market conditions. (See Criteria 1).

- 1) **Does the owner indicate by his/her asking price a willingness to sell below market value range?**  
All applications to nominate a property to the Conservation 20/20 Program must include the asking price. County staff will conduct a market analysis of the property in order to compare the asking price with ~~staff's estimated market range~~ current market conditions.
- 2) **Are there any other funds available to contribute towards the purchase price of the parcel?**  
Contributory purchase funds must be currently available to acquire the nominated property. For example, a pending grant application for funding would not qualify. Contributory purchase funds are typically provided by not-for-profit groups or government agencies.
- 3) **Does the parcel contain documented environmentally sensitive lands?**  
Environmentally sensitive lands may include, but are not limited to:
  - a) Wetlands
  - b) Rare and Unique Uplands (scrub, mature pine flatwoods, oak or cabbage palm hammock, tropical hardwood)
  - c) An outstanding natural plant community
  - d) Evidence of listed wildlife or plant species
  - e) Undeveloped island, beach and dune system, and/or tidal creek or inlet
  - f) Eco-archaeological resources
- 4) **Does the parcel have water resource features that are important for surface water and ground water management?**  
Examples include areas that provide flood protection, that improve or maintain water quality, that conserve water resources, that improve or preserve the water supply and/or that have high recharge potential to an aquifer.
- 5) **Is the parcel contiguous to a protected environmentally sensitive land or water body?**  
Protected environmentally sensitive lands and waters include existing or proposed public and private conservation lands; mitigation banks; conservation easements; wildlife management areas and refuges; and sovereignty submerged lands.
- 6) **Is there good potential for long term management of the property?**  
This criteria will be evaluated according to overall management potential including but not limited to access, compatibility with surrounding land uses, co-management opportunities, mitigation potential, potential for environmentally compatible recreational uses, and restoration needs.
- 7) **Are the native plant communities or water resources on the property in any danger of being detrimentally altered?**  
Does the parcel have government approvals or zoning (such as an agricultural exemption, development order, or planned development zoning) that allows for immediate land clearing or land development that, if exercised, would diminish the natural resource benefits of the property? This criteria only applies if the natural plant communities and hydrology of the property are substantially in their natural condition.

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CRITERIA		SCORE	COMMENTS
<b>A. SIZE AND CONTIGUITY</b>			
1.	<b>Size of Property</b>		
	a. > 500 acres	6	
	b. 400 to < 500 acres	5	
	c. 300 to <400 acres	4	
	d. 200 to <300 acres	3	
	e. 100 to <200 acres	2	
	f. 50 to <100 acres	1	
	g. < 50 acres	0	
2.	<b>Contiguous to:</b>		
	a. Coastal waters/other sovereignty submerged lands	4	
	b. Existing preserve area, c.e., wma or refuge	4	
	c. Preserve areas officially proposed for acquisition	2	
<b>B. HABITAT FOR PLANTS AND ANIMALS</b>			
1.	<b>Native Plant Cover</b>		
	a. ≥ 75 % of the property has native plant cover	8	
	b. 50% to < 75% has native plant cover	4	
	c. 25% to <50% has native plant cover	2	
	d. < 25% has native plant cover	0	
2.	<b>Significant for wide-ranging species</b>		
	Panther Habitat, wetlands, ponds, grass lands, etc.	2	
3.	<b>Rare and Unique Uplands</b>		
	a. Scrub, hammock, old growth pine	2	
	b. Mature, second growth pine flatwood	1	
4.	<b>Diversity</b>		
	a. 5 or more FLUCCS native plant community categories	2	
	b. 3 or 4 FLUCCS native plant community categories	1	
	c. 2 or less FLUCCS native plant community categories	0	

<b>C. SIGNIFICANCE FOR WATER RESOURCES</b>					
	<b>1.</b>	<b>Serves or can serve as flow-way</b>			
	<b>a.</b>	Site contains a primary flow-way, creek, river, wetland corridor, large contributing watershed; possibly identified in the Lee County Surface Water Master Plan, South Lee County Study, or by staff		<b>4</b>	
	<b>b.</b>	Site contains flow-way, through tributary, medium size watershed, or just a portion of system/one side of conveyance, may not be identified in study		<b>3</b>	
	<b>c.</b>	Same as b., smaller watershed, not as defined, disconnected		<b>2</b>	
	<b>d.</b>	Site conveys runoff, minimal area		<b>1</b>	
	<b>e.</b>	Site provides no conveyance of surface water		<b>0</b>	
	<b>f.</b>	Add 2 points if conveyance is natural (not man-made)		<b>+2</b>	
	<b>2.</b>	<b>Strategic to Flood Management</b>			
	<b>a.</b>	Well defined flood-way within parcel, possibly identified in FEMA or other study, both sides of conveyance, large upstream area, protection from encroachment critical or known flooding history		<b>4</b>	
	<b>b.</b>	Same as a., portion of floodway (one side) or within floodplain		<b>3</b>	
	<b>c.</b>	Medium size watershed, need for floodplain protection, possibly serves as an outfall for a road or development		<b>2</b>	
	<b>d.</b>	Small watershed, minimal flooding		<b>1</b>	
	<b>e.</b>	No significant flood issues		<b>0</b>	
	<b>3.</b>	<b>Protect a water supply source.</b>			
	<b>a.</b>	Parcel is within area designated high potential productivity of the Water Table, Sandstone or Tamiami Aquifer and also within area of current or proposed wellfield development		<b>2</b>	
	<b>b.</b>	Not within above mentioned zones, but advantageous due to proximity to existing water supply facilities or identified as potential water storage area		<b>1</b>	
	<b>c.</b>	No recharge or potential water supply opportunities		<b>0</b>	
	<b>4.</b>	<b>Offset Damage to or Enhance Water Quality.</b>			
	<b>a.</b>	Presence of wetland, retention, or lake that is currently providing water quality benefits		<b>2</b>	
	<b>b.</b>	Same as a., but achieved through some alterations to existing site or very limited in contributing watershed		<b>1</b>	
	<b>c.</b>	No existing or potential water quality benefits		<b>0</b>	

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<b>D. LAND MANAGEMENT/RECREATION/PLANNED LAND USE</b>			
<b>1.</b>	<b>Good Access for Public Use and Land Management</b>		
	Parcel can be accessed from a freeway, expressway, arterial street, or major collector	<b>3</b>	
	Parcel can be accessed from a minor collector or local street	<b>2</b>	
	Parcel can be accessed from a privately-maintained road that is dedicated for public use	<b>1</b>	
	Parcel can only be accessed by a private road or does not have physical or legal access	<b>0</b>	
<b>2.</b>	<b>Recreation/Eco-Tourism Potential</b>		
	Score depends upon the variety or uniqueness of potential public uses. Examples of appropriate public uses include paddling sports, fishing, hiking, equestrian, mountain biking, photography, nature study, and environmental education, such as eco-archeological resources.	<b>0-2</b>	
<b>3.</b>	<b>Land Manageability</b>		
	75% or greater of the perimeter of site is surrounded by low impact land uses	<b>3</b>	
	50%-75% of the perimeter of site is surrounded by low impact land uses	<b>2</b>	
	25%-50% of the perimeter of site is surrounded by low impact land uses	<b>1</b>	
	Less than 25% of the perimeter of the site is surrounded by low impact land uses	<b>0</b>	
<b>4.</b>	<b>Development Status (Maximum 4 points)</b>		
	<b>a.</b> The Parcel is Approved for Development or is Exempt from Clearing Regulations	<b>4</b>	
	<b>b.</b> The Parcel is Zoned for Intensive Use	<b>2</b>	
	<b>c.</b> Future Land Use Map: Intensive Land Use Category	<b>1</b>	
<b>TOTAL POINTS</b>			<b>0</b>
<b>STAFF RECOMMENDATION</b>			
<b>CRSC RECOMMENDATION</b>			
<b>CLASAC RECOMMENDATION</b>			

**ADD TO DEFINITIONS:**

Eco-archaeological resources (Initial Criteria 3.f.)

A parcel containing an archaeological site has high eco-archaeological value (1) if it has yielded, or is likely to yield, scientific information on Lee County's environment; (2) if it contains special, unusual, or unique vegetative communities specific to archaeological sites; (3) if it contains high potential to educate the public about Lee County's environment; (4) if it has potential to contribute to land and wildlife conservation goals.

If by "resources" we mean things that address specific needs, then:

**1) Eco-archaeological resources include, but are not limited to, the seeds, wood, shells, otoliths, bones, and sediments in archaeological sites that, when excavated systematically and interpreted scientifically, can help us understand Lee County's past environments (climates, sea levels, ecosystems) and how they have varied at multiple time scales.** Due to the influence of the calcium carbonate in mollusk shells, which mitigates the corrosive effects of acids in the soil, such resources are preserved in abundance in the coastal shell middens of Lee County. Thus, all sites with high shell content, a characteristic often visible at the ground surface, are likely to yield scientific information about Lee County's past environments. Furthermore, all sites located at or below the high-tide line, and all sites that contain deposits that are near or below the water table, have additional potential for extraordinary preservation of organic remains (wood, fibers, seeds, and other plant parts, as well as bones and other animal remains). These extraordinary deposits, sometimes called "wet sites," can yield very detailed information on the plant and animal communities of the past, and hence, on the past environment in general.

**2) Eco-archaeological resources include living plants and plant communities that thrive on archaeological sites due either to specific nutrients and chemicals associated with archaeological soils or to the purposeful or non-purposeful manipulation of the landscape by past people.** In Lee County, these unusual plant communities prominently include upland forests located on coastal shell mounds. However, inland sites, such as sand mounds, and those in riverine contexts can be of equal importance if they contain human-influenced ("anthropic") soils and are associated with unusual plant communities. We need to preserve them for future study because they cannot be duplicated by planting new trees. They are heirloom plants that are present in part because of decisions made by people in the past, and in part due to environmental changes that have occurred since then. Further, they are particular associations of heirloom plants. They are the descendants of ancient trees and other plants that have grown in association with one another for centuries, and hence they hold information that can help plant taxonomists and climate scholars understand how plants in certain associations (and the animals that depend on them) respond to environmental changes.



**3) Eco-archaeological resources include all archaeological sites that lend themselves to public interpretation and education about Lee County's past environments.** Such a site would have to be accessible to the public, able to be managed and kept safe for visitors, and have enough known about it through research to be able to offer an authoritative and interesting environmental story. Such sites encourage a better understanding about how the environment works and how best to conserve its resources. It is hard to appreciate something that you do not understand. We have learned that the public is fascinated with learning about Native American people, and that information about the environment in which these people lived can be taught easily and effectively in the context of learning about the people themselves. Not every archaeological site will lend itself to public education, no more than every Conservation 2020 acquisition will make a good park. But when an archaeological site has an important environmental and historical story to tell (Mound Key and Pineland are outstanding examples, but there are many more), it has high value.

**4) Eco-archaeological resources include all archaeological sites that have the potential to contribute to land and wildlife conservation efforts.** In combination with or as components of county public lands, state aquatic-preserve lands, and federal wildlife refuges, eco-archaeological lands potentially can contribute to landscape linkages/corridors which potentially will accommodate shifting plant and animal communities in response to rising water levels over the next 100 years. For example, the sediment bases of many of Lee County's mangrove-forested wetlands today are actually archaeological middens. This kind of substrate makes these forests more resistant to erosion due to sea-level rise and increasing storm intensity. As sea-level rise accelerates, middens that are today above mean sea level can serve as bases for future wetland forests.

## How Are Lee County's Coastal Eco-Archaeological Lands Environmentally Significant?

- **Lee County's Coastal Eco-Archaeological Lands support modern, unique, living biological communities.** The majority of Lee County's coastal eco-archaeological lands contain enormous numbers of preserved molluscan shells and fish bones. These high concentrations of calcium carbonate have resulted in a native-plant community type that includes high numbers of calcifers—hardwood trees and other plants—that take in calcium carbonate. (Walter Kingsley Taylor, author of *Florida Wildflowers in Their Natural Communities*, includes this special community as one of his coastal-uplands subtypes.) And because these lands often occur in mound form (sometimes multi-mound forms), the communities are elevated (e.g., Mound Key, Pineland, Josslyn Island), adding to their definition within the surrounding low-lying wetlands. These elevated, hardwood lands are important coastal-upland refuges for mammalian, avian, and reptilian populations.
- **Lee County's Coastal Eco-Archaeological Lands contribute to the development of modern and future landscape linkages/wildlife corridors.** Well-known proponent of wildlife corridors, University of Florida's Professor Emeritus Larry Harris modeled Florida's future under a 2-degree C (average annual temperature) warming scenario (with Cropper in 1992 *Global Warming and Biological Diversity*). Relevant to Lee County is the associated sea-level rise which will result in the loss of existing coastal wetlands, through erosion and inundation. In an alarming, March 2006 issue of *Science*, scientists (Overpeck et al.) state that if greenhouse gas emissions continue at their present rate, "many meters [4 to >6] of sea-level rise" could occur "before the end of this century;" the possibility far exceeds previous estimates. In combination with or as components of county public lands, state aquatic-preserve lands, and federal wildlife refuges, eco-archaeological lands can contribute to landscape linkages/corridors which potentially will accommodate shifting plant and animal communities in response to rising water levels over the next 100 years.
- **Lee County's Coastal Eco-Archaeological Lands contribute to modern and future wetlands conservation in a world challenged by rising sea levels.** While many people think of eco-archaeological sites as mounds, they also exist in the form of broadly distributed middens, usually blanketing shorelines. Because "shorelines" shifted back and forth in response to fluctuating sea levels in the past, middens today occur at varying elevations, sometimes below mean sea level, sometimes within the tidal zone, and sometimes well above the high tide mark. The sediment bases of many of Lee County's mangrove-forested wetlands today are actually archaeological middens; this kind of "substrate" makes these forests more resistant to erosion. Lee County recently (2001) acquired a perfect example at Pineland. As sea-level rise accelerates, middens that are today above mean sea level can serve as bases for future wetland forests.

## How Are Lee County’s Coastal Eco-Archaeological Lands Environmentally Significant?

- **Lee County’s Coastal Eco-Archaeological Lands are archives of plant and animal histories.** Papaya (*Carica papaya*) seeds discovered in 1992 at Pineland in a second-century-A.D. context sparked a debate in the botanical world. Some Florida scholars were unwilling to accept the find because it went against the conventional knowledge—that papaya had been introduced to Florida in the nineteenth century and not before. Dr. Lee Newsom, a McArthur Fellow at Penn State University studied the seeds and convinced the doubters. So, is papaya, then, a *native* plant of Florida? Is it a coincidence that the second century A.D. was a period of climatic warmth? Should our definition of “native” be more flexible to accommodate more Caribbean species given the world’s warming climate? The discoveries of bones from extinct Caribbean monk seals (*Monachus tropicalis*) in the Pineland and Wightman zooarchaeological collections required a visit to the Smithsonian Institution for their identification, one of the few places in the world that houses a complete Caribbean monk-seal skeleton (*Friends of Randell Research Center Newsletter*, March 2005). Archaeological records of monk seal are rare and extremely important for understanding their natural history due to the seal’s extinction in the 1950s (Adam 2003 in *Marine Mammal Science*) and two of Lee County’s eco-archaeological lands have produced seal records. These two examples—papaya and monk seal—demonstrate the potential of eco-archaeological lands to produce new knowledge about Florida’s native biota.
- **Lee County’s Coastal Eco-Archaeological Lands play an important role in the science of climate change.** The National Research Council (*Abrupt Climate Change* 2002) has made a call for more paleoclimate and human-climate research that focuses on the past 2,000 years. The idea is that more records from multiple sources (proxies) and places around the globe from this time period will lead to a better understanding of our current state of global warming by putting it in “recent” historical context. The Florida Museum of Natural History and its Randell Research Center (RRC) accepted this challenge, recognizing that Lee County’s eco-archaeological lands contain records of the highest potential for human-climate research. In part due to the high molluscan diversity (mollusks are especially sensitive to environmental change) of local estuarine-marine waters, a diversity that is also represented in its archaeological lands, this research potential is unparalleled in the state of Florida. Beginning in 1985, the National Science Foundation (NSF), the National Endowment of Humanities, the State of Florida, regional and local foundations, etc., and many private individuals have supported this research in Lee County via the Florida Museum/RRC. Currently, NSF’s Earth Systems History program supports a collaborative study between the Florida Museum/RRC (Dr. Karen Walker) and the University of North Carolina (Dr. Donna Surge, geochemist).
- **Lee County’s Coastal Eco-Archaeological Lands serve as “monitoring stations” of past estuarine conditions.** Zooarchaeological remains, primarily fish bones and mollusk shells, record past estuarine conditions. One can calculate diversity indices, for example, for different time periods. These can be used as paleosalinity indicators, as can oyster-bar assemblages that are represented in the middens. Fluctuating paleosalinity can indicate droughts, flooding, and possibly varying sea levels through time. Buck Key, Useppa, Pineland, Mound Key, Josslyn Island, and Wightman have all contributed to such studies (Walker et al. 1995 in *Journal of Coastal Research*). Archaeological clam (e.g., quahog, surf) shells and fish (e.g., sea catfish, sea trout) otoliths exhibit growth bands which, when sampled, produce isotopic records of ancient water temperatures and salinities. They may

### How Are Lee County's Coastal Eco-Archaeological Lands Environmentally Significant?

even record hurricanes; this is because rainwater of the eyewall is depleted of the isotope Oxygen 18 (the rainwater is taken up by the living clam). Working with the Florida Museum/RRC, UNC's D. Surge is examining this possibility using a quahog clam (*Mercenaria campechiensis*) that survived 2004's Hurricane Charley as a case study (*Friends of the Randell Research Center Newsletter*, September 2005).

- **Lee County's Coastal Eco-Archaeological Lands record past warm/sea-level rise episodes.** Two past multi-century warm-climate episodes have been proposed for southwest Florida based on evidence from Lee County's eco-archaeological lands. The episodes also coincide with warm episodes known for Europe: the latter part of the Roman Optimum (A.D. 1- 500) and the Warm Medieval Period (A.D. 900-1300). (These were not warmer than today, however.) It is becoming increasingly clear to climate scientists that the atmospheric/oceanic systems of the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico are all inter-related (Broecker 2003 in *Science*), and therefore such correlations should not be surprising. Some of the Lee County evidence is in the form of zooarchaeological remains indicating higher aquatic biodiversity and higher salinities compared to previous and subsequent centuries. At Pineland, during the 4<sup>th</sup> century, a major hurricane surge (the context of the seal bones, mentioned above) inundated the native shoreline village and a mangrove-forested wetland subsequently formed. It is during this time that residents may have retreated to the small mound in the eastern woods at Pineland (20/20 Nomination 045-2). Temperature and salinity analyses of Pineland quahog clam shells and sea catfish (*Arius felis*) otoliths from the first of the two episodes are underway (Walker and Surge).
- **Lee County's Coastal Eco-Archaeological Lands record past barrier-island histories.** The two warm periods cited above coincide in time with some of the beach-ridge deposits on Sanibel and Cayo Costa islands and also in NW Florida (Stapor et al. 1991 in *Journal of Coastal Research*). They also coincide with the absence of deposits which can indicate erosional events. For example, the southern half of Cayo Costa has come and gone repeatedly over the past 2,000 years and the same is true for some of the region's inlets. Eco-archaeological lands preserve clues to these histories. For example, on Useppa Island, oyster-shell middens representing multiple centuries of human occupation abruptly give way to middens with a much greater diversity and concentration of high-salinity mollusk shells in the 9<sup>th</sup>/10<sup>th</sup> centuries. This change suggests the sudden presence of at least an inlet nearby (closer than those of present day) to provide direct access to the littoral zone. The middens correspond to a warm, sea-level rise episode when the barrier islands would have undergone erosion. Thus, it is plausible that the entire southern half of Cayo Costa may not have existed during this time.

## How Are Lee County's Coastal Eco-Archaeological Lands Environmentally Significant?

- **Lee County's Coastal Eco-Archaeological Lands record hurricanes of the past.** The modern hurricane record is so short that climatologists today debate whether or not global warming is a factor in increasing storm frequency and intensity. Longer records (projected back in time) are needed for context to better understand the role of global warming. Leading hurricane specialist Dr. Kerry Emanuel at MIT (published in *Nature*), contacted Florida Museum/RRC's Walker about Lee County's paleostorms which we have identified at Pineland and Wightman and have dated to the 4<sup>th</sup> century A.D. Emanuel has recently coined the term "paleotempestology" for this new area of research.
- **Lee County's Coastal Eco-Archaeological Lands record abrupt climatic-change episodes.** Can a major, volcanic eruption in a faraway tropical region, against a background of an already cooling climate, have an impact on southwest Florida? After a warm period, Scandinavian glaciers began to expand by A.D. 500, and 36 years later a massive eruption occurred and its volcanic aerosols indeed had global impact, enhancing the cooling by blocking radiation (Keyes, 2001 *Catastrophe*). Lee County's coastal eco-archaeological lands record impacts of this rapid sixth-century cooling and subsequent prolonged related conditions. Most intensively studied at Pineland, the evidence includes: an impoverished finfish fishery; ecological disruptions in estuarine molluscan predator/prey relationships; extraordinary population increases in an opportunistic, wide-ranging scavenger, the common crown conch (*Melongena corona*) and in migratory ducks; a lowering of water levels; and a replacement of pine over mangrove as fuelwood. By A.D. 700, Pineland appears to have been abandoned. During these same centuries, across the Gulf of Mexico, the Mayans suffered a series of droughts (Hodell et al. 2000 in *Science*) and eventually their civilization collapsed, circa A.D. 800 (Gill, 2000 *The Great Mayan Droughts*). Temperature and salinity analyses of Pineland's quahog shells and sea catfish otoliths from the 6<sup>th</sup>/7<sup>th</sup> centuries are underway (Walker and Surge).
- **Lee County's Coastal Eco-Archaeological Lands may record the Little Ice Age.** Although the Little Ice Age (LIA), A.D. 1300-1850, is known to have been a broad-scale cooling event, paleoclimatologists need to know if it was a global event. Almost no one has looked for its evidence in south Florida. Recently, Woods Hole Oceanographic Institute researchers (Lund and Curry 2004) analyzed sediment cores from off the Florida Keys and results indicate cool sea surface temperatures for this time. Florida Museum scientists are currently analyzing isotopes of archaeological quahog clam shells and sea catfish otoliths from Pineland (Walker and Surge) and surf clam (*Spisula solidissima*) shells and sea catfish otoliths from Mound Key (Marquardt, Quitmyer, Jones, Stoetzel) to determine if they also record the cooler LIA temperatures. Buck Key also was inhabited during the LIA and it represents another opportunity to detect related environmental changes.

Karen J. Walker, Ph.D., Environmental Archaeologist  
Florida Museum of Natural History/Randell Research Center  
21 years of professional experience with Lee County's Coastal Eco-Archaeological Lands  
(Feel free to e-mail if I can be of assistance or if full reference citations are needed.)

[kwalker@flmnh.ufl.edu](mailto:kwalker@flmnh.ufl.edu)

<http://www.flmnh.ufl.edu/sflarch>

<http://www.flmnh.ufl.edu/anthro/envarch>

S:\POOL\2020\ARCHAEOLOGY\Lee Countys coastal Archaeological Lands.doc