

CHAPTER SEVEN

BUILDING TECHNOLOGY



STUDENTS LEARN HOW FLORIDA'S EARLY PEOPLE BUILT STRUCTURES LIKE HUTS AND FISHING WEIRS, AS WELL AS EARTHWORKS LIKE MIDDENS AND BURIAL MOUNDS.

WHAT IS BUILDING TECHNOLOGY?

Timucua building technology satisfied two basic purposes. The first was practical, including the need for shelter, access to food, and the ability to store supplies. Modern Floridians must satisfy these same basic needs. Renters and home buyers ask...

- 1) Does the air conditioner work well?
- 2) How close is the nearest grocery store?
- 3) How much closet space will we have?
- 4) How many times a week is trash collected? Is recycling collected too?

In Timucua times, these concerns were phrased a bit differently.

- 1) How can we build homes that keep the rain and bugs out, but let the breeze in?
- 2) Is there a good location nearby to build a fishing weir (permanent fish trap)?
- 3) How can we store corn and other produce to last all winter?
- 4) Where do we locate our midden, and can we use these shell trash piles to elevate our homes?

For the Timucua, building technology also served another, very different, purpose - a spiritual one. The world of the spirit had a much wider reach among the Timucua. It affected not only ethical matters, but also burial methods, health care, and community solidarity.

When modern Floridians consider these issues, they might ask...

- 1) Is there an appropriate church (synagogue, mosque, etc.) nearby?
- 2) What end-of-life options are available (burial, cremation, organ donation)?
- 3) Where are the closest hospitals and urgent care centers?
- 4) How can I bring up a matter before City Council?

When the Timucua considered these issues, their concerns included...

- 1) How do we become ritually pure? (Sweat lodges, seclusion / birthing huts)
- 2) Where should we build the charnel house and burial mound, and how will we care for the dead?
- 3) How and where do we care for our sick (particularly as European epidemics swept through Florida)?
- 4) How many "citizens" can be called on to help construct a council house? How impressive/intimidating will this structure appear to visiting chiefs and Europeans who may wish to attack us in the future?

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In modern Florida, religious, business, and civic organizations provide answers to these questions. The Timucua had to provide these services for themselves. Their building technology satisfied both spiritual and practical needs – at least until the introduction of European warfare and disease.

How can building technology solve problems? Building technologies allowed the Timucua to construct watertight roofs and food storage structures. The construction of fishing weirs provided year-round access to animal protein. The building of smaller huts, including women’s seclusion huts and possibly sweat lodges helped the Timucua to practice purity rituals. The building of giant council houses and the construction of sand burial mounds helped to advertise and solidify the power of chiefs and shamans (doctor/minister). The construction of charnel houses to care for and process the dead – as well as their final interment in burial mounds – helped the Timucua balance love for the deceased with the impurity associated with handling the dead. And what about health care? The sick were traditionally treated within their own homes. However, the Timucua belief in lighting a separate fire when caring for the sick may have been tied to the need to isolate the sick person. Moving them out of the family hut and into another “care center” (one with a newly lit fire) would have helped prevent the spread of contagion, like smallpox.

How do historians know that building technology was important to Timucua spirituality? Spanish priests asked questions to see how often the Christian Timucua practiced their own cultural beliefs (instead of newly-learned Christian beliefs). The following five questions show that buildings were still an important part of Timucua spiritual life.

QUESTION 1 - Houses and Hunting Luck: The priests asked, “Have you said that the bones of what was hunted: do not throw them out, otherwise more will not enter the trap, hang them by the ankles or put them in the thatching of the house?”

QUESTION 2 - Storehouses and Protecting Against Famine: The priests asked, “Without prayers by the sorcerer [shaman] have you said that no one should open or go up to the storehouse?”

QUESTION 3 - Houses and Health Care: The priests asked, “For someone who is sick, have you made a separate light or fire?”

QUESTION 4 - Council House and Political Power: The priests asked, “Having become a chief, have you ordered a new fire to be made for six days in the community house?”

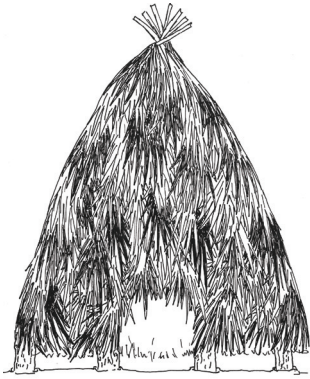
QUESTION 5 - Houses and a Chief’s Death Rituals: The priests asked, “Being sick, have you made a new house, saying here I will remain and die?”

These questions were recorded in a book called the Confessionario, written by a Spanish priest who worked closely with the Timucua. His writings provide a link between the Timucua’s physical world (which we study at archaeological sites) and their spiritual beliefs (which leave no mark in the archaeological record). Who would have guessed that hunting success, food storage, health care, politics, and end-of-life decisions were all so strongly tied to BOTH buildings and spirituality?

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LET'S TALK BUILDINGS



Palm Hut, courtesy of the University Press of Florida

Even after learning to build Spanish-style structures for the missionaries, the Timucua continued building their own homes using natural materials and traditional methods. Let's take a look at traditional hut building.

Making the Supports: First, they needed 8-10 pine trees about 15-30 cm (6-12") in diameter. Fire and shell axes were used to fell these trees and remove the branches. Shell scraping tools were used to strip away the bark. This minimized

future damage from insects that live just below the bark layer. Steam and fire were used to bend the narrow ends of the trunks a bit so they would naturally come together to a point.



Replica of a Timucua Hut in Progress

Digging Postholes: With the trees converted into posts, the next step was to dig postholes, not the easiest task when using a shell shovel instead of a posthole digger. Archaeologists have discovered postholes at a St. Augustine archaeological site that extend 13-20 cm (5-8") deep. After the first two posts were set in their holes, the pole tops were bound together with cordage. Then the Timucua continued adding posts a bit less than a meter (3') apart, until a total of 8-10 posts were planted in a circle and tied together at the top. This created a hut about 8.5 meters (25') in diameter. Some of these huts had an interior circle of support posts as well.

Weaving a Lattice: The Timucua wove thin pines and grapevines over and under the posts to form a lattice all the way around the structure. This lattice probably started a meter above the ground and went up to about a half meter from the top. How close together were the grapevine weavers? Perhaps a half meter (1.5'). These weavers provided the lattice used to thatch a roof. They needed to be close enough together to provide thick coverage by palm fronds, but far enough apart to allow the long palm stems to be bent over and under between them. A low space, about one meter from the ground, was left open. This became the entrance to the hut. Why was the doorway so short? A tall door would have caused problems with wood smoke. Normally, the smoke from the fire would rise up through the smoke hole. But if there were also a high door, the smoke would be pulled in both directions (up and sideways) filling the structure with smoke instead of channeling the noxious gases towards the outside.

What Materials Were Used for the Roof?: For this style of hut, the roof begins a half meter from the ground and continues until it reaches a half meter from the top. The very top is unthatched, to provide an escape for smoke. But why don't the thatched palm fronds reach all the way to the ground?

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Water from the soil will wick up into the palm leaves, causing rot. Keeping the palm fronds from touching the ground extends the life of the hut. Because building a hut is hard work, they'd want to get as much life from one as possible. First, they'd spend A LOT of time cutting palm fronds, perhaps 1-2,000 fronds per hut. They looked for wide, mature fronds with long stems. Florida maritime forests have plenty of young palms, with leaves accessible from the ground, but many of these leaves are too small and spindly. Palm frond collection would have been a HUGE effort, especially since the fronds had to be dragged to the site of the new hut (tangling on saw palmetto, greenbriar vine, and grapevines all the way).

Thatching the Hut: Thatching began at the bottom of the hut. Why? This allowed the topmost leaves to channel rainwater off the edge of the hut, instead of channeling it under the top of the next lower frond. Modern roof shingles are laid the same way for the same reason. The Timucua may have used whole, flat palm fronds, fronds folded in half, or fronds rolled into a bundle. We don't know which method they used. Each of these methods has been used by other cultures that build with palms.

After a palm frond was properly folded or bundled, its stem was inserted over the lowest grapevine weaver, then under the next, over the next, under the next, until the base of the frond (where it meets the stem) was snug against that bottom weaver.

Then the next frond stem was woven in beside it, this time starting *under* the lowest weaver, then over, etc. When the entire circumference of the hut (24m or 75') was thatched on that bottom level, the Timucua started thatching one weaver up. Eventually, one circuit at a time, the thatching reached the top of the hut. Palm stems were trimmed so they didn't protrude into the hut's living space. Fronds blocking the smoke hole, as well as any leaves reaching too close to the ground, were also trimmed.

Making it Habitable: The structure was now complete, but it wasn't ready for a family. Low benches, which attached to the inner walls, needed to be installed around the entire periphery of the one-room home. These benches provided sleeping space above, and storage space below. A hearth (fire pit) was dug in the center. Small pits were dug under the benches where dried corn cobs could be burned in smudge fires. These smudge fires created smoke that helped protect the sleeping Timucua from biting insects. Larger pits were dug into the floor and lined with leaves or animal hide. These provided additional "underground" storage.

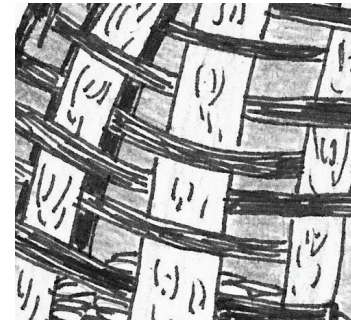
Indoor Plumbing? No such luck. The Timucua had to haul water for drinking and cooking from a nearby creek, lake, or spring. Most native cultures had designated areas – a bit away from the houses – where men and women took care of toilet needs. They may have had a "night basket" as well, for use in the middle of the night. Later, this could be emptied at the latrine areas. Most native cultures also had specific areas at nearby streams or lakes for bathing, washing clothes, and cleaning pots.

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ACTIVITY – BUILDING A THATCHED WALL:

BACKGROUND: Students of history often hear the term “wattle and daub.” Wattle refers to the interweaving of branches and vines to make a lattice. This was common in Timucua territory. Daub refers to a mixture of clay, mud, and plant fibers, which was slathered onto the wattle lattice inside and out. There is no evidence that the Timucua used daub in their construction. Wattle and daub construction was utilized by the mound-building Mississippian cultures further north. One description of the Apalachee council house notes that the inside walls were covered with clay and decorated with paintings. Perhaps the Apalachee adopted some of the artistic and architectural elements of the more complex and powerful chiefdoms they interacted with.



This woven lattice is an example of wattle.

INSTRUCTIONS: You will be using natural materials to build and thatch a small section of wall. See the table below to compare the materials you will use with the actual materials used by the Timucua.

Material You Will Be Using	Material the Timucua Used	Construction Purpose
Bamboo Planting Stakes (1/4"-1" in diameter)	Pine Trees (8" in diameter)	Hut Supports / Uprights
Bamboo Planting Stakes (1/4" - 1" in diameter)	Grape Vines (1/2" – 2") and Thin Pines (2"-3")	Weavers to create a lattice with the hut supports
Hemp Rope	Woven cord or leather strips	Tying materials
Saw Palmetto Leaves	Sabal Palm Leaves	Large leaves to cover the roof

Note: Bamboo is a bit flexible, like the natural materials the Timucua used, making it an ideal “purchasable” material for this activity. Sabal palm leaves had several distinct advantages over saw palmetto for Timucua thatching. Palm leaves are three or four times larger. The large, sturdy stems make sturdier weavers than the thin palmetto stems which sometimes slip out. Palm stems aren’t covered with saw edges either. So why are you using palmetto? It’s smaller, so it works better on model 3’ sections of wall. It is also easier to collect because it grows low to the ground and is more plentiful than palm leaves. You will need to wear protective gloves while working with saw palmetto.

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ACTIVITY – BUILDING A THATCHED WALL *continued:*

Getting Started: This activity will take some trial and error. Cut the four 6' bamboo stakes in half. Lay out four of these small stakes in a row about 6" apart. One at a time, weave each of the remaining stakes over and under the first four, making a tic-tac-toe shape. The bending of the weavers over and under the uprights should help the frame hold together on its own. But to be sure, your next step is to tie each joint securely. The Timucua were using much larger materials – pines and vines, so it took a lot of effort to bend them over and under each other. The stress of these bends held them in place without any tying required. The Timucua built huts in one piece, with poles dug into the ground, so they were thatching on an upright frame. Since your wall section is not part of a larger structure, you'll be thatching flat on the ground.



Frame made from 8 three-foot-long bamboo stakes and tied with jute twine.



Palmetto fronds: Flat, Folded in Half, and Bundled

the frond when you're done tying. If the frond stem feels snugly bent over the bamboo weavers, there's no need to use twine to tie it to the top weaver. But if it feels loose, use a piece of twine to tie the stem in place at the top too. Continue adding fronds across the bottom, alternating whether you start the palm stem over or under that bottom weaver.

Thatching: Fold a palmetto leaf in half at the midrib. Hold your palmetto with the stem pointing away from you, and the straight folded edge facing to the right. Begin weaving at the lower left corner. Weave the long stem of the palmetto leaf over and under until the base of the leaf reaches the second-from-bottom weaver. Tug the top couple of palmetto fingers loose so you can use them to tie the frond to the weaver. Don't tug too hard; they should still be attached to



Top Palmetto Fingers

Once you've gotten all the way across your wall (using about 12 fronds), move up to the next weaver and create another line, in exactly the same way. Continue until you reach the right edge of the wall again.

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ACTIVITY – BUILDING A THATCHED WALL continued:

Next, trim the palmetto stems that stick well above the top weaver to about 10 cm (4”) above the frame. This just cleans up the area so it’s easier to thatch the top.



*Start of bottom row of fronds.
Each frond is folded in half.*

keep the water out. To compensate, you will bundle your fronds instead of folding them. Folding just doubles their thickness. Bundling them quadruples the thickness (see photo). Once again, separate the 2-3 palm fingers closest to the stem on each side. Don’t rip them off; just pull them a bit to separate them from the main frond (as you did earlier). Next, bunch the remaining leaf into a bundle. Use a palmetto strip to tie it together so it will keep the long tube shape. Put the stem under the top weaver, carefully maneuvering it between the many saw-edged stems already there. Use the loosened palm fingers to tie it to the top weaver. Continue to do this all the way across the row. Because the fronds are bunched into long rolls, each one is just as thick as the layered ones below. However, it will take twice as many palm fronds to cover the space, perhaps 20. The bottoms of these fronds will tend to flop away from the wall when you pick it up. To solve this problem, reach underneath, and use palm fingers from the fronds below to tie them in place.

Palmetto frond photos courtesy of Ashley Herrera.

Thatching the Top Weaver: Why is this different? For one thing, you can’t weave the palmetto stem over AND under the frame, because there’s only one weaver left. Since it’s not going over and under, there’s no chance it will wedge tightly into place. It will have to be tied at top and bottom. There’s another difference too. Because no more thatching will occur above it, this row will only be one palmetto frond thick. The lower rows had two overlapping sets of fronds to



Above: Completed three-foot section of wall. Remember, the Timucua did not build wall sections. They built whole huts (see below for a life-size model). The small sections of wall allow us to practice thatching technology.



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ACTIVITY – BUILDING A THATCHED WALL *continued*:

A Visual Check: Before you move your wall, check that the frame is holding together well. The pressure of forcing so many palmetto fronds between them may make the corners and other edges slip free. If any of the bamboo stakes are slipping out, use twine to bind them securely in place. Now you can lift your wall. Before you water-test it, hold it up in the sunlight and look for areas that light peeks through. Patch any significant holes with bunched fronds.

Is it waterproof?: Have one team member hold the wall up so he or she can see the inside of the wall. Another team member will use a gently spraying hose to wet the outside of your wall. Does the water slide off the outside or leak through? If it leaks, why do you think this is happening? What would you do differently next time?

- 1) In your own words, describe the thatching process.

- 2) Did your thatched wall shed all of the water or did some leak inside? If some leaked, why do you think this happened?

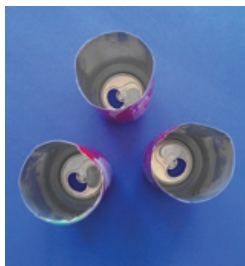
- 3) If you were assigned another thatching project (or if you were stranded on a deserted island and needed shelter), what would you do differently on your next attempt at thatching?

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EXPERIMENT – WHY DO NATIVE STRUCTURES HAVE SHORT DOORWAYS?

BACKGROUND: When visiting a replica of a native structure, people often wonder why the doorways are so low. They're rarely over a meter high (3 feet), and this seems strange to modern Floridians who are used to a standard doorway height of two meters (7 feet). Short doorways are found in both the Timucua's palm-thatched huts and the buffalo-hide teepees of the American West. Native people were not substantially shorter than modern Floridians. They clearly had to duck to enter such a low doorway. Why install this inconvenience in every dwelling they built? This demonstration will help you understand the purpose of low doorways.



Cans with bottoms removed.



A very low doorway, a mid-level doorway.



Two lit hut models.

INSTRUCTIONS: Each team will begin by creating a mock native structure from an empty aluminum soda can. One member of the team will be responsible for cutting a base and door in each can. Team Member 1 (TM1) will carefully cut the bottom off of the can. Aluminum edges are very sharp. Please be careful of your own fingers and those of your neighbors. Collect and dispose of any sharp bits along with the can base. Next, cut a doorway in your can. Make it about 8 cm (3 inches) tall. When you set the can down, the rectangle your cut should look like a comfortable door height compared to the rest of the can. If it still looks too short, you can make it taller. Note that the popped soda top functions as a smoke hole in this model.

TM1, measure the height and width of your doorway. Record it here.

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EXPERIMENT – WHY DO NATIVE STRUCTURES HAVE SHORT DOORWAYS? *continued:*

Next, TM1 will use a lighter to light a tea light candle. He will then place his can (model hut) over the candle. Be sure to place the can gently, so a whoosh of air doesn't extinguish your candle. Wait about thirty seconds, then gently blow out the candle flame through the doorway. All team members should observe what happens to the smoke. (**Note:** The aluminum can will become hot during this experiment. Use caution.)

TM1, record your observations of the smoke in the high-doorway model.

In a functional native structure, the smoke should only exit the smoke hole. If it also exits the doorway, it means that the rising hot smoky air is being pulled away from its primary exit (the smoke hole) and towards another high exit. This causes smoke to swirl around the interior of the structure, making it unhealthy for the inhabitants. A change must occur to ensure that the smoke exits properly.

Team Member 2 (TM2) will attempt a solution.

Process: Use tin snips to carefully remove the bottom of the can. This time, add a low doorway, around 2.5 cm (1 inch) high. It should be the same **width** as the doorway created by TM1.

If you look carefully, you may be able to see the smoke escaping from the smoke hole at the top AND swirling inside the doorway.



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EXPERIMENT – WHY DO NATIVE STRUCTURES HAVE SHORT DOORWAYS? continued:

TM2, measure the height and width of your doorway. Record it here.

Light a candle. Place your can (model hut) over the candle. Wait about thirty seconds, then gently blow out the candle flame through the doorway. All team members should observe what happens to the smoke. (**Note:** if your flame extinguished BEFORE you blew it out, you know that your doorway is too short. Not enough oxygen is reaching the inside of the can to allow the flame to burn. Increase the doorway height a bit. Record the new doorway height on the line above. Then retry the experiment.)

TM2, record your observations of the smoke in the low-doorway model.

Next, the group should discuss what an optimum height for the doorway might be. The higher it is, the easier it is for people to enter and exit. But if it's too high, smoke will fill the structure. Once your group decides on a "best height," Team Member 3 (TM3) will measure this height on the can and mark it with a Sharpie marker. TM3 will use tin snips to remove the bottom of the can, and carefully cut the doorway according to the group's specifications. The width should match the widths of the previous two doorways.

TM3, measure the height and width of your doorway. Record it here.

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EXPERIMENT – WHY DO NATIVE STRUCTURES HAVE SHORT DOORWAYS? continued:

Light a candle. Place your can (model hut) over the candle. Wait about thirty seconds, then gently blow out the candle flame through the doorway. All team members should observe what happens to the smoke. Is the doorway low enough to prevent smoke from collecting inside the structure? Do you think it could have been higher and still worked?

TM3, record your observations of the smoke, as well as your conclusions about the success of this mid-height doorway.

Compare your findings with other groups. Come to a conclusion about what range of doorway heights provide the best smoke clearing AND the greatest ease of access.

Record the range of heights that worked best:

In your own words, describe why doorways are so low in native structures.

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HOW WAS A TYPICAL VILLAGE SET UP?

“Typical” is a tough thing to describe. Some Timucua lived at cultural centers that included a council house. Others lived in small villages some distance away. Still others lived in tiny hamlets, with only one or two other families. Particularly on the east coast of Florida, some Timucua spent only the growing seasons (spring, summer, and fall) within a village, and then dispersed to small family camps during winter months. When such a large group tried to hunt and gather around a single village, resources could run out. Spreading out during the lean season made it easier to find food, firewood, and other necessities.

Archaeologists learn about the set-up of Timucua villages when they excavate postholes. What’s a posthole? It is the rotted remains of structural posts that supported native buildings. These organic remains stain the soil a different color. Archaeologists call the stained earth a “posthole.” Postholes are one type of “feature” – permanent marks left in the earth by man. By mapping the location of postholes, archaeologists can determine the shape and size of native buildings, how close together they were, and how big the village was as a whole.

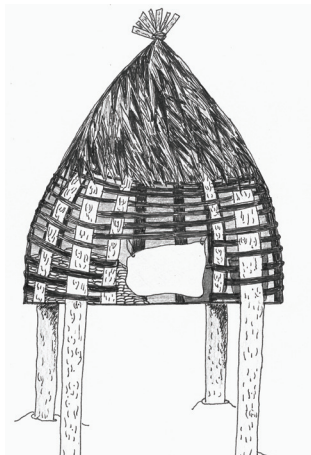


Excavation of posthole features at Mission San Luis in Apalachee territory, NW Florida, courtesy of Mission San Luis

The numbers we’ll discuss are based on an excavated Timucua village in Alachua County. This site, called the Richardson Site, is one of Chief Potano’s villages – one where the Timucua probably met De Soto on his 1539 trip through Florida. This “typical” village had no council house. In fact, archaeologists have yet to find the footprints of any Timucua council houses. This village had 15-20 huts. The huts were about 23 meters (75’) apart. Why so far apart? Perhaps this was a strategy to prevent flame from spreading if one hut caught fire. It also provided space in between for hide-tanning racks, smoking racks to preserve meat, communal cooking fires, and other community structures. How big was this village? It was about 182 meters (600 feet) to a side. This gave it an area of a little over eight acres. A professional football field covers 1.32 acres, so a Timucua village was about as big as six football fields. Archaeologists suggest that 200-250 people would have lived in an average village.

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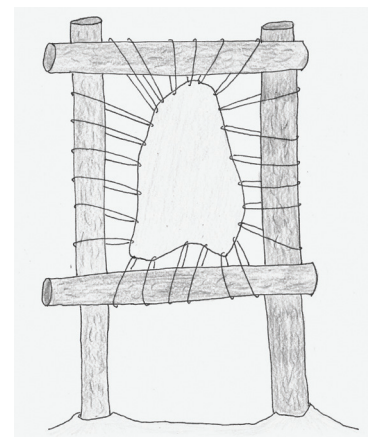
Corn Crib

What other structures were found in Timucua villages? The Timucua built a number of smaller structures. Some were used for storing surplus food. An example would be a corn crib. These cribs, like all Timucua structures, were round. They had smaller support posts, about 7-10 cm (3-4”), and they were only a little over two meters (7’) across. The floors of these huts were not at ground level. They were raised several feet off the ground to prevent rodents from getting into the dried corn. The roof of a corn crib was thatched to keep rain off the corn, but the sides were probably unthatched, exposing a loosely woven lattice. The goal was to allow air flow (reducing rot in Florida’s humid climate) without providing a 24-hour buffet for the crows. A much larger storehouse held the chief’s share of each crop. The chief’s share could be used for his own consumption, for gifts to neighboring

chiefs, visitors, and Europeans, and for redistribution to the people in times of scarcity. Because several Timucua structures left small postholes, archaeologists can’t be sure of the purpose of each small hut they find. Women’s seclusion huts (used during menstruation and recovery from childbirth) were common in the southeastern US. Sweat lodges (for sweating out impurities) as well as smoke huts (for concentrating smoke during the preservation of meats) are other possible purposes for these structures.

Archaeologists also find clusters of small postholes. These may represent drying racks for herbal medicines, leaves for weaving, and strips of bark for cordage. They may also have provided space to hang large gill nets for inspection and repair.

Posts about six feet apart could have been hide-tanning racks. These racks would have included a top and bottom spar to make a large square. The stretched hide was attached all the way around with cords.



Hide-tanning rack

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What did a Timucua council house look like? As stated, archaeologists haven't found the postholes for a Timucua council house yet. They have, however, discovered the footprint for a council house made by the Apalachee Indians of northwest Florida. This council house was at Mission San Luis, so the village had its own Spanish mission church. The council house, mission church, and other buildings have been rebuilt, and you can walk inside them the next time you're in the Tallahassee area. Here are some photos of the recreated Apalachee Council House, which holds 2,000 people.

Replica of the Council House at the San Luis Mission in Tallahassee



Outside View of Council House



Interior of Ceiling



Fire Hearth in the Center



Inner Wall with Partitioned Benches, Covered with Woven Mats and Deer Furs

One historical description of a Timucua council house noted that it was 25 meters (81') across. Just as with family huts, a row of benches was built into the inside off the outer wall. These benches were separated by partitions to create spaces for family groups. Because these buildings were so large, many had a second ring of supports partway between the outer wall and the central fire pit. The description noted that this particular council house had an inner ring of supports that was 15 meters (50') wide. Benches were often attached to this center set of posts as well. The open floor in the center was enormous, and the smoke hole in the roof above may have stretched 8 meters (27'). Public meetings, Black Drink ceremonies, celebrations, and dances were held in this enormous structure. If building a family hut was a major undertaking, constructing a council house was monumental.

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In fact, it WAS monumental. The council house was a monument to the strength of a regional leader. It took the resources of many villages to provide enough large trees, palm fronds, and laborers to complete such a structure. The Spanish reported that some council houses were only large enough to seat 300, while the Apalachee council house could hold 2,000 people. Why such a difference in sizes? The Apalachee were a single nation, united politically. Fifteen hundred people lived at Mission San Luis alone, not to mention the rest of Apalachee territory. The Timucua also had a large territory, but they were never united. Florida's western

Timucua, who depended more heavily on farming, were divided into three main groups: Potano, Northern Utina, and Uzachile. If each had a council house, it would have served only the Timucua in that region. The eastern Timucua, who depended less on agriculture, were divided into ten groups. The people of each area gave allegiance to a single head chief. So, if fewer people were in a group, a smaller council house would suffice. In any case, when they had to depend on their own human labor to do all of the work, they didn't have the resources to build bigger. Look at the map to see where some of the Timucua chiefdoms were located in north Florida and southeast Georgia.



Map Showing Locations of several Timucua Chiefdoms in Georgia and Florida

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WHAT WAS A CHARNEL HOUSE?

A charnel (kar-nel) house was part of a process that many native cultures used to bury their dead. While some individuals were buried in a mound directly after death, most were processed in a charnel house before burial. A charnel house is a structure where bodies were stored until they decomposed. At a later date, the bones were cleaned, wrapped in a deerskin bundle, and buried in a burial mound. This is called a bundle burial.

Sometimes many bundle burials were buried in the mound at the same time. This may have occurred when the charnel house was full, or perhaps at a seasonal celebration that called for mass transfer of remains to the mound. One Spanish priest wrote that the bones were purified in a fire, then put into boxes and preserved on a platform so that living members of the community could visit with deceased relatives.

This brings us to the question...why process the skeleton at all? Processing skeletons was a way of showing the proper respect for and treatment of the dead. Some native groups had a celebration for the deceased person when it was time to bury him in the mound. This practice gave loved ones a chance to celebrate the person's life anew - when the grief of loss was not so fresh. The use of a charnel house also reinforced the idea of community. Even in death, the deceased were together with the people they knew and loved. Archaeologists consider the interment of bundle burials as evidence of charnel house use.

What did a charnel house look like? We don't have much evidence from early Florida, but native groups in Virginia built a raised structure – a bit like a large corn crib. The image to the right depicts a charnel house observed in 1558 in Roanoke, North Carolina. The Timucua, of course, did not build square structures. But the practice of processing the dead was clearly going on all over the continent.

Who painted this picture? John White was an English painter and map maker. The watercolor drawings he made in North Carolina were engraved by Theodore de Bry. Because we have White's original paintings to study, we do know that de Bry didn't compose these engravings himself.



De Bry engraving titled, "The Tombe of their Werovvans or Cheiff Lordes."

Courtesy of the British Museum at www.virtualjamestown.org

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Where were charnel houses located? Spaniards recorded that charnel houses in the Tampa Bay village of Tocobago were located in the forest, some distance from the community. However, the structure was close enough to allow the native people to visit their dead every morning. Guards were posted at the charnel house, to prevent panthers and wolves from dragging off the deceased. Like many other charnel houses, this one was located atop a sand mound. The Spanish described it as temple mound, decorated with elaborate animal carvings.

The actual footprint of a charnel house has only been found in one location, near Tampa Bay (perhaps it is the same one described above). Parrish Mound 2 is about 20 meters (65') in diameter, but only about 1.8 meters (6') high. This mound supported a trapezoid-shaped building that was 7.62 meters (25') wide. The walls were upright logs that had been dug four feet into the earth. There was space in between the logs to allow air flow, and the remains of 34 individuals had been buried in the dirt floor of this charnel house, some as bundle burials and some as cremations (a rare occurrence in Florida). Seven others were buried atop the mound, but outside the building itself. Unlike the North Carolina charnel house, this one wasn't elevated on stilts. It was elevated by an earthen mound. When the charnel house was no longer in use, it was burned to the ground, a practice seen elsewhere in Florida. European artifacts in the mound show that it was still in use during the Contact Period.

Who was processed in a charnel house? Everyone in the village made their way to the charnel house eventually, except for the chief. Chiefly burials were described by French explorers, Franciscan friars, and St. Augustine Spaniards. They all spoke of an elaborate grieving process. Public lamentation by women occurred daily, sometimes for six months to a year. Men and women also cut their hair short as a tribute to the dead chief.

More about chiefly burials: In some cases, the chief was interred after three days of community fasting. He was buried in a small sand mound apart from the community burial mound. His drinking cup and other grave goods were buried with him. Other descriptions say the chief's body was processed, and the purified bones were stored in a chest so that villagers could pay homage to their lost chief. Still other descriptions describe the chief's house being burned after he died in it. Why such different burial methods? Remember, the Timucua were never a united group. They just happened to speak the same language. Being different groups, they had different practices. Consider the differences in culture among American English speakers, British English speakers, and Australian English speakers.

Archaeological Note: To avoid having to destroy the chief's house, another hut was often built, where the chief went to die. Archaeologists discovered evidence of this practice at a pre-Timucua village in Colombia County. Around 400 CE these Weeden Island peoples buried their chief in a shallow grave dug down into the floor of a small house. The house had been built on a sand mound. A cover for the grave was constructed from logs. Finally, the grave, the chief, and house were burned together.

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WHAT ABOUT MOUNDS?



*Cahokia – Monk's Mound,
in Illinois, 1,400 CE,
photo by Wikipedia*

Often, a Florida burial mound began as a platform mound—an earthen pyramid with a wide, flat top. Then a charnel house was built on the platform. When human remains were transferred from the charnel house to the soil of the mound, it officially became a burial mound.

Florida mounds aren't as massive as the ones found at Cahokia in Illinois. The largest there (Monk's Mound) is a stunning 291 meters (955') tall. For comparison, the Great Pyramid at Giza is 146 meters (481') tall. Turtle Mound, found in Volusia County, is the largest Florida mound at 23 meters (75') tall.

Why are Florida mounds so much smaller? Most Florida groups were not organized into complex Mississippian-style chiefdoms. The great mound centers that pepper the interior of the US were controlled by powerful central leaders. They weren't just chiefs (or even headchiefs of groups of villages). They were the leaders of confederations made up of many chiefdoms.

Most Florida cultures, like the Timucua, were less politically complex. Agriculture was less intense, social classes were more equal, and populations were smaller. As a result, they lacked the labor force and the powerful centralized government to take on such enormous projects. The closest many groups got to this sort of *monumental* display was their council house.

Two Florida cultures did achieve true chiefdom status, though not at the extreme levels found in the US interior. One of these groups, the Apalachee, prospered through intensive agriculture (remember the Council House at San Luis?). The other, the Calusa, achieved Mississippian power through the intensive harvest of marine resources, like fish and shellfish. They actually built whole islands out of shell middens.

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*Lake Jackson Mound 2
1,000-1,500 CE, Tallahassee,
photo by Wikipedia*

The Fort Walton Culture (which later became the Apalachee) built this mound at Lake Jackson. It is 11 meters (36') high. The Caloosahatchee culture (which later became the Calusa) dug an extensive system of canals in southwest Florida. Those canals connected many villages with the Gulf of Mexico and allowed people in the main Calusa village to canoe right up to their huts. These massive earthworks attest to each group's ability to command significant labor forces.

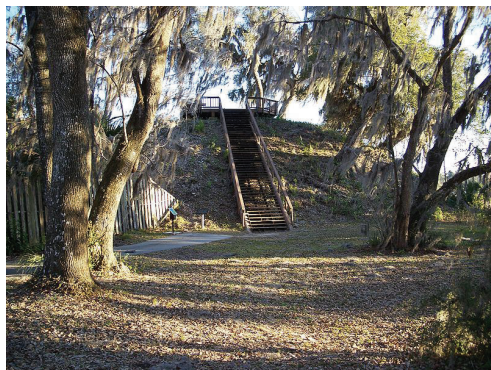
What other mounds are found in Florida?

The Crystal River site in Citrus County included six distinct mounds. Mound G (a burial site) has been radiocarbon dated to several hundred years BCE. At that time, Temple Mound 1 (pictured below) was probably about 9 meters (30') high. This mound complex (city) was occupied continuously from 200 BCE until about 1000 CE. It was a ceremonial center, visited by thousands who wished to trade, participate in ritual activities, and bury their dead. All of those people created a lot of trash. The crescent-shaped trash midden at Crystal River is 400m long, 30m wide, and 1.2m tall. Twelve hundred years' worth of occupation leaves a mark on the environment.



*Calusa Canals, Fort Myers Area,
1,400 CE, Art by Merald Clark.*

*Courtesy of the Florida
Museum of Natural History*



*Crystal River Temple Mound 1
Citrus County, West Coast of Florida,
photo by Wikipedia*

The earthworks at Crystal River, Lake Jackson, and Caloosahatchee are far from Timucua territory. But we do have a few platform mounds at archaeological sites in our own backyard: Mount Royal, Thursbys, Shields and Grant. While these were not true Mississippian cultures, they were clearly influenced by the complex chiefdoms in the interior of the US. The construction of platform mounds, and the inclusion of exotic ceremonial objects such as grave goods, links them with Mississippian cultures as far away as Oklahoma.

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Let's talk about Mount Royal. Mount Royal, in Putnam County, is located about 40 miles south of St. Augustine in a freshwater environment on the banks of the St. Johns River. Why were these native peoples able to coordinate the labor to build a mound here? It was a combination of things. Their position on the St. Johns River allowed them to intensively harvest freshwater resources. At the same time, they were far enough inland to have good soils for agriculture. Finally, their position near Lake George (close to the start of the St. Johns River) allowed them to control trade routes between East and Central Florida peoples. Added together, these things made them powerful enough to harness the labor of many surrounding villages. Mount Royal reached the peak of its power as a mound center between 1,050 and 1,300 CE. After this time, native peoples continued living there, but Mount Royal had lost its strength as a cultural center. The Timucua living there 200 years later still engaged in trade, but their government was not as centralized, nor did they command the same power.

When the French visited this location in 1565, they found an average Timucua village called Enecape. It had a large platform mound, probably topped by a charnel house. A huge earthen highway led up to the mound. The French also visited Edelano, another Timucua village on the shores of Lake George. They described a similar causeway at Edelano which was 300 paces long and 50 paces wide. In 1765, William Bartram visited another nearby native site, on Drayton Island. He noted seeing a “great avenue or Indian highway” there. The existence of three significant road-building operations in three neighboring communities offers significant evidence that a centralized government was at work.

Archaeologists and historians have worked together to unite these archaeological features with European records about mission churches established at Timucua villages. Their hard work allows us to identify the Mount Royal site as the Timucua village of Enecape.

So, what happened to the once-powerful inhabitants of Mount Royal? In 1595, a Spanish mission was set up there. By 1656, native populations throughout northeast Florida had been so depleted by disease, that the Spanish moved the remaining Timucua at mission San Antonio de Enecape north to another mission, to consolidate survivors. Later, in 1680, a group of Yamassee Indians from Georgia was resettled at Enecape. By the early 1700s, they too, had disappeared.

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ACTIVITY – MAPPING THE MOUNT ROYAL SITE:

BACKGROUND: The Mount Royal site was excavated by C.B. Moore in 1894. This early archaeologist kept thorough records, but modern archaeological practices had not yet been established. This means that many important pieces of information were never even noticed. Excavations occurred so quickly that there was no time to sift the soil for tiny bits like fish bones. Native American graves were disrupted and the grave goods removed with no regard for cultural concerns.

Did you know that modern archaeologists leave part of each site unexcavated, so that future archaeologists with better methods can learn more? Once an archaeological site has been excavated, the information we can learn from it has been destroyed. Keeping thorough records is of absolute importance, since the learning process destroys the object being studied. Moore’s methods left us with many now-unanswerable questions. But if he hadn’t excavated those mounds back in the 1890s, many would have been looted and destroyed with no information recorded at all.

It is much easier to visualize an archaeological site when you plot it on graph paper. However, to plot it on paper, all of the measurements must be expressed in the same units. The original measurements for the Mount Royal features were recorded in paces, yards, feet, miles, and roods (a rood is equivalent to one quarter of an acre). Luckily, modern archaeologists have taken measurements to supplement Moore’s work. The combined data are presented below.

INSTRUCTIONS, Part I: In the Table titled, “Mount Royal Features,” convert feet and yards into meters.

MOUNT ROYAL FEATURES

Mount Royal Features	Original Data (Without the Paces and Roods)	Size in Meters
Burial Mound (Roughly Circular)	160 feet across	m in diameter
Causeway	820 yards long	m in length
Causeway	Ranging from 12-25 feet across (Use 20' for this activity.)	m in width
Ridge on Each Side of the Causeway	Up to 12 feet wide (use 12')	m in width
Pond width	100 yards wide	m in width
Pond length	150 yards long	m in length

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ACTIVITY – MAPPING THE MOUNT ROYAL SITE *continued*:

INSTRUCTIONS, Part II: Use the data in the table and the information in the paragraph below to create an accurate sketch of the Mount Royal site on graph paper. Be sure to label all features, title your map, and include a list that describes how many units long or wide each feature is. For example, “Causeway is X units long.” Also include a north arrow on your map.

The three features at Mount Royal (a burial mound, a long highway with raised ridges on each side, and a shallow pond) are oriented on a north-south axis, with the mound farthest south, the pond farthest north, and the highway connecting the two. The burial mound at Mount Royal is just less than 5 meters high, and the ridges alongside the causeways are about 1 meter tall. The existing pond was probably the borrow pit that provided the soil used in mound construction. Archaeologists do not know why these pre-Timucua peoples hauled soil from nearly a half mile away when building this mound.

- 1) In order to make a proportional sketch, you will have to decide how many meters will fit in each square on your graph paper. Record that information here, and be sure to include it in a key on your sketch.

- 2) Create your sketch of the Mount Royal site on a sheet of graph paper, then copy it over on a fresh page for submission to your teacher.

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MOUND BUILDING

How did they actually build mounds? The answer is different for every mound. Some mounds are made of shell. They're basically middens (trash piles) that were shaped on purpose. Other mounds are made completely of sand, with no shell at all (even when shell was available). All mounds do have one thing in common: layers. The following steps describe the construction of Mount Royal.

Step One: First, the native peoples scraped the ground clean of leafy debris. Sometimes they dug below the surface a bit. Shell hammers, axes, and shovels made good digging and scraping tools.

Step Two: Next, they mixed bits of charred wood with yellow sand from the borrow pit. Then they hauled this mixture, basket by basket, a half mile to reach the cleaned area. They spread the sand around, creating a blackened layer that marked the base of the mound.

Step Three: Next, they mixed hematite, a red iron-ore, with huge amounts of yellow sand. They spread this light red mixture across the mound in a layer that sometimes reached 2.1 meters (7') thick. That's A LOT of sand. At 1,886 square meters, this mound was bigger than an Olympic-sized swimming pool (1,250 m²). The building of this layer alone required them to haul more dirt than it would take to fill that Olympic swimming pool. And they hauled it from a half mile away.

Step Four: They added another yellow layer, the final preparation before the mound could receive burials. Both kinds of burials, primary (still articulated) and secondary (bundle burials), were set into the yellow layer. Each grave was marked with handfuls of dark red hematite sand. The association of red with burials is common among North American native peoples and prehistoric Europeans.

Step Five: The native peoples buried special items with many of the graves, including whelk shells, shell beads, pottery, copper beads, and copper breastplates. They also scattered stone tools throughout the yellow layer, perhaps as a tribute to the whole group.

Step Six: Next, they covered the skeletons and grave goods with another layer of yellow sand. This ended the physical burial event. Archaeology cannot teach us how these native people expressed love or grief at such an event, because emotions leave no mark in the archaeological record.

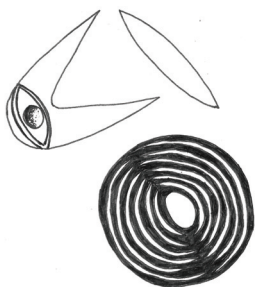
Step Seven: Eventually, the native people would need to transfer another group from the charnel house to the burial mound. At this time, they built new sand layers atop the existing mound, first, scraping the top of the mound clean of leaves. Next, they hauled a layer of colored sand to make an obvious base for the new burial event. Then, steps 2-6 were repeated.

Step Eight: After a long period of time, the native people stopped using this mound as a burial spot. They mixed a large batch of deep red hematite sand and spread it across the entire top of the mound as a cap.

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What have archaeologists learned by studying mounds in Timucua territory? Let's look at a few mounds... Mounds in Putnam, Nassau, Duval, and Volusia Counties. Some of these mounds contain shell, but most are primarily sand. Shell mounds preserve bones much better than sand because the calcium in the shells makes the soil alkaline. Sandy soil alone is mildly acidic and eats away at skeletons until they finally disappear entirely. Each of these mounds contains layers, human burials, and grave goods.

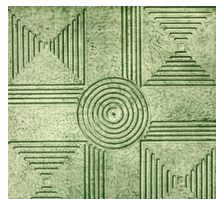


Forked Eye Motif

Putnam County (Mount Royal): Mount Royal is best known for its copper artifacts, which demonstrate the trading power of these native peoples. One 10 ½” copper breast plate was decorated with the forked eye design so popular in Mississippian cultures to the north. Copper-covered wooden ear spoons are another trade item found at Mount Royal.



Replica of a copper-covered ear spoon, courtesy of Brian Floyd



Mount Royal copper breastplate, image from *Certain Sand Mounds of the St. Johns River, Florida, parts I and II. Journal of the Academy of Natural Sciences of Philadelphia, 1894*



Dog Adorno - an ornament on a clay pot found in Shields Mound. Courtesy of Dr. Keith Ashley

Duval County (Shields and Grant Mounds): The Mill Cove Complex includes Shields Mound and Grant Mound. It also includes all of the artifacts and features that pepper the 750-meter space between them. Shields Mound contained drilled bear canine teeth, igneous stone points, and a dog adorno (a small decoration on a clay pot). Less than a mile away, Grant Mound contained an incredible 147 stone celts! These two mounds were traditionally considered to be separate sites. However, recent archaeological studies have confirmed that both mounds were active at the same time, between 900 and 1150 CE. They're both built on natural sand hills (to give them added elevation), and they both have long causeways leading up to them. Some mound centers were only used for ceremonial purposes, but the variety of artifacts found between these two mounds shows that the Mill Cove Complex was a thriving town as well.

Nassau County (Walker Mound): Walker Mound on Amelia Island was a small cone-shaped mound topped with a red sand cap. Some of its red-hematite layers contain skeletal fragments, including teeth, finger bones, and bits of skull. These bits may have been collected from the charnel house after the skeletons had been bundled for burial.

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Volusia County (Thursbys Mound): Thursbys Mound is located at Blue Springs State Park, just a few miles from where the large wooden owl totem was discovered. The mound was 3.7 meters (12') high and 27 meters (90') in diameter, with a shell ramp leading up from the river. This site boasts a huge number of plant and animal effigy pots. Some pots were replicas of acorns, squash, and gourds. Forty-two other effigies are replicas of animals, including fish, turtles, panthers, bears, squirrels, turkeys, and dogs.

WHAT ABOUT MIDDENS AND SHELL RINGS?

Shell middens cover acres of northeast Florida and southeast Georgia. Many middens were first laid down by the Archaic Indians (8,000 BCE – 750 BCE) and are peppered with sherds of thick Orange Period pottery. As these cultures evolved or were replaced by migrants, the artifacts in the middens changed. The new group might have used different pottery styles, but they were still harvesting oysters and dumping them where they had always been dumped. Some Florida middens cover a large area, but are only a few inches thick. They're called sheet middens. The largest midden in Florida is found at the Canaveral National Seashore in Volusia County. Turtle Mound was at least 23 meters (75') high in prehistoric days (only 50' today). It's so tall that it was used as a navigational aid for ships (for example: "Pull into port near the giant shell hill"). Today, Turtle Mound covers two entire acres, and has a modern boardwalk, so you can hike to the top.

Historical Note: Why are Florida's middens smaller than they once were? Most were harvested for use as fill in road construction projects in the early 1900s.



*Archaic Shell Midden, 2,500 BCE
Pelotes Island in Duval County. The
arrows show where you can see the
shell hill through the tree cover.*



*Close-Up of an Oyster Shell Midden
with Eroding Sherds of Pottery*

What is a shell ring? It's a large ridge of shell shaped like an O, a U, or a C. These intentionally-shaped middens were created by Archaic peoples who lived in Florida long before the Timucua. Three shell rings have been identified in Timucua territory: Oxeye (the earliest), Rollins, and Guana. How

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did the Archaic peoples build these rings? Their villages were probably set up with the houses in a ring and an open plaza in the middle. Shells and other trash were dumped behind the houses, eventually forming a ring around the village. As these ridges grew higher, the Archaic people moved their houses to the ridge tops. Why elevate their houses? Aside from the better view, elevation protected homes from the extreme high tides associated with hurricanes. Some of these ridges were nearly 3 meters (9') high and very steep, so houses could not have been built on them. The immense amounts of shell suggest that the rings were regional ceremonial sites where lots of feasting took place.

All shell rings were monuments, a show of strength and power. They predate the great mounds of North America by thousands of years. The development of shell rings may be the first evidence that egalitarian societies (where everyone's equal) were becoming more stratified--meaning some people have more status and power than others. After all, someone had to coordinate the oyster dumping to create those extra tall shell rings.

Some of these rings, including the Rollins site, have shell ramps leading up to the top, making it easier to carry up buckets of shell. These rings are built primarily from oyster shell, but other species are included, with some rings having thick sections of coquina shell. Many artifacts are found in the ring middens, particularly pottery and shell and bone tools. Human remains are very rare.

Because sea levels have risen so much over the last few millennia, half of the Oxeye Shell Ring is now under the marsh. When it was created, that area was high and dry. Oxeye and Rollins are only four miles apart, with Rollins materials dating to only a few hundred years after Oxeye. Perhaps the ring-builders moved inland as their shell ring was flooded. Rollins is unique because it has 9 attached ringlets (some of them fairly large, greater than 80m in diameter).

How big are these shell rings? The shapes are very irregular, so you can't get a single diameter for a ring. The diameters of Oxeye, Rollins, and Guana range from 130m to 235m (430-770'). That's the length of four to seven football fields. The plazas in the middle ranged from 65m-140m across (213-459'). And how tall were these rings? Guana is 1.3 meters high; Oxeye, 2.2 m, and Rollins 3m (all ranging from 4-10 feet high). So, their heights are not very impressive. It's the sheer volume of shell and its intentional arrangement that catch the attention of archaeologists.

Shapes of Shell Rings Found in Timucua Territory:

*Rollins Shell Ring,
Duval County
2,460 – 4,150
years ago*



*Guana Shell Ring,
St. Johns County
2,740 – 3,860 years ago*



*Oxeye Shell Ring,
Duval County
4,370 - 4,580
years ago*



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LET'S TALK ABOUT WEIRS

Weirs are large, semi-permanent fish traps. The Timucua used them to harvest fish and shellfish without actively having to be there to catch them. Building a fishing weir was a community effort. Timucua communities living inland along fresh water rivers probably built their weirs from rivercane, a North American relative of bamboo, which grows to over 9 meters (32') tall. The tough, hollow stems grew to be 7 cm (3") in diameter. They made perfect, ready-to-use poles. All they needed was to be cut to the proper length. Because rivercane does not grow well in salty water, it would not have been as easily available to villages near salt marshes.

Instead, these Timucua used young pine trees to make their poles. Using young pine trees required more labor than using rivercane. Branches had to be stripped away, perhaps the bark too. Next, the poles were cut to size. How long? That depended on the depth of the water. For inland creeks, tidal action did not affect the level of water. Simply observing water levels from season to season would indicate how deep the water would get. In tidal situations, the depth of the water can change radically twice a day because the tide flows in and out twice during each 24-hour period. A weir should allow the fish to pass across it at high tide, but be trapped at low tide.

Archaeology Note I: In 1913, subway builders found the remains of several 2,000-year-old fishing weirs buried beneath Boston, MA, in an area that was once a salt marsh. These ancient fences were probably 30-46 meters (100-150') long. They were made of poles that were 5 cm (2") in diameter and about a meter (3-4') long.

Archaeology Note II: In many parts of the world, permanent weirs were created by piling up stones to make the walls. Some of these ancient weirs are still in existence today. Other weirs were "earthen," with the walls made of piled up dirt. An incredibly large earthen weir cuts across 500 square kilometers of seasonally flooded wetlands in Bolivia. This huge archaeological feature can be seen from the air when flying over the Amazon.

Archaeology Note III: In February 2011, a team of University College Dublin archaeologists spent every minute of each day's 2-hour low tide studying a 700-year-old fishing weir. They were hoping to learn as much as they could before funding - and the weir - disappeared forever. The weir had been buried in the marsh mud for centuries. Tidal action exposed the posts that made up this ancient fence, exposing them to the destructive power of oxygen, marine animals, and moving water.

Historical Note: In the 1560s, the French explorer, Jean Ribault, wrote that the Timucua created weirs that were "built in the water with great reeds, so well and cunningly set together after the fashion of a labyrinth, with many turns and crooks." Similarly, Rene de Laudonnière described them as "inclosures, made of reeds, and framed in the fashion of a labyrinth, or maze...."

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ACTIVITY – WEIR BUILDING:

BACKGROUND: The chart below tracks the tidal changes along northeast Florida’s St. Johns River. Some of the lows are negative because they drop below the mean low tide level expected at those sites. To figure out how deep the water will actually be at high or low tide, you need to know the value of Mean Low at the site your weir will be built.

The Timucua didn’t have printed tide tables. Instead, they had an intense awareness of tidal changes developed through daily observation. The older members of the community remembered the low lows as well as the hurricane-driven super-high tides. They probably measured water depth using their bodies as a gauge, in lieu of modern tools like rulers. For example, low tide is at my knees; high tide is at my hips. Instead of storing tide-charts on the internet, village elders passed this information on to younger members of the village.

For this activity, assume the following:

- 1) You are building a weir in a tidal marsh or river.
- 2) To keep it simple, mean low water depth at all of the proposed weir sites will be 1’.
(Mean Low Water is how deep you expect the water to be at low tide on an average day.)
- 3) You will need 2’ at the bottom of the pole to pound down into the marsh/river mud.
- 4) Your weir should be able to block the fishes’ paths at mid-tide, halfway between high and low.

INSTRUCTIONS, Part I: Use the information presented above to complete the table titled, “Tide Charts and Weir Building.” Use a separate piece of scratch paper if needed.

TIDE CHARTS AND WEIR BUILDING

Location of Weir	Low Tide	High Tide	Change in Water Elevation	Half of this Change	Mean Low Depth	Depth pole is buried in the mud	Length of Poles Needed
Mayport	-1.1’	5.1’	6.2’	3.1’	add 1’	add 2’	6.1’
Clapboard Creek	-0.8’	3.7’			add 1’	add 2’	
Downtown Jacksonville	-0.1’	2.1’			add 1’	add 2’	
Palatka	-0.2’	1.1’			add 1’	add 2’	
Green Cove Springs	-0.3’	0.8’			add 1’	add 2’	
Welaka	0.0’	0.5’			add 1’	add 2’	

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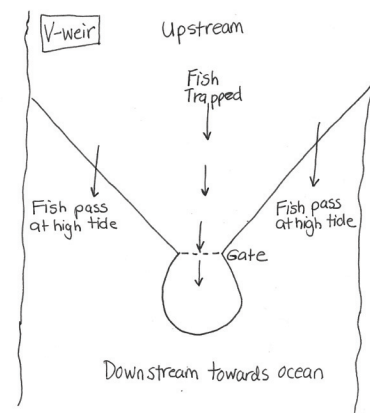
ACTIVITY – WEIR BUILDING continued:

INSTRUCTIONS, Part II: Based on your reading of the completed table, answer the following questions.

- 1) In this table, the weir locations are organized according to distance from the ocean. Mayport is closest to the Atlantic Ocean, while Welaka is far to the south, near Lake George, close to the start of the St. Johns River. Write a sentence describing how tidal changes differ as you move further and further from the ocean. Why do you think this occurs?

INSTRUCTIONS, Part III: Prepare your work space by adding a one-inch layer of sand to the bottom of a tray. This substrate will give you something to press your weir “poles” into. Your goal is to construct a weir that will funnel fish towards a trap located at the tail end of the weir. You may construct one of three basic weir types.

- 1) A V-weir was usually placed in a creek or small river in order to catch fish moving downstream. This can be used in both tidal and non-tidal situations. The wide end of the V is pointed upstream, nice and open for the fish to swim into. The V narrows as the fish move downstream until it funnels them into an enclosure at the end. These enclosures could be made with gates that formed a pen, allowing the Timucua to return and collect the fish days later if desired. If a pen was used, the walls of the pen had to be taller than the high tide level, or the fish could just swim out. If you build this kind of weir, the funnel walls should be short enough to allow fish to pass freely across at high tides, but tall enough to block them at low tide.

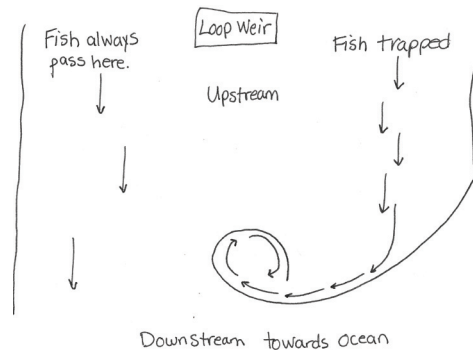


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BUILDING TECHNOLOGY

ACTIVITY – WEIR BUILDING continued:

- 2) A loop-weir, instead of spanning an entire large river, extends from one bank out into the middle. These fences probably started in the marsh grasses at the edge, and curved out towards the middle in a downstream direction. Then they curved all the way around to create an almost-closed loop at the end which contained the fish. Many fish species will become disoriented and continue to swim loops even if the trap is not gated.



- 3) The labyrinth-weir described by Ribault and Laudonnière is a variation on a loop-weir. Instead of the gently curving loop trap at the end, the Timucua may have added several twists and turns, so that fish became disoriented and got stuck at the dead ends in the maze.

Getting Started: Think about which weir you plan to build and the shape that your weir will take. You can create a V-shaped fence with an enclosure, a curved loop-weir, or a more complex labyrinth-weir of your own design. Draw a sketch of your weir plan. Be sure to label the direction of the tidal flow, noting upstream (inland) and downstream (towards the ocean). Using your fingers, break popsicle sticks into appropriate lengths and press the sticks into the sand. When you start inserting the sticks, they should not actually be touching. Water needs to flow freely through the weir - or the pressure of the tidal flow will eventually damage the structure. Add water to an approximate depth of one inch above the sand level. You can use a dry Cheerio to represent a fish. To simulate the fish swimming with the tide, nudge the Cheerio along with a pencil.

Testing Your Weir: Start with a fresh Cheerio. Set it afloat and nudge it along downstream. Does the weir trap the fish as planned? If not, what's wrong? Is the water level too high or low? Change it. (In real life, this would mean building a taller or shorter weir, since you can't actually alter the levels of the tides.) With this change, does your weir function better? Did your fish get caught between the slats of your weir? Alter the stick placement to fix the problem. Could the fish too easily escape the loop-style weir? How can you alter your plan to fix the problem? Did the labyrinth-style weir capture fish effectively? Does it work any better than the simpler loop-weirs made by classmates?

CHAPTER SEVEN

BUILDING TECHNOLOGY

ACTIVITY – WEIR BUILDING continued:

Results: Your weir is meant to be a work in progress with continual changes until you are happy with the way it is working. Native peoples did not invent this technology overnight. It was tested and modified over thousands of years until it became a well-perfected fishing technology. On the lines below, describe your weir. Explain problems encountered during the weir-building process and how you overcame them. In the box, draw a line sketch of your weir. Use arrows to show how fish can be trapped in this weir, and how they can pass safely. (Catching every fish would destroy the fish population you depend on for food.) Be sure to label your weir as a v-weir, loop-weir, or labyrinth-weir. Note which direction is upstream and which is downstream.

