Investigating a Light Station

Instructions for the Teacher

Written by
Lianne Bennett, M.Ed.
Sarah Bennett, M.A.

With Support from
Sarah Miller – Florida Public Archaeology Network
Brenda Swann – St. Augustine Lighthouse & Maritime Museum
This project has been financed in part with historic preservation grant assistance provided by the Bureau of Historic Preservation, Division of Historical Resources, Florida Department of State, assisted by the Florida Historical Commission. However, the contents and opinions do not necessarily reflect the views and opinions of the Florida Department of State, nor does the mention of trade names or commercial products constitute endorsement or recommendation by the Florida Department of State.

Acknowledgments
We generously thank Sarah Miller of the Florida Public Archaeology Network (FPAN) for authoring the grant. We extend equal thanks to the Division of Historical Resources for awarding funds for the production of Project Archaeology: Investigating a Light Station. We also appreciate the guidance provided by St. Augustine Lighthouse & Maritime Museum (SAL&MM) staff, particularly Brenda Swann and Barbara Holland. Duncan Bullock, responsible for many of the illustrations, we appreciate you, too!

Wilma Daniels, daughter of Lightkeeper Cardell Daniels, and Greg Smith, one of the Environmental Services, Inc. archaeologists who excavated the light station site, also deserve credit. Thanks to both of you for providing us with enthusiasm, stories, and great ideas. The curriculum benefitted from these “meetings.”

Thanks to those who reviewed the curriculum draft:
Jeanne Moe, Project Archaeology
Crystal Alegria, Project Archaeology
Sarah Miller, Florida Public Archaeology Network
Della Scott Ireton, Florida Public Archaeology Network
Kevin Gidusko, Florida Public Archaeology Network
Emily Jane Murray, Florida Public Archaeology Network
Brenda Swann, St. Augustine Lighthouse & Maritime Museum
Barbara Holland, St. Augustine Lighthouse & Maritime Museum
Amy Zengotita, Town of Ponce Inlet

Photo Credits
Thanks to the St. Augustine Lighthouse & Maritime Museum, Greg Smith and Environmental Services, Inc., the State Archives of Florida, Florida Memory, St. Johns County Government for use of photographs and documents. Unless otherwise noted, photos are property of the authors, Lianne Bennett and Sarah Bennett, or graphic designer, Duncan Bullock.
Photo courtesy of the SAL&M
Part Two: History
Instructions for the Teacher

Materials
For Each Student
- “Investigating a Light Station: Part Two” (Archaeology Notebook, pages 9-18).

Preparing to Teach
1. Make a copy of “Investigating a Light Station: Part Two” for each student.
2. Post the Word Bank words.
3. Cut two 6-feet long pieces of rope or light string. Measure 3 feet from one end of each string and tie a knot.
4. Project “Aerial Photograph of the St. Augustine Light Station” (page 22).
5. Make one copy of the “St. Augustine Light Station Timeline Activity” (page 24).

Word Bank
automated: to run or operate something by using machines or computers instead of people doing the work
buoys: float attached by line to the bottom of a river, lake, or ocean that mark important locations and help
with navigation
daymark: unique color pattern, shape, and height of each individual lighthouse
diameter: the length of a line passing through the center of a sphere Frenel (fray-NEL) lens: a type of compact lens for lighthouses
light station: the lighthouse, the keepers’ house, and other structures
lighthouse: a tower with a bright light on the top
log: an official daily record of activities and behavior; similar to a journal
nightmark: distinct pattern of the light at night for each individual lighthouse
prisms: geometric shapes that can be used to bend light
remote: far away from; distant; secluded

Discover New Knowledge
1. Go over the cover sheet information for PART TWO and look at the data sources students will use in
their investigation.
2. Remind students that they are now studying people who lived almost 100 years ago when life was very
different from our lives now. Sometimes life in earlier times may seem primitive, but people must use what is
available to them and often find creative solutions to challenging problems. Students should be reminded that no
culture or time in history is better than another.
3. Project image of “Aerial Photograph of the St. Augustine Light Station.” Point out to students where the
keepers’ quarters are in respect to the lighthouse. Ask the students why they believe the lighthouse and the
keepers’ quarters were placed this way. List their responses on a chart.
4. Students continue working with their partners to complete “Historic Photos of the Light Station.”
5. Students continue working with their partners to complete “History of the St. Augustine Light Station.”
6. Assist students with defining automated, daymark, diameter, light station, lighthouse, nightmark, and prisms.
7. Lighthouse Lens Activity
   a. Project the First Order Fresnel lens picture (page 6).
   b. Go outside with the class.
c. Ask students: What is the diameter of the Fresnel lens at the St. Augustine Light Station?
d. Have students estimate a circle with a diameter of 6 feet. If you have a large class, make two circles.

8. Have students read “Keeper Culture.” Tell them that understanding what archaeologists have searched for in the past is part of the historic research we must do before we begin a new investigation.
9. Assist students with defining [buoys, log, and remote]. Address students’ questions as appropriate, but remind them that some of their questions will be answered as the investigation proceeds.
10. Students analyze the data in teams of two.
11. Introduce the “St. Augustine Light Station Timeline Activity.” Students continue to work in teams. Distribute a Timeline card to each team. Students refer to the text in order to find the appropriate date for the event listed on their card. Each team fills in the date and illustrates their event on the back of their Timeline card. When finished, students will arrange themselves chronologically to create a human timeline. Students may also adhere the cards to a board or to the wall in chronological order.
Aerial Photograph of the St. Augustine Light Station

Aerial view of keepers’ dwelling (brick structure with chimneys), oil house (red roofed structure attached to the lighthouse), and the lighthouse (with its distinctive daymark). The keepers’ dwelling is 70 feet east of the lighthouse.

Photo courtesy of the SAL&MM
Answer Key for “Historic Photos of the Light Station: Observing and Collecting Data” (page 12)

1. **Photo #1** – people, a woman, three children, an umbrella/parasol, rocks, ruins, a building, water, sand, a hat, clothes
   **Photo #2** – a man, a child, a hat, a clock, clothes, metal, wires, a bell, technology, hangers, buttons, knobs, gears
2. **Photo #1** – rocks; students may infer water or sand.
   **Photo #2** – metal, wood, wire, paint
3. **Photo #1** – There are children in the water and a woman is standing on the beach. All of the younger people are looking toward the camera. The woman is not. It is possible they are posing, but not formally.
   **Photo #2** – The child is playing; his hand is blurry so it is moving. The man is staring, but not at the camera. He might be smiling because of the child. They do not seem to be posing for the photo. They are not looking at the camera. Both people seem to be doing something else.
4. **Photo #1** – It might be spring or summer because everyone is at the beach. The weather and water would probably be too cold in the winter. Their clothes may not tell us much because swimsuits look different nowadays. It is probably late afternoon because their shadows are long. Also, the woman is using her parasol.
   **Photo #2** – Again it might be a warmer time of year. Keeper Cardell Daniels rolled up his shirt sleeves. The clock looks like it may point to 1:00. It is probably in the afternoon. A child would probably not be up at 1:00 in the morning and it looks like the sun is casting a shadow on the wall.

Answer Key for “Historic Photos of the Light Station: Analyzing and Interpreting the Data” (page 13)

1. **Photo #1** – This could be a vacation keepsake. It could also be a postcard shot for the City of St. Augustine. It could be a family day at the beach.
   **Photo #2** – This looks like a portrait, but not done by a professional photographer. A family member took a photo to remember Keeper Daniels and the child at play.
2. **Photo #1** – People have always enjoyed the beach. They used to dress differently at the beach. They also protected themselves from the sun differently. Maybe this was a popular sightseeing spot because of the first lighthouse ruins.
   **Photo #2** – Keepers were held to high standards. They still played with their children. They did not dress nicely all the time. Clocks and other technology used to be bigger/look different.
3. Answers will vary.
4. Visit or contact the St. Augustine Light Station; Search books or the internet for information on the site or the time period; Ask local experts (historians, archaeologists, and descendants).
5. **Similarities**: The people do not appear to be posing. Children are playing in both photos. The adults are doing something else. The photos show things that we use today, but they look different (bathing suits, parasol, the clock, technology, knobs and buttons).
   **Differences**: The first photo was taken outside and has the first lighthouse ruins in the background. The second photo was taken inside the current lighthouse.

Answer Key for “History of the St. Augustine Light Station: Analyzing the Data” (page 18)

1. Keepers earn an efficiency star by maintaining the light station and keeping the property clean, orderly, and operating. Keepers wore the efficiency star for one calendar year.
2. He has 4 gallons of paint and needs 10 more gallons to complete the lighthouse. Fourteen gallons of paint are needed.
3. Answers will vary.
4. Answers will vary.
# St. Augustine Light Station Timeline Activity

<table>
<thead>
<tr>
<th>The earliest known lighthouse was built in Egypt over _______ years ago.</th>
<th>The British colonists built the lighthouse in Boston in _______.</th>
<th>The first lighthouse in St. Augustine, and Florida, was lit in _______.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Spanish settled St. Augustine in _______.</td>
<td>The Spanish used coquina to fortify their wooden watchtower on Anastasia Island in _______.</td>
<td>The Lighthouse Board, in _______, decided that St. Augustine needed a new lighthouse.</td>
</tr>
<tr>
<td>Keeper William Russell lit the lamp in the new lighthouse in _______.</td>
<td>In _______, the lighthouse began to use electricity.</td>
<td>In _______, the Coast Guard automated the lighthouse and keepers and their families no longer lived at the light station.</td>
</tr>
</tbody>
</table>
Answer Key for “St. Augustine Light Station Timeline Activity” (page 24)
1. The earliest known lighthouse was built in Egypt over 2,000 years ago.
2. The Spanish settled St. Augustine in 1565.
3. The British colonists built the lighthouse in Boston in 1716.
4. The Spanish used coquina to fortify their wooden watchtower on Anastasia Island in 1737.
5. The first lighthouse in St. Augustine, and Florida, was lit in 1824.
6. The Lighthouse Board, in 1870, decided that St. Augustine needed a new lighthouse.
8. In 1936, the lighthouse began to use electricity.
9. In 1955, the Coast Guard automated the lighthouse and keepers and their families no longer lived at the light station.
Investigating a Light Station

Archaeology Notebook

Name of Student Archaeologist

In this investigation you will use geography, history, and archaeology to learn about a Florida light station and the people who lived there. You will look at historic photographs and read oral histories. You will “make” an archaeological site and classify artifacts. You will infer how the geography of Florida shaped the light station. You will use what you learned to plan and draw a shelter that meets the needs of multiple lightkeepers and their families. In a final composition you will report what you learned.
Investigating a Light Station:  
Part Two: History

Archaeology Notebook

You are an archaeologist. Your question is:

How can investigating a light station help us understand the culture of keepers and their families?

Investigation Activities

1. Examine “Historic Photographs of the Light Station” (pages 10-11).
2. Complete data collection sheet for the “Historic Photographs at the Light Station” (pages 12-13).
4. Read "Keeper Culture" (page 17).
5. Complete the data collection sheet for “The History of the St. Augustine Light Station” (page 18).
6. Complete the “St. Augustine Light Station Timeline Activity” (teacher).

Data Sources

Historic Photographs at the Light Station (page 10-11).
History of the St. Augustine Light Station (pages 14-15).
Department of Commerce Primary Documents (page 16).

Word Bank

automated: to run or operate something by using machines or computers instead of people doing the work
buoys: floats attached by line to the bottom of a river, lake, or ocean that mark important locations and help with navigation
daymark: unique color pattern, shape, and height of each individual lighthouse
diameter: the length of a line passing through the center of a sphere
Fresnel (fray-NEL) lens: a type of compact lens for lighthouses
light station: the lighthouse, the keepers' house, and other structures
lighthouse: a tower with a bright light on the top
log: an official daily record of activities and behavior; similar to a journal
nightmark: distinct pattern of the light at night for each individual lighthouse
prisms: geometric shapes that can be used to bend light
remote: far away from; distant; secluded
Historic Photographs at the Light Station

Photo #1: Swimmers with the first St. Augustine Lighthouse coquina ruins in background, circa late 1880s
Photograph courtesy of the St. Augustine Lighthouse & Maritime Museum (SAL&MM)
Historic Photographs at the Light Station

Photo #2: Keeper C.D. Daniels and child in the lantern’s Rotation Room
Photograph courtesy of the SAL&M
Name ____________________

**Historic Photos of the Light Station: Analyzing the Data**

*Examine the historic photographs of the light station and answer the following questions.*

**Observing and Collecting Data**

1. List the objects you see in the photographs.
   - Photo #1
   - Photo #2

2. What materials were used to build the light station structures?
   - Photo #1
   - Photo #2

3. What are the people doing? Are they posing for the picture? What makes you think so?
   - Photo #1
   - Photo #2

4. When do you think each picture was taken (time of day, season)? What makes you think so?
   - Photo #1
   - Photo #2
Analyzing and Interpreting the Data

1. Why do you think the photos were taken?
   Photo #1 Photo #2

2. What does each picture tell you about the past? What is your evidence?
   Photo #1 Photo #2

3. What questions do you have about the photographs?
   Photo #1 Photo #2

4. How could you get more information to answer your questions?

5. How are the photographs different? How are they the same?
History of the St. Augustine Light Station

A **lighthouse** is a tower with a bright light on the top. It helps warn sailors of dangerous areas and serves as a navigational aid that helps to keep ships and boats safe. A **light station** includes the lighthouse, the keepers' house, and other structures. These buildings helped lightkeepers carry out their duties.

The earliest form of lighthouses was probably bonfires on the beach. The earliest known lighthouse was built in Egypt over 2,000 years ago. Archaeologists have found the remains of more than 30 lighthouses built by ancient Romans. The first British colonial lighthouse is located in Boston, Massachusetts. It was built in 1716. The first lighthouse in Florida is located in St. Augustine. It was lit in 1824.

When the Spanish settled St. Augustine in 1565, they built wooden towers along the coast to defend the city. It is possible that Spanish soldiers used bonfires to light their watchtowers; doing so made the watchtowers an early form of a lighthouse. No evidence of them remains today. In 1737, the Spanish used coquina to fortify the wooden watchtower on Anastasia Island. When the British took over Florida, they made the wooden watchtower taller. They also may have used bonfires to light the tower. A keeper’s house was added to the watchtower when Florida became a part of the United States. This became Florida's first lighthouse and first light station.

In 1870, the Lighthouse Board decided that St. Augustine needed to construct a new lighthouse. Land erosion threatened the coquina tower. In 1874, keeper William Russell lit the lamp in the new lighthouse. The lighthouse stands 165 feet tall. The **daymark** is a black and white spiral on the tower with a red lantern on top. Ships near the shore used it as a landmark during the day. Until 1936, the lightkeeper carried oil up 229 stairs to keep the light lit. After 1936, the lighthouse became electrified. The US Coast Guard automated the lighthouse in 1955. Keepers and their families no longer needed to live at the light station.

In 1870, the Lighthouse Board decided that St. Augustine needed to construct a new lighthouse. Land erosion threatened the coquina tower. In 1874, keeper William Russell lit the lamp in the new lighthouse. The lighthouse stands 165 feet tall. The **daymark** is a black and white spiral on the tower with a red lantern on top. Ships near the shore used it as a landmark during the day. Until 1936, the lightkeeper carried oil up 229 stairs to keep the light lit. After 1936, the lighthouse became electrified. The US Coast Guard automated the lighthouse in 1955. Keepers and their families no longer needed to live at the light station.

An important part of the lighthouse is the **Fresnel lens**. The lens is made of many **prisms** that are mounted in a steel frame. The lens arrangement makes light from the lighthouse lamp act as one strong beam. The St. Augustine lighthouse has a first order Fresnel lens and uses a 1000 watt bulb. The lens consists of 370 hand-cut glass prisms. They are arranged in a beehive shape that is 9 feet tall and 6 feet in **diameter**. The
The **nightmark** is one fixed white flash every 30 seconds, which can be seen up to 24 miles away. It is used after sunset because nighttime is the most dangerous time for ships to navigate.

Daymarks and nightmarks make every lighthouse unique. The daymark is the paint color and pattern on a lighthouse. The nightmark is a distinctive light pattern that is fixed and flashes or rotates and flashes. Each distinctive daymark and nightmark can be seen from the sea and are used by sailors so they know where their ships are located along the coast.

**Distinctive Daymarks**

In the space below, describe the daymark for each lighthouse.
Document 1. The efficiency star was awarded to encourage efficiency and friendly rivalry among lightkeepers. Inspectors graded the keeper on the light station condition and operation.

*Document courtesy of the SAL&MM*

---

Document 2. Lightkeepers requested supplies from the government. Note the U.S. Coast Guard’s “Received” stamp on the right side of the letter.

*Document courtesy of the SAL&MM*
Keeper Culture

Lightkeepers’ primary duty was to keep the lamps trimmed and burning. This meant that the light was lit and working so that ships could navigate safely. If the keeper was ill or had to be away from the light station, sometimes the wives, sons, and daughters kept the light burning. Keepers also repainted the outside of the tower and scraped and painted the ironwork inside the tower. The keepers and their families took care of the lighthouse grounds and buildings. Lighthouse inspectors came to check on the keeper’s work. When they passed inspection, the keeper received an efficiency star. Keeper responsibilities included tending to buoys. If a ship wrecked, the keepers rescued the people on board. They kept a log to note the activities at the light station.

Cardell Daniels’ log refers to constructing and repairing stables, chicken coops, and barnyard enclosures. There are references to gardens, but not specific crops. The log frequently mentions digging holes for trash.

Schooling was important for children who lived at light stations. Some families taught their children at home if no school was near. Other kids stayed with family on the mainland during the week if the lighthouse was remote. They returned home to the light station on the weekend. Other lighthouse kids traveled by boat to get to the school bus stop. Wilma Daniels rode the bus to attend school in St. Augustine.

At home, children did chores before they could play. They cleaned the lantern windows around the lens, washed floors, cared for the animals, and worked in the garden. They explored and played on the light station grounds. Boating, fishing, swimming, and digging for clams or oysters were popular activities. Building models, playing with dolls, and learning to knit and crochet were other interests. Wilma Daniels liked to play with her dolls, ride her tricycle, or play outside with her brother, Cracker.

For many lightkeepers and their families, life was remote. When the mail came, it was the highlight of the day because it was a chance to visit with friends. The US Lighthouse Service provided a Traveling Library which contained all sorts of books. Light stations shared these portable libraries. The Lighthouse Service provided each family with a chest containing basic medical supplies like iodine and tooth pullers because doctors usually did not live near the light stations. For the Daniels family, these things were not necessary. The St. Augustine Light Station was located close to the city. Keepers and their families had a regular mail schedule and had access to the city library and local doctors.

Cardell Daniels stands in front of the keepers’ quarters while in uniform.

Photographs courtesy of the SAL&M

Keeper Cardell Daniels, his wife, Grace, and daughter, Wilma, pose on a buoy.
Name _______________

History of the St. Augustine Light Station: Analyzing the Data

1. According to Document 1, how do keepers earn an efficiency star? How long can the keeper wear the star?

2. According to Document 2, how many total gallons of black paint are needed to finish painting the lighthouse? Why is additional paint needed?

3. What else would you like to know about everyday life at a light station?

4. Draw a picture of life at St. Augustine Light Station using the information provided in the “History of the St. Augustine Light Station” and “Keeper Culture.” Write a caption for your drawing.