



## Discovering our Nation's First National Marine Sanctuary – Monitor National Marine Sanctuary Diver

### Lesson Specifications

#### Grade Level

3<sup>rd</sup> to 7<sup>th</sup> grade

#### Timeframe

2 to 3 hours

#### Prerequisites

Sanctuary Guardian Diver

#### Materials

##### Lesson

- PowerPoint presentation
- Computer and projector
- Dark-colored balloons filled with various materials; rice, flour, beans
- Sidewalk chalk or premade shipwreck for pool deck
- Premade shipwreck for underwater OR strong, waterproof adhesive tape
- 30-foot measuring tapes
- Shipwreck artifacts
- One clipboard per group – see preparation section for details
- Tape
- One 6-foot measuring tape per group

##### Scuba

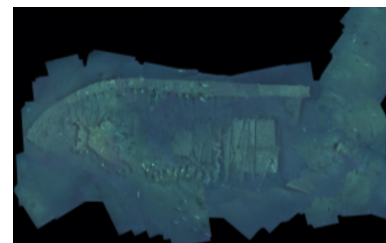
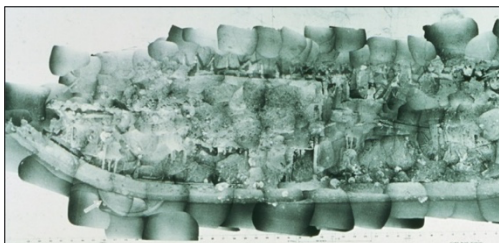
- All required scuba gear

##### Space/ Location

- classroom
- pool

#### Key Words

Maritime archeology  
Baseline  
*In situ*  
Site plan  
Bow  
Port  
Starboard  
Stem



Left: First photomosaic created of the USS *Monitor* wreck site in 1974. Right: Photomosaic created of the USS *Monitor* wreck site in 2006. Credit: NOAA

### Activity Summary

This lesson introduces students to Monitor National Marine Sanctuary and the importance of maritime archaeology. Students will learn the process used by maritime archaeologists to map shipwrecks by creating a site plan that gives a general outline of a shipwreck, interpreting the data collected to make inferences about the ship and its crew and to learn about the past. Students will also learn about actions divers can take to minimize threats to maritime heritage sites, such as shipwrecks.

### Essential Questions

1. What is maritime archeology, and why is it important?
2. What is a site plan?
3. How does documenting shipwrecks and making inferences about artifacts help maritime archeologists learn about the past?
4. Why is it important to protect and conserve shipwrecks?
5. What can you do to protect these important maritime resources?

### Learning Objectives

Students will be able to:

- Define maritime archaeology and describe its importance to our national maritime heritage.
- Draw a site plan to scale and explain how maritime archeologists use a site plan to document a shipwreck.
- Study the artifacts to learn about the past.
- Generate at least one action that divers can take to minimize threats to shipwreck sites.

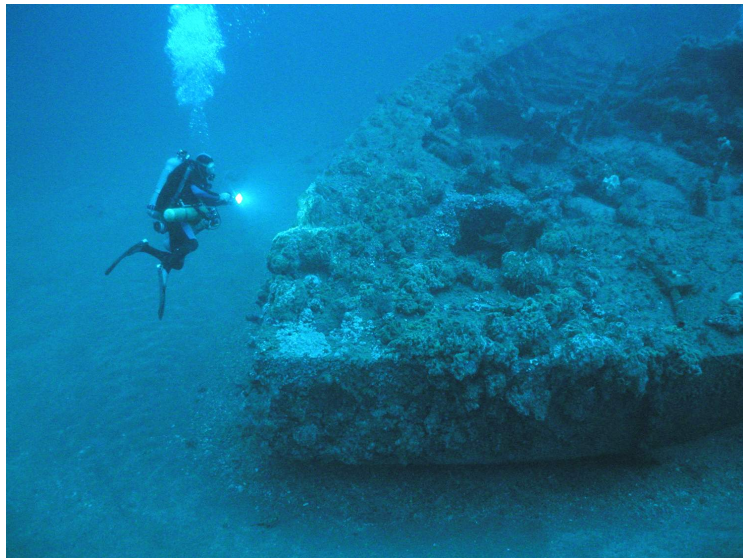
## Monitor National Marine Sanctuary Diver Performance Requirements

At the surface students will:

- Streamline gear prior to entry.
- Demonstrate proper descent techniques and awareness of the environment.
- Review hand signals necessary for the dive.

Underwater, students will:

- Locate and safely approach a mock shipwreck.
- Work in teams of two to record the necessary information to create a site plan of a mock shipwreck.



USS *Monitor*'s bow (2008) Photo: NOAA, *Monitor Collection*

### Background Information

Monitor National Marine Sanctuary is one of the marine protected areas in the National Marine Sanctuary System. These special underwater places are protected for their biological, ecological, and cultural significance.

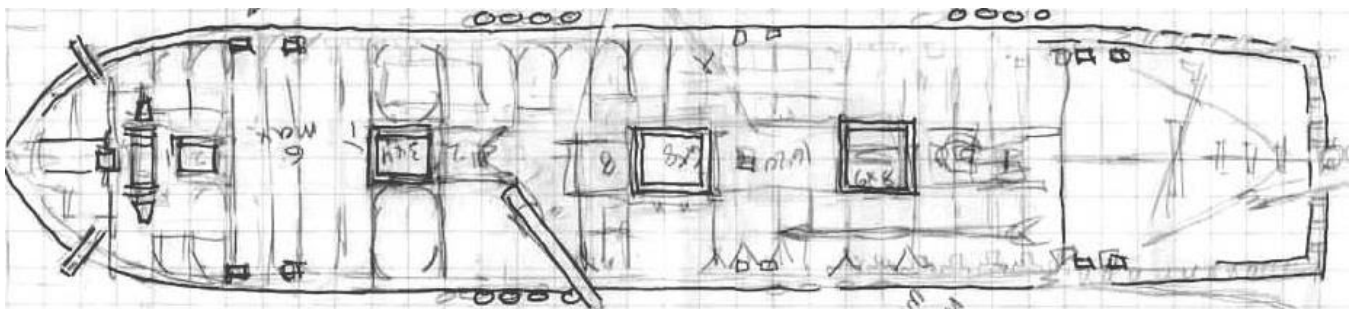
Monitor National Marine Sanctuary was designated as the nation's first national marine sanctuary on January 30, 1975. The site is named after the wreck of USS *Monitor*, a Civil War ironclad, that was designed by Swedish-American engineer, John Ericsson. The vessel contained all of the emerging innovations that revolutionized naval warfare in the 19th century. Today, the ship lies deep beneath the ocean surface off the North Carolina coast about 16 miles south-southeast of Cape Hatteras.

With *Monitor* resting at 230 feet deep, diving on the wreck site is limited to technical divers. However, there are several places on land that you can visit to learn more about this historical ship. The official visitors center is The Mariners' Museum and Park in Newport News, Virginia. Visitors to the museum can be a part of the action in the high-definition Battle Theater, walk on the deck of a full-scale *Monitor* replica, and get a bird's eye view of *Monitor*'s turret and other large artifacts while watching conservation in action.

Maritime archaeology is the study of past human connections with an emphasis on how humans interacted with the world's ocean, lakes, and river systems. In an effort to better understand our maritime heritage, maritime archaeologists may document a wreck site using a variety of tools, such as sonar imaging, photos, videos, and/or by physically mapping the shipwreck. Once a shipwreck is documented and mapped, a scaled drawing, called a site plan, is created to show the shipwreck and its artifacts as they lie at that moment in time. A site plan focuses on basic dimensions of the wreck site,

along with the location of major features and artifacts. It can provide an overview of the site that aids maritime archaeologists in planning a more thorough and detailed documentation of the site.

Education Standards	
Dive Industry Standards	PADI Wreck Specialist SSI Marine Life Ranger NAUI Junior Scuba Diver
Ocean Literacy Principles	6. The ocean and humans are inextricably interconnected. (C)
Climate Literacy Principles	n/a



Example of a site plan

Vocabulary	
Maritime archaeology	A discipline that studies human interaction with the sea, lakes, and rivers through the study of vessels, shore side facilities, cargoes and human remains
Baseline	Reference line running along the length of a ship through the center from the bow to the stern
<i>In Situ</i>	In its original place or position
Site plan or Shipwreck Map	A general sketch of a shipwreck that focuses on basic dimensions of the wreck and the location of major features and artifacts
Bow	Front of a ship
Port	Left side of a ship when facing the bow
Starboard	Right side of a ship when facing the bow
Stern	The back of the ship

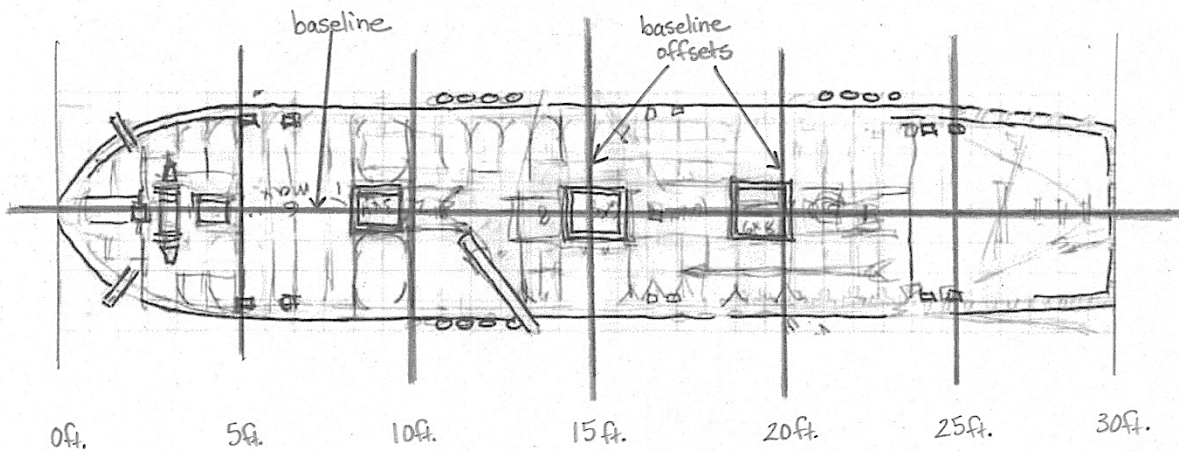
## Preparation

Prior to beginning the activity, review the lesson plan, PowerPoint presentation, and other materials to determine how best to use it with your students.

For the observation and inference activity, prepare enough dark-colored balloons (black works best) for each pair of students. The balloons should be filled with uncooked rice, cornmeal, oatmeal, popcorn, or other small items. Do not overfill and tie each balloon tightly.

Before the activity, the instructor will prepare the mock shipwreck site on the pool deck using sidewalk chalk or tape. An alternate and reusable option is to draw a shipwreck on a flat bedsheet, which is best done with two twin sheets attached end-to-end. The site plan should be about 30 feet long and no wider than 12 feet with the baseline and sections already marked. See example below. Before beginning the activity have students identify bow, stern, port, and starboard.

The number of sections can be modified based on the length of the mock shipwreck and/or number of students participating in the activity. (Example: For 24 students (12 teams of two), divide 30 feet into six 5-foot sections for a total of 12 sections [starboard and port] with two students per section.)



Starboard: Group 1 (0-5 feet), Group 2 (5-10 feet), Group 3 (10-15 feet), etc.

Port: Group 1 (0-5 feet), Group 2 (5-10 feet), Group 3 (10-15 feet), etc.

Note: In this pool deck activity, each section will have one or two artifacts for the team to document, thus allowing the team to practice documenting multiple artifacts underwater in the pool activity.

Students will use a clipboard for both the pool deck and underwater activities. It is suggested that the instructor prepare the clipboard for the underwater activity and then use it for the pool deck activity as well.

- Underwater Clipboard: One clipboard is needed for each team, along with a 6-foot tape measure. *\*Another option for the tape measure is 50 m Fiberglass Metric Long Tape that won't rust underwater.*
  - To prepare a waterproof clipboard for each section of the shipwreck, place the appropriate log sheet on the clipboard and overlay the log sheet with waterproof paper, such as Mylar\*. Make sure the shiny side of the paper is facing down. Use waterproof tape to secure all edges to prevent water from seeping under the waterproof paper.

Attach a pencil using string or rubber tubing. Optional – Attach a tape measure to the board.

- Pool Deck Clipboard: For this activity, you will use a paper copy of each log sheet. Therefore, use the underwater clipboard and just place a paper copy of the log sheet on top of the waterproof paper.

*\*The inclusion of product names in this guide does not imply endorsement or support of any product, services, or providers.*

## Procedure

1. Show the first seven PowerPoint slides to the students providing background information on Monitor National Marine Sanctuary, USS *Monitor*, the role of maritime archaeology in the study of our nation's heritage, and the use of a site plan, created by maritime archaeologists, to document a shipwreck.
2. Ask the following essential questions to pre-assess the students' understanding. These questions will also be used at the end of the dive lesson to assess student learning.
  - What is maritime archeology, and why is it important?
  - What is a site plan?
  - How does documenting shipwrecks and making inferences about artifacts help maritime archeologists learn about the past?
  - Why is it important to protect and conserve shipwrecks?
  - What can you do to protect these important maritime resources?

## Activity A: Observation and Inferences

Prior to beginning the activity, assess students for understanding of observations and inferences.

1. To help students differentiate between making observations and making inferences, do a short activity to explain the difference.
  - Provide each pair of students with a dark-colored balloon filled with a material, such as flour, sugar, oatmeal, salt, beans, rice, etc.
  - Review the five senses - sight, taste, smell, hearing, and touch.
  - Ask the students to use their five senses to make observations. For example, it is black, it has an oval shape, it smells like rubber, it is soft or squishy, items inside are pointed/sharp, and so on. Accept any observation, but be sure it is NOT an inference.
  - Based on their observations, ask the students to make an inference (an educated guess) about what is inside their balloon. Correct answers will be what is inside the balloon.

- Explain to students that an observation is what we observe with our five senses (see, feel, smell, hear, or taste) and an inference is a judgement or decision (conclusion) based on logical observations.
- When maritime archaeologists map a shipwreck, they use both observations and inferences. They must astutely observe the wreck site as they do detailed drawings of the site. They can use the drawings, along with photos, videos, and sonar imaging to make inferences that will give additional insight into the ship and its crew and passengers.

## Activity B: Creating a Site Plan on the Pool Deck

1. Use PowerPoint slide #8 and #9 to explain the purpose of mapping a shipwreck to create a site plan and how the site plan helps archaeologists study the site. Explain that it is an overview of the shipwreck's dimensions and placement of key artifacts. Help to understand that after the basic site plan is created, maritime archaeologists use other data, such as sonar images, photos, video, and computer programs to create a comprehensive detailed drawing of the wreck.
2. Group the students into teams of two with one as *measurer* and the other as *recorder*. Explain that each team will be assigned a section of the ship to map. Explain that dividing into teams is the most efficient manner to document a shipwreck because of the limiting factors of diving, such as the depth of the water, limited time underwater, size of the wreck, visibility, and others.
3. Use slide #10 to explain the vocabulary for the parts of a ship and how maritime archaeologists first run a baseline or transect down the center of the wreck to divide it into port and starboard. Use slide #11 to show how the ship is further divided into 5-foot sections and assign each team a section of the shipwreck to survey and document.
4. Use slides #11 and #12 to identify the shipwreck's baseline/transect (length) and baseline offsets (width). In addition, point out the key features and/or artifacts. To check for understanding, ask each group what section they are documenting and have them respond with their position. For example, group 2 says "port side 5 to 10 feet."
5. Give each group a measuring tape, a dive clipboard with an attached pencil, and a paper log sheet attached on top of the waterproof paper. Tell the students they will measure using inches and feet.
6. Use slides #13 to #16 to explain how to measure a shipwreck section and the artifacts contained within.
7. Tell the teams to find their respective sections of the "shipwreck," and check to make sure each team is in the right location. Allow teams time to practice documenting their artifact, while instructor monitors and provides guidance if needed.
8. Once the students finish measuring and sketching the artifacts, have them bring their clipboards together in order to put the log sheets together to create a "site plan" of the shipwreck. You will need to fold or cut the log sheets to fit them in order. See slide #17 and #18 as references.

Students are now ready to do the activity underwater in the pool.

## Pool Mission

At the surface students will:

- Streamline gear prior to entry.
- Demonstrate proper descent techniques and awareness of the environment.
- Review hand signals necessary for the dive.

Underwater, students will:

- Locate and safely approach a mock shipwreck.
- Work in teams of two to record the necessary information to create a site plan of a mock shipwreck.

## Preparation for Pool Mission

Set up the mock shipwreck underwater:

1. Prior to the mission, the instructor will set up the underwater environment in the pool by creating a mock shipwreck on the pool floor. To do so, use dark colored rope and weights or waterproof tape to create an outline of a shipwreck at the bottom of the pool. Shipwreck outline should not be more than 12 feet wide.
2. To help students easily find their section of the shipwreck, use colored tape to mark off 5-foot sections along each edge of the pool (PORT and STARBOARD).

### **Artifacts**

1. To add non-glass artifacts, place 3-dimensional objects to represent key artifacts on the shipwreck or draw artifacts on the pool floor with waterproof adhesive tape. Possible groupings of artifacts may include galley (pots, pans, dishes), passenger cabins (personal items, such as comb, brush, jewelry, toys), engine room (tools), and cargo (shoes, lumber, toys). Place the objects in the pool.
2. Check out these two links for examples of artifacts found on the *USS Monitor*:  
<https://monitor.noaa.gov/150th/artifacts.html> and  
<https://monitor.noaa.gov/150th/sailors2.html>.

### **Prepare dive clipboards**

1. Use the underwater clipboards from the preparation section on page 4. One clipboard is needed for each team along with a 6-foot tape measure. \*Another option for the tape measure is 50-meter Fiberglass Metric Long Tape that won't rust underwater.

## Activity C: Pool Mission

1. Before the pool dive, assist the students in developing a dive plan that outlines their tasks underwater. Remind students that as divers, they cannot speak underwater while taking measurements, so they must communicate using pre-arranged hand signals. As a class or as a

team, have the students determine what hand signals each **measurer** will use to communicate the length to the **recorder**.

2. Prior to pool entry, explain to the students that time is limited underwater. Set a specific time and monitor the time with a stopwatch.
3. Students will move along the edge of the pool deck and the underwater mock shipwreck to the appropriate section of the baseline that matches their specific section. For example: Port 0-5: Students stand on the port side of the pool at the bow of the ship and will map from 0 feet to 5 feet.
4. Students enter the pool. Underwater, the students will work in their teams to measure and document their section of the shipwreck, just as they did in the pool deck activity.
5. Student teams complete their documentation, and then exit the pool and remove their dive gear.

### Activity D: Putting the Pieces Together

1. Each team then transfers their sketches from the waterproof page to a paper copy on the appropriate corresponding log sheet.
2. Students come together as a class and align their log sheets as they did before, making sure that the port and starboard log sheets are in correct order. The log sheets need to be folded or cut in order for the grids to fit together. Tape all of log sheets together. The result will be a sketch of the mock shipwreck with key features and artifacts. Note any discrepancies in how the pieces fit together and discuss what might have happened.

### Discussion Questions

Use the following discussion questions with students:

1. What did you observe and document during the dive?

The students will discuss their observations of the mock shipwreck, artifacts, and/or the site plan. Remind students to only give observations (no inferences at this time). For example, the shipwreck was 30-feet long, the rope was black, a large box of wood was at the stern, etc. They should just state facts about what they observed and documented.

2. What inferences can you make about each section of the ship based on the observed artifacts?

Answers will vary depending upon the artifacts used. Possible answers are galley, passenger or crew cabins, engine room, or cargo.

3. What can you infer about the passengers or crew based on the artifacts you documented?

Answers will vary depending upon the artifacts used and how they were placed on the mock shipwreck.

4. Lead a discussion based on the students' observation and ask:

- a. What can you infer overall about the shipwreck?
- b. Did you observe any damage to the ship? If so, do you think it was from natural erosion? Battle? Storm? Explain how you drew your conclusion.



5. What can you infer from the location of the shipwreck and where it may have been going?  
(Use slide #3 with the map and point out the shipwreck.)

6. How do artifacts give a glimpse into the past and the culture of the people that were onboard? What do the key artifacts tell you about the ship, its crew, the culture and the time period?

Answers will be dependent upon the artifacts used for this activity.

### ***In Situ Discussion***

Lead a discussion of the importance of leaving shipwrecks *in situ*. A brief answer is given for each question, but answers will vary.

1. What does *in situ* mean?

*In its original place or position; to be left in place*

2. Why is it important to leave a shipwreck *in situ*?

*Shipwrecks are time capsules that preserve a specific moment in time. If items are taken from a shipwreck, part of its historical story is removed and can never be replaced.*

3. What would happen if divers took something from the shipwreck each time they dove on it?

*Over time, there would not be much left of a shipwreck making it difficult for maritime archaeologists to study the shipwreck.*

4. If artifacts are taken, how would the ship's story change? How could valuable information be lost to history?

*Artifacts help tell a ship's history and about the culture of the people who sailed on it. If they are removed, you lose a piece of the story, which could be a key to learning about the shipwreck. Some artifacts may seem irrelevant or trivial, but can actually offer invaluable information. For example, an inscription or a maker's mark on pottery can offer maritime archaeologists insight into the time period.*

5. What do you think people do with artifacts they take off shipwrecks? Are they properly conserved? Does it make a difference if they are not properly conserved? Why or why not?

*Some artifacts removed from shipwrecks by divers are put on display in their home or office and are often not conserved. Some artifacts if not properly conserved will deteriorate over time, destroying the object. Other answers will vary.*

Use slides #4 to #6 again to explain that shipwrecks are non-renewable resources, and each artifact helps to tell the complete story of the ship. When a ship sinks it is like a time capsule capturing that specific moment in time. If any of the artifacts are removed, then there would not be a comprehensive picture for maritime archaeologists to fully understand the ship, its crew, and its culture.

### **Wrap-Up**

To assess learning, instructor asks students the following question: (possible answers are in *italics*):

1. **What is maritime archaeology and why is it important?** *Maritime archaeology is the study of past human cultures with an emphasis on how humans interacted with the world's ocean, lakes, and river systems. It is used to interpret the material remains of these cultures, including ships and small craft, their crews and cargoes, and their shore-based facilities. Maritime archaeology is important because it helps us to better understand our past and how humans and the ocean are connected.*
2. **What do maritime archaeologists do?** *Maritime archaeologists work to find and study shipwrecks and other cultural resources to interpret the material remains of cultures.*
3. **What tools do maritime archaeologists use?** *Maritime archaeologists document a wreck site with sonar images, photos, videos, and/or by physically mapping the shipwreck.*
4. **How does a site plan help maritime archaeologist better understand a shipwreck?** *Site plans offer an overview of a shipwreck that helps maritime archaeologist study the shipwreck. It can aid in identification of unknown shipwrecks, and it can lead to a better understanding of what caused the ship to sink. It also gives us a better understanding of the craft, crews, cargos, and the culture of the time.*
5. **Why is it important to protect and conserve shipwrecks?** *Shipwrecks are nonrenewable resources. Once an artifact is taken from the ship or a part of the ship is destroyed, it can never be replaced. It is a missing piece of the ship's story and that limits maritime archaeologists' understanding of the ship and its culture.*
6. **Ask students: What do you think it means to “take only pictures and leave only bubbles?”** Discuss why this would be a good practice for divers? *Accept all reasonable answers.*
7. **What can you do to protect these important maritime resources?** *Accept any reasonable answer, but make sure students understand the call to action and the importance of not disturbing shipwrecks when they dive on them.*

Help students log the information from the dive in their Ocean Guardian Dive Club passports.

## For More Information

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## Resources

### Monitor National Marine Sanctuary

Read about USS *Monitor* to learn how it helped to save the Union, how and when it was discovered, and what is happening today to conserve its artifacts.

<https://monitor.noaa.gov>

### Monitor National Marine Sanctuary Education

Visit the Learn tab to access the Teacher section to download curriculum guides and lessons for maritime archaeology, World War I, World War II, USS *Monitor*, and more.

<https://monitor.noaa.gov/education/teachers.html>

### Monitor National Marine Sanctuary Shipwreck Pages

Visit the Shipwreck section of the website to 1) view and download dive slates and site plans; 2) watch videos of maritime heritage; and 3) read over 45 shipwreck stories accompanied by sonar images and current and historic photos.

<http://monitor.noaa.gov/shipwrecks/welcome.html>

### NOAA's Office of National Marine Sanctuaries

Learn about the unique underwater areas across U.S. waters that create the National Marine Sanctuary System. <https://sanctuaries.noaa.gov/>

### Sanctuaries' Maritime Archaeology

Visit this site to learn how maritime archaeology is the study of past human cultures with an emphasis on how humans interacted with the world's ocean, lakes and river systems.

<https://sanctuaries.noaa.gov/maritime/arch.html>

### NOAA's Maritime Heritage Program

Created in 2002, this program is an initiative of the Office of National Marine Sanctuaries that focuses on maritime heritage resources within the sanctuary system. Learn more about the expeditions, research, and how NOAA works to protect our nation's cultural resources.

<https://sanctuaries.noaa.gov/maritime/welcome.html>

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