Monitor National Marine Sanctuary
National Marine Sanctuary System

- Olympic Coast
- Greater Farallones
- Cordell Bank
- Papahānaumokuākea
- Hawaiian Islands Humpback Whale
- Monterey Bay
- Channel Islands
- American Samoa (U.S.) (Including Rose Atoll)
- Wisconsin - Lake Michigan
- Thunder Bay
- Stellwagen Bank
- Mallows Bay - Potomac River
- Monitor
- Gray's Reef
- Florida Keys
- Flower Garden Banks

Scale varies in this perspective. Adapted from National Geographic Maps.
Curriculum and More

• Overview of the Monitor NMS and Maritime Heritage Program

• *Shipwreck of the Deep*—Integrated curriculum developed in partnership with Newport News Public Schools

• *Maritime Archaeology: Discovering and Exploring Shipwrecks*—A guide integrated with social studies and STEM

• Other Educational Offerings—A variety of standalone activities and learning modules from Civil War to WWI
What was the USS Monitor?

An Innovative Warship Built in less than 100 Days
Inventor and Innovator

• John Ericsson

• Innovative Technology

• Major Impact on Maritime and Military History
USS *Monitor* and the CSS *Virginia* engage in the first battle of steam powered ironclads. The battle ushers in a new era of naval technologies and naval warfare.
John G. Newton of the Duke University Marine Laboratory proposed testing the application of geological survey equipment for underwater archaeological survey and assessment.
History and Technologies Worth Preserving
The Monitor National Marine Sanctuary was established by Congress on January 30, 1975, the 113th Anniversary of the Monitor’s launching at Greenpoint, NY.
A column of water one mile in diameter from the surface of the sea to the seafloor
Recovery and Archaeology

USS Monitor Mosaic

Monitor Collection, NOAA
Recovery and Archaeology

Once the sections of deck and armor belt were removed....

....the turret was partially excavated to reduce the lift weights.
Monitor Expedition 2002 – Turret Recovery

August 5, 2002 5:47 PM
Joint POW/MIA Accounting Command (JPAC) (Central Identification Laboratory) Hawaii
LSU FACES Lab
(Forensic Anthropology and Computer Enhancement Services)

Mary Manhein
Director

Nicole Del Harris
Forensic
Anthropologist
US Navy Memorial Museum
Washington, DC

USS MONITOR
In Honor of all those who served on the USS Monitor and in Memory of the 16 officers and crew who made the ultimate sacrifice when the ship sank on Dec. 31, 1862

that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion

Abraham Lincoln

PRESENTED 2012 BY THE MONITOR NATIONAL MARINE SANCTUARY
Burial at Arlington
March 8, 2013
USS Monitor: Preserving a Legacy

USS Monitor Crew

CSI Monitor

Forensic experts recreate the faces of the USS Monitor.

USS Monitor Sailors to be Interred

On February 12, 2012, Secretary of the Navy, Mr. H.R. Robert Ray Mabus, announced that 15 sailors from the original 64-man crew of the USS Monitor were to be reinterred from the remains of the USS Monitor at the military cemetery in Bath, Maine.

Battle of Hampton Roads

Ordered to Hampton Roads, Va., the ship's crew was notified that the Union ironclad Monitor was to be sent to Hampton Roads to join the Federal fleet.

The Lost Monitor Boys

The Monitor was commanded by Captain John Worden, who had previously served in the Civil War as a Union Army officer.

The Lost Monitor Boys

On December 31, 1862, 16 men perished when the Monitor and the CSS Virginia exchanged a series of devastating shots.

The Monitor Boys

On July 4, 1862, Union photographer James F. Gibson, came ashore to take the first and only photos to document the celebrated ironclad and her crew. President Lincoln also planned to visit that day, and Gibson hoped to photograph Lincoln on the Monitor. Although both Gibson and Lincoln visited the Monitor on that day, by the evening Gibson had left on his steamer from Harpers Ferieta.

USS Monitor 150th Anniversary

Origin of the Monitor - Life on Board - Monitor Today - Education - News & Events

For Teachers

The Monitor National Marine Sanctuary aims to provide teachers with resources and training to support the 150th anniversary of the USS Monitor. You will find curriculum, lesson plans, and activities that will excite your students not only about the Monitor and the Civil War, but also about science and technology.

Sinking Through 1862

Students become detectives and use various clues to discover the identity of a sailor whose remains were discovered on a Civil War shipwreck.

Labs, Cameras, Action

The Battle of Hampton Roads was one of the greatest battles in naval warfare. It was the first time ironclad ironclads met. In this activity, students discover how the Monitor and the CSS Virginia were developed, engineered and constructed, and learn the ultimate, long-reaching outcome of the Battle of Hampton Roads. Students will present their findings with supporting evidence in a music video created with animators or other media programs.
NOAA’s Maritime Heritage Program
Battle of the Atlantic
Battle of the Atlantic (1939-1945)
- Little known, but significant part of our national story
- U-Boats operated all along the Atlantic coast including the Chesapeake Bay
- North Carolina - Where the war came home
Significance of North Carolina

- Shipping Lanes
- Oceanic Currents
- Continental Shelf
- Water Depth
- Water Temperatures
Documenting and Surveying
Photomosaics

U-85

U-352
Dive Slates
Technology

Multi Beam Sonar on an ROV
Multibeam sonar survey during which the YP-389 was located and subsequently identified.

Background on the Discovery of the YP-389

- 1973 Eastward
- Tie to the Monitor

Multibeam sonar survey
Discovery of U-576 and *Bluefields*
Maritime Heritage: Shipwrecks of the Deep
Project Based Learning
Crittenden Middle School

75% Black
17% White
6% Hispanic
2% Asian
1% Two or more races

68% Free or Reduced Lunch
Course Outline
Development

Two Teachers
Semester Course
Maritime Heritage
Ecology / MWEE
Crittenden Goals

Semester-length, Motivating STEM Curriculum with Ecology Service Project
Our Goals
NOAA’s Maritime Heritage Program
Integrated Curriculum

Three Sections:

- Maritime Heritage and Archaeology
- Life Science
- Chemistry of Conservation

http://monitor.nosa.gov
Part I—Maritime Heritage

Project-Based

Students simulate searching for a shipwreck while learning about maritime heritage and archaeology. They use primary source documents and images to identify the shipwreck.
Students Simulating Searching for Shipwrecks and Engage in Engineering
Incorporating STEM into the Classroom

• Engineering Design
• Newton’s Laws of Motion
• Buoyancy—Archimedes’ Principle
• Properties of Air
• Team Work
• Math
Mock Shipwreck Mapping Activity

Mock Shipwreck: Mapping the Past

Activity Summary

Maritime archaeology is a field of study that provides many career opportunities based in science, technology, engineering, and mathematics (STEM). The focus of this lesson is the creation of a shipwreck site plan. The students engage in teamwork as “divers” to create sectional, scaled drawings of mock shipwreck. The students make connections to maritime history, mathematics, and technology.

NOTE: Extension activities incorporate English language and social studies.

Learning Objectives

Students will be able to:
- Define maritime archaeology and describe its importance to our national maritime heritage.
- Employ measuring and scaling techniques to sketch drawings of a mock shipwreck to better understand how divers document an actual shipwreck.
- Determine the scale factor of their drawing in relation to the mock shipwreck.
- Make inferences about the mock shipwreck based on observations.

Background Information

During World War II, many battles were fought on foreign shores. However, few people know about those fought closer to home. The Battle of the Atlantic consisted of several skirmishes and decisive maneuvers between German U-boats and Allied and merchant ships along the coasts of Europe and the United States.

The German U-boats were under orders to prevent merchant vessels from getting supplies to Allied nations. The United States deployed their own ships to act as defensive escorts armed with anti-submarine artillery. Many German and Allied merchant ships fought and sank off the North Carolina and Virginia coasts.

The wrecks of these sunken ships still lie at the bottom of the ocean. It is the job of maritime archaeologists to find and study these links to our past in order to understand our history, conserve our heritage, and honor the memory of those who died defending our nation’s future.

http://sanctuaries.noaa.gov/education
Pool Time
Puzzling Pieces

Reading the Records

Materials:
- Per Pair:
  - Bag of puzzle pieces
  - Bag of puzzle pieces
  - Cardstock
  - Parts of a Ship
  - Drum or Saucer

Teacher Prep:
For each team, copy activity pp. 62-63.

For each team, copy diagrams on pp. 66-67. Cut along the dotted lines into small square pieces. Keep these pieces for each page together and place them in a zip lock bag. You will have four bags. Label bags accordingly: Ship 1-4 (bow); Ship 1-4 (stem); Ship 2 (bow); Ship 2 (stem). Copy parts of activity on pp. 67 and Drum Saucer, p. 68-69, for each team.

Extension:
Give students the ship pages and have them cut into their own unique puzzle pieces and exchange puzzles with another group.

Have students draw their own ship pieces and create puzzles.

Sleuthing Through 1908

Materials:
- Per Group:
  - 12 bags with artifacts
  - List of missing people

Per Class:
- Tub or small swimming pool with sand

Sailors of the US Monitor

When the news of the Civil War arrived, US Monitor was recovered in 2002, two sets of human remains were discovered inside. In articulation of human remains being found and due to the fact that the Monitor was a US Navy vessel, the Joint POW/MIA Accounting Command (JPAC) was onboard.

With the help of Naval history, maritime archaeology, and JPAC, the remains of two sailors were recovered and sent to JPAC for investigation.

Personal artifacts recovered with the remains were sent to the National Museum of the U.S. Navy.

Activity
1. Use clues to:
2. Connect:
3. Report:
4. Read clues to:
5. The ship:
6. Write a crew for:

Purpose:
To collect clues, analyze, and compare them and use source documents to draw conclusions.

Background
In this activity, students read a story of a fictional ship, the Eclipse, which sank in September 1908. In the story, 12 people perished with the ship, including the captain's wife and son. Then the story jumps to 2017, when the ship was found, along with human remains. Because the remains were not military, they were left in situ, but extensive documentation was done. A report was made to the company that had the legal rights to the ship, and later the next year, the company raised parts of the ship that included the remains. Forensic anthropologists conducted an investigation on the remains and attempted to identify them against records and DNA samples. Artifacts recovered also helped to identify the unknown.

Teacher Prep
The teacher will create 12 bags (one will be used with the tub of sand). Inside each small bag, place "artifacts" that help to identify the owners of each bag. Suggested "artifacts" are listed on the Artifact Sheet (p. 66), but you may substitute other items that might be more readily available. Just be sure to have the stories of each person match the clues you place in the bag (e.g., if the story says that a sailor had a wife and two children, then the photograph should be of a woman and two children). Search the Internet for images that match information. Write letters (from sweethearts, etc.) on the Artifact Sheet (p. 66).

To model how to use artifacts to help identify unknowns, fill a large tub or small swimming pool with half-way wet sand. Make sure sand is dry and not damp. In the sand, hide the suggested artifacts for William Symes, whose remains have been discovered. Also in the sand, conceal some seashells and other ocean-related items you might have on hand. To spark a conversation on marine debris, you may also want to put some marine debris, such as plastic cups, into the sand. Ask students if they think plastic cups can be identified, and if not, then how not to be identified?

For each group of students, print story sheet, The Eclipse of the Eclipse (p. 66) and the activity sheet with the List of Crew and Passengers (p. 67). Go through the artifacts in the tub one-by-one, and have students review the story and the list of those onboard. Come to a consensus with the group as to the identity of the remains. Have students continue working independently with their group through the clues and artifacts in their bags to determine who once owned the bag.

NOTE: For realism, wear gloves as you handle the "artifacts."
Students build an observation buoy and learn about water quality in order to determine if the shipwreck site is a healthy artificial reef.

Then they explore oyster gardening, grow spat, and do an oyster restoration project.
Wrecks as Reefs
Growing Oyster Spat
Water Shed
Pollution
Water Quality Testing
Basic Observation Buoy (BOB)
Oysters as Filters
Plankton Tow—Identifying Plankton
Built BOB
Deploying and Recovering Buoy from the SRVx Sand Tiger

Grant Funded
Part III—Chemistry of Conservation

In the last section, students learn about conservation of artifacts and ethical practices.

As a culmination of the project, students hold a Socratic seminar and give their final decision to NOAA on what to do with the shipwreck.
Artifact Recovery

August – December 2002
Socratic Seminar

Final Presentation
Maritime Archaeology:
Discovering and Exploring Shipwrecks

NEW
Integrated Curriculum

- NOAA and MHP
- Ships through Time
- Maritime Archaeology
- Tools of Shipwreck Discovery
- Documenting Shipwrecks
- What’s Next?

http://monitor.noaa.gov
### Education Standards Continued

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<th>NCSS Standards:</th>
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<tr>
<td><a href="http://www.socialstudies.org">http://www.socialstudies.org</a></td>
<td>- Standard 1: Cultures</td>
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### National Standards for Science

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<td><a href="http://www.corestandards.org">http://www.corestandards.org</a></td>
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<td>Craft and Structure</td>
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<td>Integration of Know</td>
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<td>Integration of Knowledge</td>
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### National Mathematics Standards

<table>
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<th>NCTM 5-8 Numbers and Operations</th>
<th>NCTM 5-8 Measurement Standard</th>
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<tr>
<td>Understand numbers, ways of representing numbers, relationships among numbers, and number systems (Computation, A)</td>
<td>Understand measurable attributes of objects and the units, systems, and process of measurement (A, B, and C)</td>
</tr>
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<tr>
<th>NCTM 5-8 Geometry</th>
<th>NCTM 5-12 Measurement Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify locations and describe spatial relationships using coordinate geometry and other representations (A, B, and C)</td>
<td>Understand measurable attributes of objects and the units, systems, and process of measurement (A)</td>
</tr>
</tbody>
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<tr>
<th>NCTM 5-12 Process Standard</th>
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<td>Problem solving (A)</td>
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<td>Connections, Representation</td>
<td>Connections, Representation</td>
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Six Sections

A: NOAA and Maritime Heritage

B: Ships Through the Ages

C: Maritime Archaeology

D: Tools of Shipwreck Discovery

E: Documenting Shipwrecks

F: What’s Next?
**Exploring NOAA**

**Background**

Reside under the Department of Commerce, the National Oceanic and

**Monitor to the Rescue**

As our nation's first national marine sanctuary, Monitor National Marine (MNMMS) was established to preserve and protect our nation's first Civil War ironclad, USS Monitor. The Monitor and her brave crew helped to turn Civil War and forever changed naval warfare when it fought the ConfederateCSS Virginia, also known as the Merrimack.

As the two ships fought in the Battle of Hampton Roads on March 9, battle also marked the first time that iron met iron and the age of the war came to an end. Another unique new invention that the Monitor nation rotate gun turret. The clever design gave warfare more maneuverable battle and became a standard on all future ships.

The Monitor did not see much action after the Battle of Hampton Roads was sent to support a small skirmish off Sewell's Point and it also participated at Battle of Drewry's Bluff near Richmond. The crew, affectionately know Monitor Boys, spent most of their time in Hampton Roads waiting for a once again battle the CSS Virginia.

On December 31, 1862, just 11 months after it launched from Grampus N.Y., the Monitor encountered a storm off Cape Hatteras, N.C., and at night, sixteen brave men made the ultimate sacrifice. The Monitor's crew remained unknown until 1973, when John G. Newton and his team from the University Marine Lab, using side scan sonar, identified an unknown site they thought was the Monitor. They confirmed its identity in 1974. Not long after, Congress to protect this national treasure and on January 3 Monitor became our nation's first national marine sanctuary.

In 2002, NOAA, in collaboration with the US Navy, raised the iconic Navy diver were exploring the turret, they found the remains of a M. On June 7, 2006, the Monitor was raised from the bottom of the water to meet the bottom. A second result remains was the 150th anniversary of the USS Monitor, the Secretary of the Navy attended an event at Arlington National Cemetery on October 6, 2013. Today the remains of the USS Monitor are preserved at The Mariners' Museum in Newport News, Va.

NOAA's Maritime Heritage Program

**Museums of the Deep**

**Class Activity**

**Background**

America's greatest museum of our past as a seafaring nation lies on the bottom of our nation's oceans, seas, lakes and rivers. They are places to explore, discover and appreciate our country's maritime cultural heritage. That heritage is a legacy of thousands of years of settlement, exploration, immigration, harvesting the bounty of the sea, and creating coastal communities and maritime traditions. Overall, it is an important link to our past and how we developed as a nation. Through NOAA's dynamic education and outreach programs, exhibits, visitors' centers and media, the importance of our unique heritage is conveyed to people with the knowledge they need to promote the preservation of these nonrenewable cultural resources.

In June 2000, the president recognized the need to increase ocean exploration and thus, he established the Office of Ocean Exploration and Research (OER). The office was created to coordinate the agency's exploration and research expeditions with the mission to enhance research, policy and management decisions, to develop new lines of scientific inquiry and to advise NOAA and the nation on critical issues. OER works with archeologists, scientists, and oceanographers to explore the vast mysteries of our country's waterways.

Created in 2002, NOAA's Maritime Heritage Program is an initiative of the National Marine Sanctuaries (NMS). Each of our thirteen national marine sanctuaries and two marine national monuments, regardless of regulation and designation purposes, contain cultural resources. However, two sanctuaries, Monitor NMS and Thunder Bay NMS, were specifically designated to protect shipwrecks. Today through partnerships with the Office of Ocean Exploration and Research, other state and federal agencies and academia, the program continues to focus on maritime heritage resources within the National Marine Sanctuary System and promotes maritime heritage appreciation throughout the entire nation.
Section B

Sailing Through the Ages

Abandon Ship!

Background
Why do ships sink? The shipswrecks, because many of them are even intact, are often a common reason. They break apart or to take on water off course causing them to sink. Other factors that make ships sink, include: flood, fire, collision, and storms. A shipwreck can be a hazard to navigation and can be dangerous to people who do not know its presence. How many ships sank during the Civil War? Is it possible that there are still ships hidden at the bottom of the ocean? The answer to these questions can be found by looking at shipwrecks and other historical artifacts.

Grade Level: 6-12
Timeline: 2-4 hours
Materials:
- Computer with internet access
- Journal!
- Rubric
Activity Summary
This lesson explores the various aspects of ships, including those used in the Civil War. Students will research different types of ships and their components, such as the hull, rigging, and engine, and compare and contrast them with other types of ships.

Learning Objectives
- To use technology to present their findings
- To develop an understanding of the significance of ships in history
- To use a variety of sources to gather information

Activity Overview
In this activity, students will research and present findings about a specific shipwreck. They will use online resources to gather information about the shipwreck, its history, and its significance in the context of history. They will also create a presentation or poster to share their findings with the class.

Past Connections

Background
Humans, ships, and the ocean have long been intricately bound together. Even in ancient times, ships provided the fastest and most economical means to move goods, people, and ideas from one place to another. In order to survive, people must have learned about the ocean and developed new ways to navigate it.

Shipwrecks offer an exciting window into the past. They provide a treasure trove of artifacts, a record of past trade and communication. They also tell us about the culture of the people who built and sailed them, the materials used, and the stories of their lives.

These submerged cultural resources give us a fresh perspective on history and are valuable classroom resources. Shipwrecks provide a variety of information related to the development of seafaring nations, the development of maritime nations, and the development of seafaring nations. They provide a valuable learning tool for students.

Vocabulary
- Tonnage
- Cargo
- Ship's name
- Vessel
- Cabin

Activity Summary
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Maritime Archaeology

Background

Archaeology is the study of the ancient and recent past through material culture; it is a subfield of anthropology, the study of human culture, archaeology of the past, and cultural anthropology of human history and culture. Furthermore, archaeology helps us understand when and where people lived, as well as why and how they did so. Much of our history relies on written records and documents to interpret the past. The archaeology allows us to go back in time even before written language. The analysis of objects left behind, we are able to glimpse at what everyday life was like in the past.

Underwater, maritime, or naval archaeology are terms to describe archaeological sites conducted under water. Although each discipline is slightly different from the others, all rely on studying human interaction with the sea, lakes, and rivers. This study of physical remains. Whether on land or in water, the tools, techniques, and methods for each discipline are essentially the same—although, different methods may be used. For example, different environments may require different techniques. SCUBA divers, for example, may use different methods than those used by underwater archaeologists. The goal of understanding the past is always the same—to connect to real people and their everyday lives, including evidence of both the mundane and the extraordinary.

Although most people think of shipwrecks when they think of maritime archaeology, there is so much more to the field. Today, maritime archaeologists study complete systems in their natural environment, referred to as the "Maritime cultural landscape." Specifically, this consists of a combination of archaeological resources in maritime activities, whether on land or in the water. Looking at the historic landscapes can encompass shipwrecks and associated sites on shore, such as docks and warehouses, harbor and industrial structures, wharves and shipyards, military forts, sites of religious significance, and more. It also includes the natural landscapes of bodies of water, such as the Atlantic Ocean, which are some of the most important sources of information in the field.

Vocabulary

Self-Vocabulary Box

National Standards:

http://monitor.noaa.gov
Section D

Searching the Deep — Plotting the Course

Activity A
Battle of the Atlantic

Although World War II's Battle of the Atlantic has been extensively studied, German U-boats continued to be a threat to Allied shipping. Students will learn about the Battle of the Atlantic, its significance, and the role of the U.S. Navy in combating it.

Grade Level: 6-12
Timeframe: 1-2 hours
Materials per Group:
- Activity Sheet: Plotting the Course
- Colored pencils
- Copy of Convoy KS-576
- Two copies of map

Activity Summary:
This activity simulates the plotting of U-boat movements during World War II. Students will use a map of the Atlantic Ocean to plot the positions of U-boats and identify key battles and engagements.

Learning Objectives:
- Students will develop mapping skills.
- They will understand the strategic importance of the Battle of the Atlantic.

Key Words:
NATO, U-boats, convoys, Battle of the Atlantic

National Standards:
- Mathematics: CCSS.MATH.CONTENT.8.G.A.1
- Science: NGSS.K-EN.Earth-Science.3.

Searching the Deep — Sonar Imaging

Activity B
Side Scan Sonar

Side scan sonar is a specialized system used to detect objects on the seafloor. Students will learn about the technology and its applications in maritime archaeology.

Grade Level: 6-12
Timeframe: 2-4 hours
Materials per Group:
- Prepared box: One-Teacher Prep Section
- Masking tape
- Different colored pencils
- Paper (or use provided)
- Wooden skewer (~30 cm)

Activity Summary:
Students will simulate the use of side scan sonar to detect objects on the seafloor.

Learning Objectives:
- Students will develop problem-solving skills.
- They will understand the importance of side scan sonar in maritime archaeology.

Key Words:
Echo sounder, sonar, sonar imaging

National Standards:
- Science: NGSS.K-EN.Earth-Science.3.
Searching the Deep — Roving Along

Searching the Deep—Magnetometers

Activity E

SCUBA, SCUBA, SCUBA — DOI

Searching the Deep — NOAA Vessels

Activity E

NOAA Vessels

NOAA ships and aircraft play a critical role in the collection of oceanographic, atmospheric, hydrographic, and fisheries data. The NOAA Fleet is managed and operated by the Office of Marine and Aviation Operations (OMAO), an office composed of civilians and officers of the NOAA Commissioned Corps. OMAO also manages the NOAA Diving Program and the NOAA Small Boat Program.

OMAO's research and survey ships compose the largest fleet of federal research ships in the nation. The fleet ranges from large oceanographic research vessels capable of exploring the world's deepest oceans, to smaller ships responsible for charting the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries research, nautical charting, and ocean and climate studies.

OMAO's aircraft operate throughout the world to perform a wide range of services including hurricane reconnaissance and research, marine mammal and fisheries assessment, and coastal mapping. NOAA aircraft carry scientists and specialized instrument packages to conduct research for NOAA's missions.

In addition to research and monitoring activities critical to NOAA's mission, OMAO ships and aircraft provide immediate response assistance for unpredictable events. Following Hurricanes Katrina and Rita, NOAA ships conducted emergency surveys for navigation hazards that helped Gulf ports reopen quickly. Aerial images of disaster-torn areas—taken by NOAA aircraft—enabled residents and emergency workers to verify the condition of houses, bridges, and roads.

I Can Name that Part

Background
Every profession has its own terminology andargon, and nailing is no exception.

Putting the Pieces Together—Photomosaics

Background Information
How do maritime archaeologists study a wreck? They observe the site, document the ship's measurements, make drawings, and take photographs. When archaeologists make a careful site plan, they can create a photomosaic. Photomosaics are very useful for archaeologists: they can see exactly what they have.

Sometimes when a shipwreck is found, the archaeologists cannot spend a long time at the site. They document the wreck site using pictures. Later, the pictures are put together to create a photomosaic.

From the early 1990s to 2002, the Monitor, including the steam engine, propeller, and all the other details, was removed from the site. After being documented, the Monitor was taken to the North Carolina Maritime Museum in Beaufort. The Monitor is now displayed in a gallery of the museum.

Mock Shipwreck: Mapping the Past

Background
During World War II, many battles were fought on foreign shores. However, few people know about these fought closer to home. The Battle of the Atlantic consisted of several skirmishes and decisive maneuvers between German U-boats and Allied and merchant ships. These ships fought and sunk off the north coast of Great Britain and in the North Atlantic Ocean off the United States.

Activity Summary
During the Battle of the Atlantic, many battles were fought on foreign shores. However, few people know about these fought closer to home. The Battle of the Atlantic consisted of several skirmishes and decisive maneuvers between German U-boats and Allied and merchant ships. These ships fought and sunk off the north coast of Great Britain and in the North Atlantic Ocean off the United States.

To better understand these cultural resources, maritime archaeologists document them by physically mapping the shipwreck. Once the shipwreck is mapped, a site plan is created. During the dives, numerous images are taken to enhance the details of the site plan and to provide a complete photo documentation of the site. This thorough documentation gives researchers a complete snapshot of the shipwreck at that moment in time, then allowing them to study the site, learn about its history, and gather information about how ships sank or deteriorated over time.

Activity Summary
Maritime archaeology is a field of study that provides many career opportunities based in science, technology, engineering, and mathematics (STEM). The focus of this lesson is the creation of a shipwreck site plan. The students engage in teamwork as “divers” to create sectional, scaled drawings of a mock shipwreck. The students make connections to maritime history, mathematics, and technology.

NOTE: Extension activities incorporate English language and social studies.
Activity Overview

Students learn the history of scuba diving, through important inventors and divers. After choosing a historical figure in:

- **Scientific Diving**: Diving performed as a necessary part.

Monitor National Marine Sanctuaries: Marine Archaeology—Discovering and Exploring Sunken History

Name: 

Date: 

The People of SCUBA

Class Activity

Monitor National Marine Sanctuaries: Marine Archaeology—Discovering and Exploring Sunken History

### Historical Inventors and Divers

### Pioneers of Diving

- John Scott (1724-1760): air pump
- Sibert Penfold (1726): recycled air
- William James (1800s): wet suit
- Renato Russovent (1857-1917): and Augusto
- Dagnino (1867-1930): gas diving out
- Henry Foss (1851-1932): closed circuit breathing
- Victor Regis (1891-1974): helmet diving
- Enzo Maiorino (1900-1971): inventor of demand regulator
- Philippe Tallec (1905-2013): developer & scuba diving
- Philippe Duret (1904-1977): underwater photography
- Teseo Tesei (1903-1941): inventor of human lungs
- Frederick Dumas (1913-1991): spear fishing, wreck diving
- Anna Zanzetta (1917-1945): post diving
- Hans Hass (1919-2013): underwater photography
- Édouard Adnot (1924-): inventor of scuba diving equipment & deep diving equipment needed
- James F. Cuthill (1920-2008): scuba diving
- Nick (1929-2013): scuba & scuba technology
- Robert Hanks (1933-): first scuba admiral
- Gary Gentile (1948): scuba diving
- E. Lee Sykes (1947): underwater photography
- Storck Sessler (1940-1984): scuba diving
- Bert Gilliam (1951): technical diving
- Bill Neth (1952-1955): scuba diving
- Wesley C. Stevens (1955-2010): scuba diving
- Jared Halvorsen (1938): technical diving
- Cato Reischl (1950): scuba diving
- Tom Moret technical diving

### Notable for Other Reasons

- Greg B. Cooper (1945): Aquanaut
- George F. Bass (1932): Early underwater archeologist
- James Talbot: Aquanaut
- Nasa Ranger: Aquanaut
- Barry L. Black (1935-1969): Aquanaut
- Dennis Larmour: Aquanaut
- Santos Ainy (1972-2009): Aquanaut
- Karen Kohlmaier: Aquanaut
- Lionel Dohms
- Michael C. Emmons
- Willard Franklin Davis (1922-2008)
- Anees Mokhles (1919-2011)
- Bob Heine (1919-2004)
- David Sheu (1955-2005)
- Dean Dreyer (1974-1994)
- Jackolyn Chandler (1972-1975)
- Keith Janssen (1932-2010)
- Leigh Baskin (1958)
- Barbara Schneir (1957)
- Steve Lewis (1964)
- Ted Eddy (1920-2003)
- Trevor Jackson (1970)
- Billy DeLarge (1959)
- Fabian Cousteau (1967)
- Graham Jessop (1957)
- John Chelton (1972)
- Jean-Michel Cousteau (1934)
- Richi Kolber
- Oscar Gunay (1919)
- Philippe Cousteau (1946-1978)

### Record Holders for Depth or Cave Penetration

- Simon Mitchell
- Claudio Seppi
- John Bothwell (British)
- John Bennett (British) (1959-2004)
- Mark Ellis
- Norm Stone (British) (1951)

Monitor National Marine Sanctuaries: Marine Archaeology—Discovering and Exploring Sunken History

### Sample Fact Sheet

**George F. Bass—Scuba Diver and Founder of Marine Archaeology**

**Images of George F. Bass**

L.R. Nick (1929), Henry Foss (1951), and Jacques Cousteau (1984)
Lesson Plans, Activities and More!
When Johnny Comes Marching Home

Background Information

Music could be heard throughout the Civil War amongst soldiers, sailors, slaves, women, men, and children. Many of the songs were taken from print, memory, or passed down orally and were sung because they were familiar songs that brought comfort or inspiration. New lyrics were often created to embellish traditional songs, and the words were pertinent to circumstance or motivation.

Some songs originated as African-American spirituals. Slaves and workers in the fields often sang spiritual songs to bring courage, strength, and unity to the hardships in which they lived and worked. Spiritual songs were usually composed in the moment, reflecting suffering or understanding.

Shanties were work songs set to a tempo that synchronized with repetitive tasks. Sea shanties, such as Blow the Man Down, also brought men together who worked on the ships at sea. The songs had a purpose and the lyrics harmonized with the sailors’ labors. There were also patriotic battle songs that inspired and united the troops. Sailors and soldiers had songs about the flag and love of country, their sweethearts, religion, and even drinking songs. Music offered a time for the soldier and sailor to relax and reflect.

Women, children, and the men who did not go to war, also sang songs that revealed their suffering and hope for an end to the war. Civil War songs span from spiritual and protest to historical, shanty, and traditional. Action songs roused people to raise their voices. Traditional songs and ballads spoke of heritage and remembrance.

Today, songs usually are sung for entertainment. However, some still serve the purpose to pass down civil traditions, show love of country, pay tribute to the struggles of ancestors, or to protest in order to rally people to action.
The Civil War in Review

Test Your USS Monitor Knowledge

Tour the Wreck of the USS Monitor

Move mouse cursor slowly around plan view for details and images.

Back to the Monitor National Marine Sanctuary Home Page
Mock Shipwreck: Mapping the Past

Activity Summary
Maritime archaeology is a field of study that provides many career opportunities based in science, technology, engineering, and mathematics (STEM). The focus of this lesson is the creation of a shipwreck site plan. The students engage in teamwork as "divers" to create sectional, scaled drawings of a mock shipwreck. The students make connections to maritime history, mathematics, and technology.

NOTE: Extension activities incorporate English language and social studies.

Learning Objectives
Students will be able to:
- Define maritime archaeology and its role in our national maritime heritage.
- Employ measuring and scaling techniques to sketch drawings of a mock shipwreck to better understand how divers document an actual shipwreck.
- Determine the scale factor of their drawings in relation to the mock shipwreck.
- Make inferences about the mock site.

Background Information
During World War II, many battles were fought with few people knowing about them. These battles consisted of several skirmishes and dozens of battles between the German U-boats and Allied and merchant ships of all United States. The German U-boats were under orders to keep shipping and supply lines to Allied nations. The U.S. had to act as defensive escorts armed with a few ships and Allied and merchant ships fought on Virginia's coast.

The wrecks of these sunken ships still lie at the bottom of the sea. To understand our history, we need to find out who built and defended our nation's history.
Shipwrecks as Reefs: Biological Surveys

**Activity Summary**
The focus of this lesson: Students will conduct a practical method of surveying fish species and perform biological surveys.

**Learning Objective**
Students will be able to:
- Define artificial reef
- Demonstrate data analysis
- Interpret graphs
- Compare surveys of fish communities

**Materials**
- 200 Measured tape or measuring tape (roll x 2)
- Cut-out of fish species and reef species
- 20 x 20 square frames (e.g., wash tape traced together)
- Clipboards
- Student sheets

**Key Words**
- Artificial Reef
- Biological Survey
- Transect Line
- Quadrat
- Biodiversity

**Survey Log – Transect Line**

**Analyzing Your Data**
Now that you made observations and collected data, what do you do? In order to draw conclusions or make inferences about the reef community, scientists must be aware of and identify the species they have collected. Follow the steps below using the species count data you have collected:

1. Create bar graphs for the Transect Line – Fish Counts
   - Title each graph according to the shipwreck surveyed
   - Label the x-axis and y-axis
   - Use bar colors or patterns to identify fish species

2. Compare the shipwrecks:
   - Create a table comparing the total number of fish, number of species, and common species at each site.

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http://sanctuaries.noaa.gov/education

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World War I

In or Out? Debating Entrance into the Great War

Education

The Mystery of the Mirlo: Interpreting Primary Sources

Education

Propaganda: Posters with a Purpose

Activity Summary
This lesson will require students to examine and evaluate propaganda posters used during World War I. At the conclusion of the activity, students will create their own poster which will require the students to demonstrate an understanding of the reasons the United States entered the war.

Learning Objectives
Students will be able to:
• Analyze propaganda posters for bias and symbolism.
• Explain and illustrate the reasons for the United States joining the Allied Powers in the First World War.
• Create an original propaganda poster.
• Evaluate other students’ posters and explain which posters are the most persuasive.

Zimmerman Telegram: The Last Straw

Activity Summary
This lesson focuses on the importance of the Zimmerman Telegram and other causes of World War I. Students are given a portion of the Zimmerman Telegram and must break the code and analyze the message. They are asked to think critically to determine how Americans and key decision makers, who wanted to be neutral in the European war, would feel about the telegram. Finally, they will make their own short code on how to avoid another world war.

Learning Objectives
Students will be able to:
• Examine the causes of U.S. involvement in World War I
• Demonstrate the value in military intelligence practices, such as code breaking

Background Information
The assassination of Archduke Franz Ferdinand in Austria-Hungary set off a chain reaction of defense alliances that in 1914 led Europe into war. A chain of uncoordinated events and decisions led to the U.S. getting involved in the war and the Zimmermann Treaty is often seen as the last straw to the United States joining in.
Welcome to the Outer Banks Maritime Heritage Trail. Click the arrow buttons on the map to play the videos and click (+) below for descriptions of each video.

Coastal North Carolina is an extraordinary place with strong ties to the marine environment. Surrounded by water, the Outer Banks of North Carolina are a chain of narrow barrier islands separating the Currituck, Albemarle, and Pamlico Sounds from the Atlantic Ocean. This dynamic environment has shaped the islands and its people for centuries.

Along Highway 12 are a series of iconic places and features that make the Outer Banks unique. From the lighthouses to the wildlife to the shipwrecks offshore, the Outer Banks culture reflects the surrounding marine environment. We invite you to take a trip down this stretch of road and experience the maritime heritage of the Outer Banks of North Carolina through videos, pictures, and stories.

Videos
[1 Video: "Introduction"
Start at Whalebone Junction]


[1] 3 Videos: "The Story of the Old"


[1] 4 Videos: "HMS and WWII off the Coast of Cape Hatteras"

[1] 4 Videos: "The Chiricosme Life Saving Station"

[1] 6 Videos: "The Cape Hatteras Lighthouse"


Click here for more information about the Outer Banks.

Oral Histories
The residents of the Outer Banks have amazing stories to tell. Their lives are constantly influenced by the marine environment in which they live and their stories are as unique and vibrant as their surroundings. During WWII, many residents were witnesses to the Battle of the Atlantic which occurred along the coast of the United States. Listen to their stories as they recall their experiences with the war that was being fought right off of their shores.

Educational Activities
Students experience the unique maritime culture of the Outer Banks, N.C., when they watch one, or all ten, video clips and listen to the oral histories of those who experienced WWII on the shores of the Outer Banks. Each video is accompanied by supporting activities and a set of focus questions, to be answered while the students view the video.

Sailor Edition
Sailor Edition 1
Sailor Edition 2
Ancient Mariner
Ancient Mariner 2
Lamplight Reader
Jason Martin
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Click here to download the educational activity packet.

Background Information
Coastal North Carolina is an extraordinary place with strong ties to the marine environment. Surrounded by water, the Outer Banks of North Carolina are a chain of narrow barrier islands separating the Currituck, Albemarle, and Pamlico Sounds from the Atlantic Ocean. This dynamic environment has shaped the islands and its people for centuries.

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Learning Objectives
Students will be able to:
- Recognize unique features of the Outer Banks, N.C.
- Understand the area's significance during World War II
- Discover the final resting place of the USS Monitor
- Appreciate the importance of lighthouses along the coast
- Explain why the area is called "The Graveyard of the Atlantic"
- Learn about the rich ecology of the Outer Banks

Teacher Prep
Download videos and/or oral histories, or bookmark website http://sanctuaries.noaa.gov/obx/ for students.

http://sanctuaries.noaa.gov/education
Video: *The USS Monitor and NOAA: A Look Through Time*

https://www.youtube.com/watch?v=EX6H3Tp-2yE

Or visit the “Teacher” Section at http://monitor.noaa.gov
To download copies of modules and activities visit:

http://monitor.noaa.gov

“Education” Tab
Monitor NMS Education Websites

http://monitor.noaa.gov/education/teachers.html

Shipwrecks and STEM

Maritime Archaeology: Discovering and Exploring Shipwrecks

This curriculum introduces students to the world of NOAA and its Maritime Heritage Program. Students learn 1) why shipwrecks are important, 2) the tools used to study shipwrecks, 3) about the complex and costly process of recovering and conserving artifacts, and 4) how NOAA works to protect our maritime heritage. Although the curriculum is designed to be taught as a unit, each lesson can stand on its own. The lessons are aligned with national standards.

Shipwreck of the Deep

The project-based curriculum is divided into three parts and based on a storyline where the students are 1) maritime archaeologists that discover and document a shipwreck, 2) engineers that design and build a remotely operated vehicle, 3) researchers that study the wreck as a reef, and 4) conservators that help to determine if artifacts should be recovered. To culminate the unit, students debate in a Socratic seminar and give a final presentation detailing their analysis of the shipwreck and recommendations. The curriculum is designed as a unit, but each activity stands on its own. The unit is aligned to national standards.

Remotely Operated Vehicle (ROV) In a Bucket

Check out this excellent manual to get you started building your own underwater robot. The manual includes a detailed list of ROV parts and pieces and where to find them. (Doug Levin, NOAA Chesapeake Bay Office).

Remotely Operated Vehicles Curriculum Guide

This curriculum introduces middle and high school students to ROVs and careers in marine science and underwater archaeology. Students use problem based learning and hands-on STEM activities to solve real world problems, while learning about the engineering design process. Curriculum can be used in its entirety or activities can be used independently.

- [Teacher One-Pager](#)
- [Student One-Pager](#)
- [ROV Curriculum Guide](#)

Mock Shipwreck: Mapping the Past

This high school activity engages students in teamwork as “divers” to create sectional, scaled drawings of a mock shipwreck. They make connections to maritime history, mathematics, and technology.

- [Lessen Guide Mock Shipwreck](#)
- [Log Sheets Port 10 Units](#)
- [Log Sheets Starboard 10 Units](#)
- [Log Sheets Port 12 Inches](#)
- [Log Sheets Starboard 12 Inches](#)

Wrecks as Reefs

[Click here to view the Monitor video on YouTube](#)
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Monitor National Marine Sanctuary

https://www.facebook.com/pages/Monitor-National-Marine-Sanctuary/75101577927

- #MonitorMondays
- #TBT
- #WackyWednesdays
- Monitor Trivia
- This Day in History
- Current Expeditions
- And More!
Thank You!

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