

Mock Shipwreck: An Exercise in Maritime Archaeology

By Kate Thompson

FOCUS

Maritime Archaeology

GRADE LEVEL

4 – 6 grade physical and social science

FOCUS QUESTION

What techniques do maritime archaeologists use to create a site plan?

What factors influence an underwater archaeological site?

Why should underwater archaeological sites be preserved?

LEARNING OBJECTIVES

Students will gather data from physical clues.

Students will learn to form hypotheses based on observed data.

Students will map a mock underwater archaeological site.

Students will discuss the importance of preserving shipwrecks intact.

Students will use the data gathered to develop evidence

MATERIALS

- ☐ Log Sheet to record wreck measurements and observations
- ☐ Mock shipwreck (set up in the classroom, on the lawn or beach!)
- ☐ (Measuring tape or 50 ft of nylon line
- ☐ Measuring tape, clipboard, ruler, graph paper, compass, plastic navigational compass, pencils and paper for each group of three to four students
- ☐ Reference sheets (“Log Sheet”, “Parts of a Ship”, “Triangulation”, and the “International Dive Signals” that can be downloaded from the following website: <http://sanctuaries.noaa.gov/education>

PREPARATION

1. Prior to students entering the room put together a mock shipwreck with either canvas, plastic, or materials from the classroom. (See figure 1-This mock wreck was made of 4 pieces of painter's canvas with a wreck painted onto them.) Set up the baseline (a line from one point to another from which other points can be measured) for the wreck site, usually from the bow (front) to the stern (back) of the vessel. Use either nylon rope or a flexible measuring tape to represent the baseline.

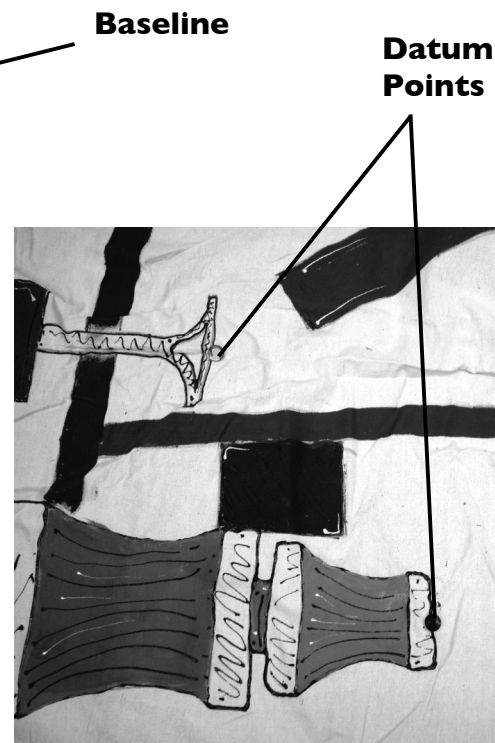
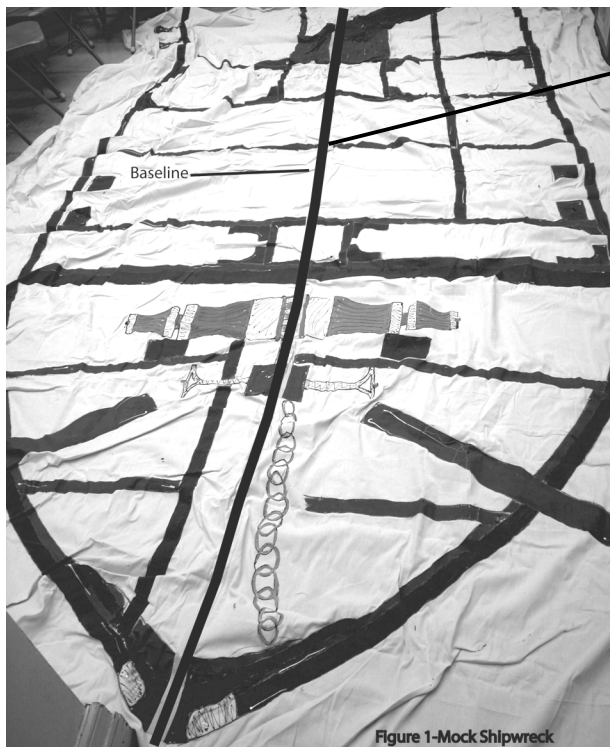


Figure 1- Mock Shipwreck

Figure 2- Datum Points

Create visible datum points on the mock wreck for students to measure to and from to create their site map. See Figure 2

2. For this section, a review in basic geometry would be helpful. Provide the students with a lesson in how to use compasses and rulers. Use the following websites for information:

- <http://www.educ.queensu.ca/~egnatoff/digicurr/math%20and%20art/lesson4.html>
- http://www.bbc.co.uk/schools/ks3bitesize/teachers/lessonplans/maths/measure_bearings_offline.shtml

After this lesson is taught, sketch the mock shipwreck on paper, and draw out a baseline on the graph paper similar to the baseline on the mock shipwreck. Begin plotting points

from the log sheets using a compass. The point is plotted where the arcs intersect from each of the baseline measurements. Connect related points and draw in features. Flip to the section **LEARNING PROCEDURE** for more information. Refer to the reference guide “Parts of a Ship” below. Make copies of the guide and pass it out to all of the students to enable them to better understand and label their site plan.

Parts of a Ship

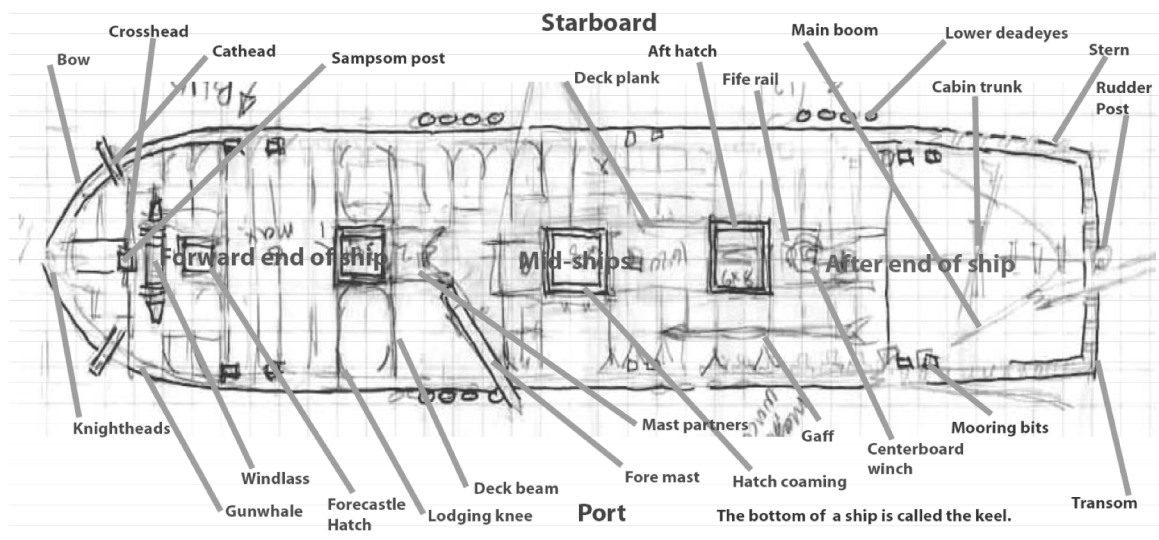


Figure 3-Parts of a Ship Reference Sheet

AUDIO/VISUAL MATERIALS

Chalkboard, marker board, flip chart or overhead projector to facilitate presentations and date summaries.

TEACHING TIME

Two or three 45-minute class periods, depending on length of time devoted to discussions, evaluations, and extensions.

SEATING ARRANGEMENT

Six groups of four for a class of 24 will evenly distribute the work among the teams. If the class is smaller or larger create as many groups of three or four as possible.

KEY WORDS

Maritime Archaeology
Triangulation
Site Plan
Baseline

Datum Point
Bow
Stern
Port
Starboard
Artifact
Keel
Preservation

BACKGROUND INFORMATION

This activity is based on the survey technique that archaeologists use underwater to document a shipwreck. Imagine finding a shipwreck. Because the site of the wreck presents a mystery to the beholder, the first questions usually asked are basic:

- What kind of ship was this?
- How was it used?
- Why is it resting in its present location and position?

For thousands of years when a shipwreck was found, the first thought was to use any way possible to salvage all items or artifacts (portable objects that have been modified, shaped or utilized by humans) of value (gold, jewels, ceramics, cannons, engine parts, etc.). Separating these items from the ship separated them from their history, thus diminishing the monetary value of the treasure. In addition, the moment in time when the disaster occurred is forever lost as the pieces of the puzzle are removed creating holes in the puzzle, preventing the entire story from ever being told. To be able to piece together the puzzle remains, a team of maritime archaeologists must collect data and create a detailed drawing of the wreck called a “site plan”. Some ships, once documented, have been compared to original ship design plans to determine the changes taken place over time on the wreck site. However, often times the original plans are not available, but by creating a plan of the ship you can study the choices for materials and construction that explain the needs of the time from which the vessel originated.

The technique most commonly used by archaeologists to develop a site plan is called triangulation. This is a simple form of survey by measuring horizontally from two known points to a third, and then producing a scale drawing using a compass to draw an arc from each measured point on graph paper at the distance measured on the wreck. Where the two arcs intersect gives the plotted position of the third point. Accuracy is increased if the measurements are taken from three known points because survey or drawing errors become more apparent.

Martin, Dean. 1988. “Guidelines on Acceptable Standards in Underwater Archaeology”

Tell students that archaeologists are like detectives. They search for evidence and analyze clues to reach a conclusion. Students will not only use the triangulation technique to draw site plan, put they will use their deductive reasoning skills to answer questions about the wreck specific to their observations. To thoroughly understand some of these concepts, please visit the following website resources for reference:

- <http://www.cyberpursuits.com/archeo/uw-arch.asp>
- <http://www.culture.gouv.fr/culture/archeosm/en/>
- <http://www.pophaus.com/underwater>

LEARNING PROCEDURE

1. Define for the students archaeology, and the difficulties of working on a site underwater (time limit, lack of communication and variable sea states). Explain how each group must work in teams to document the site, and then have them record general observations as they take their first “dive”. Pass out the log sheet provided (download from sanctuaries.noaa.gov/education) for the student groups to record the observations and dive information. Also, remind them that they are divers without any communication gear and cannot talk to one another. Provide each student with the international diver hand signal sheet for their reference to review while preparing for their dive. However, often times wreck sites have low visibility making it difficult to communicate. Explain to the students that they must communicate with their compasses, measuring tape, hand signals and drawing slates. Make sure each student group creates a dive plan before diving to the mock wreck site (entering the classroom). A dive plan is developed to ensure all members of the dive party understand what the goals of the dive will be before the dive, and to ensure that all dives are safely conducted. This is an important concept to relay to the students. All dives are limited by time, the depth of their dive, and the air in their tank. All of the students should understand each of their roles when planning their “dive” to the site. So, if miscommunication occurs while on the site the dive can be called because the plan has not been followed. This is a good section used to teach teamwork and communication skills.

2. **COMMUNICATION**-each student on the team has a role to play. The first student records; another is in charge of the “zero” end of the measuring tape, or the end where the units of measurement begin; the third student is the “measure” end of the tape, or the end where the numbers increase (See Figures 4 and 5). The measure end is also in charge of the tape and communication. The recorder is always next to the smart end writing the information down as each point is measured. One pull of the tape means to move to the next measurement, while two pulls of the tape means to come to the smart end for discussion. If there is a fourth team member, he/she will become the site planner to make sure the original dive plan is being followed. The planner has the ultimate decision to call (stop) the “dive” if it is not according to the original plan set before the project began.

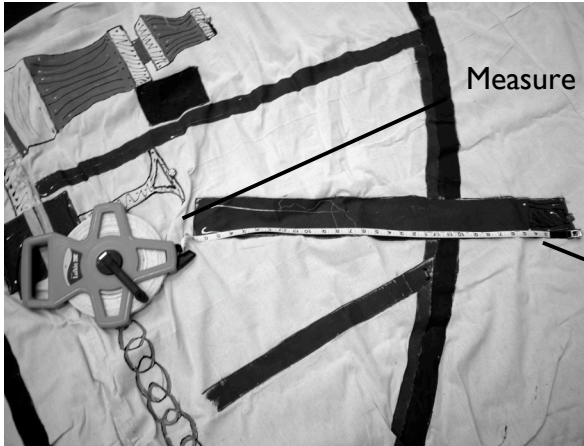


Figure 4-Measure End and Zero End

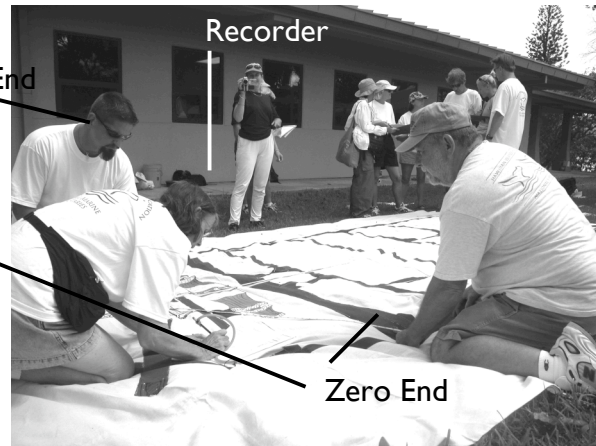


Figure 5-Communications on the wreck

Make sure all members of the groups understand they must develop their plan before they “dive” to the wreck site. They will learn communication and planning at this stage of the process. The groups will also need to appoint tasks to each member before they “dive.” If there is extra time, allow each student to play each role on the team. This creates an enhanced learning experience for each student to understand each role.

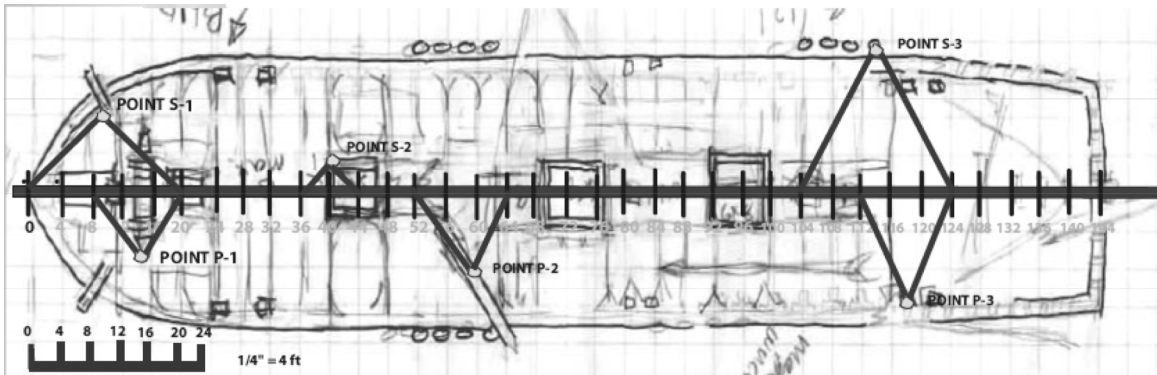


Figure 6-Triangulation Reference Sheet-notice baseline and scale

3. Demonstrate triangulation techniques off a set baseline to a mock shipwreck set up in the classroom. Make sure all of the students understand the concepts of using compasses, graph paper, and measuring tapes. Show the students how to take their work back to their desks (most likely the next day) to develop a scaled site plan of the wreck site. Please refer to the TRIANGULATION info sheet to teach this concept.

4. After creating a baseline on the shipwreck, have students decide what their scale will be on their graph paper. The wreck shown here is a $1/4" = 4 \text{ ft}$ scale. The blue lines are the measurements taken from the baseline, and labeled POINT S-1 for the starboard (right) side of the ship, and POINT P-2 for the port (left) side. Have the students take each point and fill them in on their log sheet. Make sure the students measure to the middle of something small to make a point, and then measure the size of the artifact for

accuracy. If there is a square feature measure to all four corners from the same place on the baseline. (See Figure 6 and 7)

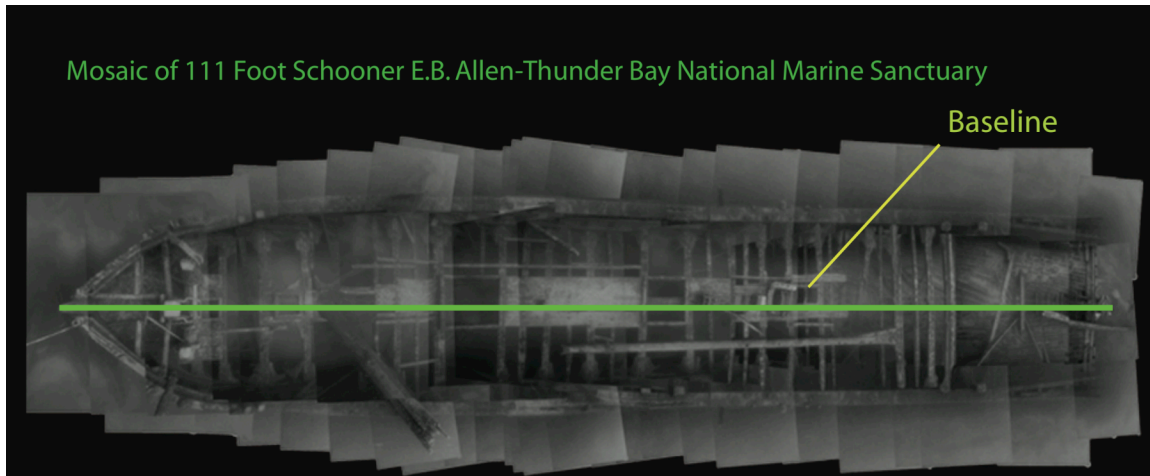


Figure 7- Real Life Two-Masted Schooner E.B. Allen

For example (refer to drawing of “Triangulation” reference sheet):

POINT S-2-Taken from 36 ft and 44 ft on the base line.

The top left hand corner of the fore hatch is 4.5 ft from each point on the baseline. Repeat process for each corner.

Have the students observe each of the hatches after they are measured. Are all of the hatches the same length? What might the holds beneath been used for? What might the ship have been carrying? Is there any evidence of cargo? Is the vessel sail or steam powered?

After all of the points are taken (the more points, the more accurate the ship site plan will be) have the students take their log sheet back to their desks to begin the development of their site plans. Make sure each student has a compass, piece of graph paper, ruler and pencil. Students may develop individual site plans, or do it as a group from the data that they collected from the wreck site.

5. Lead a class discussion about each team’s observations. Have the students give a presentation on their site plans, their hypothesis on what might have happened, and how to protect the resource. Then, discuss the importance of preserving shipwrecks, and the significant roles that archaeologists play in re-telling the stories of our maritime past through submerged maritime heritage resources. Have the student research famous shipwrecks, and have them lead discussions as a team as to how those stories might have been altered by natural or human effects.

THE BRIDGE CONNECTION

<http://www.vims.edu/bridge--Click> on “Ocean Science Topics” in the navigation menu to the left, then “Human Activities,” then “Heritage.”

THE “ME” CONNECTION

Based on their observations of the wreck, students can write a short essay and prepare a brief oral presentation from the perspective of a member of the ship’s crew. They must determine a time period based on their hypothesis for their period of dress, what their life might have been like to be the captain, deck hand, cook or first mate. Have them describe their lives during that time period, and have them share some stories of adventure as if they were sailing on this vessel during a certain time period. For reference on what life was like on a 19th century vessel check out the website:
<http://www.sdmaritime.org/contentpage.asp?ContentID=104>

CONNECTIONS TO OTHER SUBJECTS

English/Language Arts, Mathematics, Social Studies

EVALUATION

Evaluate the students by the accuracy of their site plan, their work as a team, and the observations they made of the wreck site as archaeologists. Also evaluate their hypothesis’ about the wreck site and whether or not they used their data collection to come to clear and concise conclusions about the wreck site.

EXTENSIONS

Visit <http://sanctuaries.noaa.gov/education> for information about education within the Maritime Heritage Program in national marine sanctuaries.

Visit <http://channelislands.noaa.gov>, <http://thunderbay.noaa.gov> and <http://monitor.noaa.gov> for websites referencing shipwrecks in the sanctuary program.

RESOURCES

<http://oceanexplorer.noaa.gov>- other maritime archaeology lesson plans
<http://data2.itc.nps.gov/submerged/>- the National Park Service information on shipwrecks
<http://www.gomr.mms.gov/homepg/lagniapp/shipwreck/> – US Department of the Interior Minerals Management Service publication, “Historic Shipwrecks of the Gulf of Mexico: A Teacher’s Resource”

Martin, Dean. 1988. “Guidelines on Acceptable Standards in Underwater Archaeology”,
The Scottish Maritime Studies Development Association, St. Andrews, Scotland.

NATIONAL SCIENCE EDUCATION STANDARDS

Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Content Standard E: Science and Technology

- Abilities of technological design
- Understandings about science and technology

Content Standard F: Science in Personal & Social Perspectives

- Natural hazards
- Risks and benefits
- Science and technology in society

Content Standard G: History and Nature of Science

- Nature of science

FOR MORE INFORMATION

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Key Term Definitions

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.

Triangulation- a simple form of survey by measuring horizontally from two known points to a third, and then producing a scale drawing using a compass to draw an arc from each measured point on graph paper at the distance measured on the wreck.

Site Plan- A detailed drawing of a collection of artifacts and/or features left by people who once lived or worked in a specific place.

Baseline- a line or standard by which things are measured or compared. In the case of a site plan, the main line that is used as a base of measurement from which site characteristics are measured.

Datum Point- key reference points used to measure artifacts or large features.

Bow- the front section of a ship or vessel.

Stern- the back section of a ship or vessel.

Port- The left-hand side of a ship or aircraft facing forward.

Starboard- The right-hand side of a ship or aircraft as one faces forward.

Keel- The lowest and most continuous line on a ship (wood or steel), This is usually referred to as the backbone of the vessel.

Artifact- A portable object(s) that has been modified, shaped, or utilized by humans.

Preservation- the activity of protecting something from loss or danger