Unit 1 Lesson 2: Reef Surveys and Deep Worker

Lesson Objectives: Upon completion of this unit students should gain knowledge and understanding of:

- factors that cause physical damage to coral reefs
- the unique abilities of the submersible, Deep Worker, to explore great depths

Vocabulary: groundings, submersible

When Coral Reefs Get in the Way . . .

High volumes of ship traffic occur in close proximity to many sensitive coral reef ecosystems around the world. Therefore, it is not surprising that large ships periodically run aground, causing extensive damage to valuable reef resources. Within the United States, coral-rich marine protected areas have had their share of **groundings**.

In response to these accidents, and in order to minimize physical and biological damage to the only shallow-water coral reef system in North America, the United States Congress designated an "Area To Be Avoided" by vessels longer than 50 meters as they transit the Florida Keys National Marine Sanctuary (FKNMS). Unfortunately, this measure has not eliminated groundings in the sanctuary. On February 2, 1997, the containership, *Contship Houston*, ran aground in the FKNMS. An extensive coral salvage operation is currently underway to glue fractured coral heads together and right corals and sponges

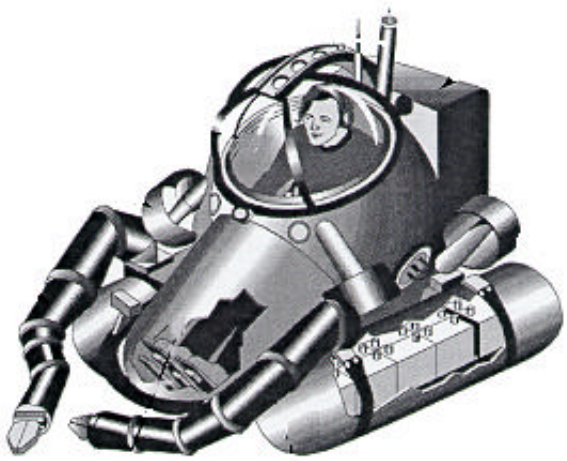
which were overturned during this most recent grounding.

Deep Worker

Deep Worker is a one-person **submersible** that is currently being used in the Sustainable Seas Expeditions. It allows a research scientist to remain underwater longer and to go deeper than he or she normally would be able to using SCUBA equipment. From Deep Worker, a scientist can perform a multitude of tasks: collect samples, run water quality transects, and photograph and film marine plant and animal life.

The submersible is a steel, space-like craft that is 8.25 feet long, 5.3 feet across its beam and has a height of 5.75 feet. Out of the water, it weighs 1.3 tons (2600 pounds). It can carry 250 pounds of payload, or a single person. It travels at a speed of 3-4 knots, and can dive to and operate at 2000 feet below the surface of the water.

Using Deep Worker, a scientist has 106 hours of life support, supplied by two externally mounted oxygen cylinders. However, the 20 batteries powering the four thrusters will last for only five to six hours under constant operating conditions. In warm climates, due to human limitations, about four hours is the limit a researcher can remain underwater.



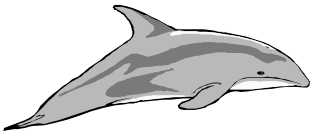
An illustration of the Deep Worker submersible.

Activity 2-1: Ocean Animals vs. Humans

Teachers: Use information about ocean animals vs. humans to teach ratios to your students. They will find it fun and interesting to see how humans fare against these athletic animals.

Objective: Students will use critical thinking skills to solve word problems and use ratios to compare humans to ocean animals.

Materials:



- paper
- pencils
- World Atlas
- Ocean Animals vs. Humans Worksheet

Activity: Have the students work out the following problems. All of the information needed is presented in each question. Students may work with partners if the teacher wishes.

Answer Key for Teachers:

1. The dolphin can jump 8 feet 2 inches higher than the male, and 9 feet 2 inches higher than the female. Ratios are: male:dolphin = 1:2; female:dolphin = 1:2.4.
2. Answers will vary depending on the route measured from Lisbon to New York.
3. For example, if the student is 5 feet tall, he/she could hypothetically dive 1,003 feet deep using this ratio.
4. 40 to 400 inches.
5. If a human were running at the same speed as the Olympic record, it would take approximately 9 hours and 30 minutes to travel 100 miles a day.

Ocean Animals vs. Humans Worksheet

Directions: Answer each question on a separate sheet of paper. Show all work and place a box around your final answer. Be sure to use the correct units on all numbers.

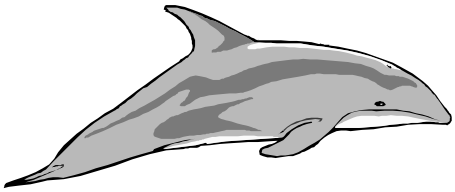
1. A bottlenose dolphin can jump up to 16 feet out of the water. The male Olympic record for the high jump is 7 feet 9.75 inches. The female Olympic record is 6 feet 8 inches. How much higher can the dolphin jump than the male? Female? Now express your answers as ratios of male:dolphin, female:dolphin.

2. If a green sea turtle travels across the Atlantic Ocean at 1 mile per hour, how long will it take the turtle to cross from Lisbon, Portugal to New York, New York? How does this compare to the human travel time on a cruise vessel with top speed of 30 miles per hour?

3. A sperm whale is 50 feet long and can dive up to 1.9 miles deep. Using this ratio of length vs. diving depth, how deep could you dive (hypothetically) using your height?

4. Coral polyps grow very slowly, between 0.5 - 4 inches per year. If a coral polyp starts to grow when the modern Olympic Games started in 1896, what's the most it will have grown by the time of the 1996 Olympics in Atlanta? What's the least it will have grown?

5. The Arctic tern has the longest migration route of any bird. It migrates from Antarctica to the Arctic every year, traveling 24,000 miles in 8 months. This in an average of 100 miles per day. The women's Olympic record is 2 hours 24 minutes and 52 seconds for the 26-mile marathon. Using the women's record, how long would it take a human to run the daily migration distance of 100 miles?



Student Activity Sheet 2: Reef Surveys and Reef Balls

Scientists are trying to save coral reef organisms in many ways. In broadcast number 2, you will learn about reef surveys. Read on for another way scientists are trying to restore the environment.

Reef Ball is a human designed artificial reef used to restore ailing coral reefs and to create new fishing and SCUBA diving sites. Reef Balls are the only artificial reef that can be floated and towed behind any size boat!

Reef Balls are made of a special, marine friendly, concrete and are designed to mimic natural reef systems. They are used around the world to create habitats for fish and other marine and freshwater species. Reef Balls are made in many sizes to best match the natural reef type that is being mimicked. Scientists are very hopeful that these will be useful, and help to create aquatic habitats.

For more information, visit www.reefball.org and www.reefball.com.

DID YOU KNOW?

The word Astronaut/Cosmonaut has maritime origins? It comes from the word *nautes*, which means sailor. So an astronaut is a “star sailor.” The word skyscraper originally referred to the topsails of ships! The topsails were called skyscrapers, which later became the name for tall buildings.