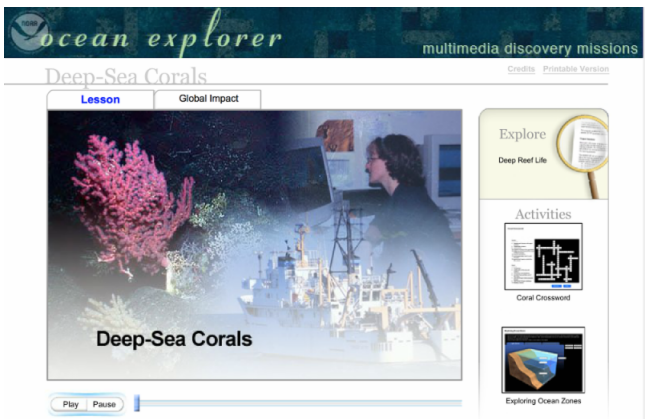
Ocean Exploration and Research

Ocean Exploration Education Highlights

April 2017

Welcome to the NOAA Ocean Explorer Education Highlights newsletter. This monthly newsletter provides you with quick access to ocean exploration-focused, standards-based tips and tools to bring the excitement and science of ocean exploration into your classroom!

What's the Latest from NOAA Ocean Exploration for Your Classroom?



The Ocean Explorer Multimedia Discovery Missions are a series of 13 interactive multimedia presentations and learning activities that address a wide range of ocean topics.

Deep-sea Corals - A Multimedia Discovery Mission

Coral reefs are vibrant ecosystems teeming with color and life. Most grow in the warm sunlit waters of tropical seas. Beautiful and accessible, shallow water corals are beloved by the public and well known to scientists. In contrast, deep-sea corals are generally unknown and unappreciated. Living in the icy darkness of the abyss, these creatures are difficult and expensive to study. For most of the 20th century, deep-sea corals could only be studied when fishermen accidentally pulled a broken specimen to the surface. In the last few years, scientists have used sophisticated submersible and underwater sensing technologies to penetrate the corals' remote realm.

Currently, scientists on the NOAA ship *Okeanos Explorer* are investigating bio-diversity in areas around American Samoa, including deep-sea coral communities. The Deep Sea Coral Multimedia Discovery Mission is an interactive multimedia presentations and learning tool that includes a short video lesson, a second video on global impact, and online interactive student activities.

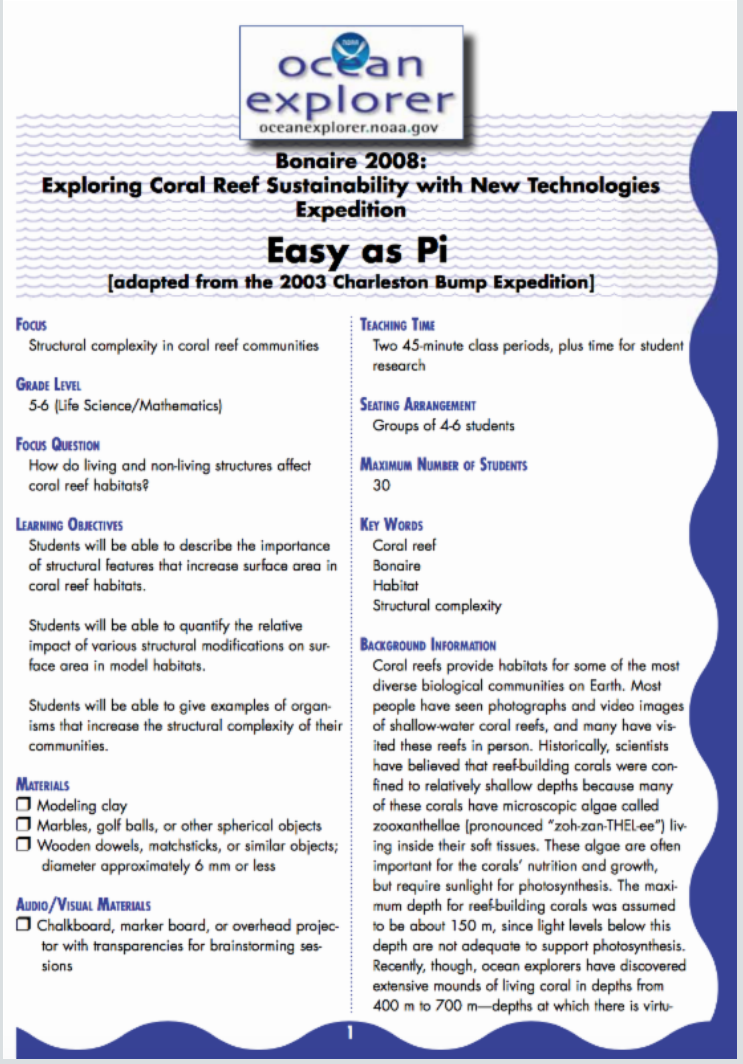
Standards-based Lesson

Easy as Pi

(Grades 5-6)

During the 2017 American Samoa Expedition: Suesuega o le Moana o Amerika Samoa expedition on board the NOAA Ship *Okeanos Explorer* we are investigating several seamounts located east of Vailulu'u around American Samoa. Seamounts are formed by volcanic processes that create a mountain on the seafloor which can be close to the water surface or thousands of meters deep, and they provide important habitat for diverse species such as coral and sponge communities.

In this lesson, students engineer a model benthic habitat site to learn about habitat variety and structural features that increase surface area and quantify the relative impact of various structural modifications on surface areas. Students will also be able to give examples of organisms that increase the structural complexity of communities.



ocean explorer
oceanexplorer.noaa.gov

Bonaire 2008:
Exploring Coral Reef Sustainability with New Technologies Expedition

Easy as Pi
[adapted from the 2003 Charleston Bump Expedition]

Focus
Structural complexity in coral reef communities

Grade Level
5-6 (Life Science/Mathematics)

Focus Question
How do living and non-living structures affect coral reef habitats?

Learning Objectives
Students will be able to describe the importance of structural features that increase surface area in coral reef habitats.

Students will be able to quantify the relative impact of various structural modifications on surface area in model habitats.

Students will be able to give examples of organisms that increase the structural complexity of their communities.

Materials
- ❒ Modeling clay
- ❒ Marbles, golf balls, or other spherical objects
- ❒ Wooden dowels, matchsticks, or similar objects; diameter approximately 6 mm or less

Audio/Visual Materials
- ❒ Chalkboard, marker board, or overhead projector with transparencies for brainstorming sessions

Teaching Time
Two 45-minute class periods, plus time for student research

Seating Arrangement
Groups of 4-6 students

Maximum Number of Students
30

Key Words
Coral reef
Bonaire
Habitat
Structural complexity

Background Information
Coral reefs provide habitats for some of the most diverse biological communities on Earth. Most people have seen photographs and video images of shallow-water coral reefs, and many have visited these reefs in person. Historically, scientists have believed that reef-building corals were confined to relatively shallow depths because many of these corals have microscopic algae called zooxanthellae (pronounced "zoh-zan-THEL-ee") living inside their soft tissues. These algae are often important for the corals' nutrition and growth, but require sunlight for photosynthesis. The maximum depth for reef-building corals was assumed to be about 150 m, since light levels below this depth are not adequate to support photosynthesis. Recently, though, ocean explorers have discovered extensive mounds of living coral in depths from 400 m to 700 m—depths at which there is virtu-

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For more educational materials on seamounts, including lessons, essays and multimedia resources, visit our Seamount Theme Page.

Note: All lessons are written to support the NGSS and the Ocean Literacy Essential Principles and Fundamental Concepts.

Image of the Month

Spectacular Jelly

Is this a UFO spotted in the night sky? No! An alien observed in space? No! It's a jelly seen in our ocean!

This jelly was imaged during our first dive on 'Utu' seamount, on February 21, 2017. *Image courtesy of NOAA OER, 2017 American Samoa.*

Scientists saw this spectacular looking jelly on February 21, 2017, during the 2017 American Samoa Expedition: Suesuega o le Moana o Amerika Samoa expedition on Utu seamount. In this image, you can see the arrangement of the two sets of tentacles; scientists think this is a position that allows for optimum feeding in the midwater environment at ~3,000 meters.

This jelly is in a family of hydromedusae called Rhopalonematidae, which is known for the canals running vertically on the inside of the bell, gonads attached to these canals, and sometimes having two sets of tentacles.

Through remotely operated vehicle video observations such as this, we can learn much about the animals in the midwater and what they are up to when we can catch them in an undisturbed manner.

Join Us as the NOAA Ship *Okeanos Explorer* Makes New Discoveries!

The 2017 field season is well underway! Join scientists from around the world as they explore the deepest, darkest reaches of our planet's last unknown frontier, and hear them discuss their findings and watch as true discoveries unfold!

Yellow zoanthids colonizing the base of a dead golden octocoral skeleton. *Image courtesy of NOAA OER, 2017 American Samoa.*

The Mountains in the Deep: Exploring the Central Pacific Basin Expedition will run from April 27 through May 19, 2017, and will investigate unknown and poorly known deepwater areas in the Kingman Reef and Palmyra Atoll, and Jarvis Island units of the Pacific Remote Islands Marine National Monument, around the Cook Islands Marine Park, and the high seas.

Mark your calendars for a Webinar for Educators on April 20, 7 PM EST/1 PM HST. This 1 hour presentation will share the science behind the expedition and online resources for educators to help bring this expedition to life in your classroom. Registration information will be posted on our website later this month.

Another webinar for Educators will be hosted on April 27, 7 PM EST/1 PM HST to introduce the Exploring the Sunken Heritage of Midway Atoll: Honoring the Legacy of the 75th Anniversary of the Battle of Midway Expedition. This expedition will take place May 2 through May 16, 2017.

You can watch the ROV *Deep Discover's* live video feeds on your computer here. You can also download our free mobile app (for iOS or Android devices) that will allow you to bring the excitement of ocean discovery directly to your smart phone or tablet.
Or visit our website to see exciting discoveries we have made thus far this year.

An overview of the entire 2017 field season can be found here.

The women on board the NOAA Ship *Okeanos Explorer* during the Discovering the Deep: Exploring Remote Pacific Marine Protected Areas expedition. These women represent all aspects of life at sea, from the officers, deck crew, engineers, support staff, and scientists. *Image courtesy of NOAA OER.*

Teachers build a methane hydrate model during the Exploring the Deep Ocean with NOAA Professional Development workshop for educators at the Loveland Living Aquarium in Draper, Utah in March 2017. A shark tank was a pleasant backdrop during the workshop. *Image courtesy of NOAA OER.*

If You Could Be Any Sea Creature, Which Would You Be?

Amanda Demopoulos, a Research Benthic Ecologist for the U.S. Geological Survey (USGS) at the Wetland and Aquatic Research Center in Gainesville, Florida, was recently asked this question during the 2017 Discovering the Deep: Exploring Remote Pacific Marine Protected Areaexpedition. Amanda had to think for a moment, then she said: "I would probably want to be any animal that can travel vast distances, maybe a tuna. I think it would be cool to travel far-reaching distances and see the different environments and ecosystems in the ocean. I don't think I would do well as a deep-sea coral. It would be boring staying in one place for thousands of years. As a benthic ecologist, I do not think I would do well as the critters I study."

Amanda's work examines the community structure and function of animals found on the seafloor or in the mud (a.k.a. sediment). After completing a post-doctoral fellowship at Scripps Institution of Oceanography, Amanda obtained her current position at USGS, where she conducts research on the community ecology of coastal wetlands, seagrass habitats, shallow and deep-sea corals, seeps, and submarine canyon environments.

This expedition had a record number of women on board the *Okeanos Explorer,* and Amanda was one of the two lead scientists. She gave us an inside look at what it is like to be a female scientist at sea. She said: "I have been sailing on vessels since

Upcoming and Past Education Professional Development

NOAA OER holds Professional Development workshops for educators at 15 alliance sites across the country to help bring exploration-focused, standards-based tips and tools and the excitement and science of ocean exploration into classrooms.

In addition to these regular offerings, NOAA OER also hosts workshops on request at select locations. On March 4th, 2017 OER held a Professional Development workshop at the Loveland Living Planet Aquarium in Draper, Utah. The workshop was attended by 26 educators from across the state and several Aquarium staff. During and after the workshop participants expressed how informative and enjoyable it was, and how the workshop will help them enhance their classroom instruction. "To understand exactly what NOAA is doing and have real time data will greatly enhance student engagement. The more confident I am [in the ocean science I teach] the more students will learn" said one teacher.
Less than two weeks after the workshop another teacher said: "I have already used portions of the lessons and ideas from the workshop in my classroom".

If you want to learn about why and how we explore the deep ocean, please attend one of our free educator professional development workshops at an aquarium or science center near you!

Upcoming workshops in April, May and June

1995. Personally, I have seen a change throughout my time starting as undergraduate student to now at United States Geological Survey (USGS). It is now part of the status quo for women to participate in every operation at sea. For example, on the *Okeanos Explorer* for this expedition, we have women working as part of the deck crew and engineering staff, as officers, and as members of the science team. It is now more accepted for women to leave home and go to sea. I have had great experiences as a woman at sea which keeps me coming back."

Read more about Amanda's compelling work during this expedition and about her path to science.

will be held in Louisiana, Massachusetts, New Hampshire, California, North and South Carolina, Maryland, and Illinois. The complete Spring/Summer 2017 professional development schedule for *Exploring the Deep Ocean with NOAA* is posted on our website.

Note:
This workshop is a combination of the previously offered Why Do We Explore? and How Do We Explore? workshops.

We hope that these Exploration Education Highlights will help you focus more of your classroom teaching and learning on the amazing discoveries taking place right here, right now, on our own Planet Ocean! Onward and downward!

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