NOAA Gray's Reef National Marine Sanctuary
Acoustic Fish Tagging Project
Activity: Discover Gray's Reef Habitats – Grades 6-8
Developed by C.J. Carroll and Cathy Sakas – 9/3/2009

Focus
Benthic habitats found at Gray's Reef National Marine Sanctuary

Focus Questions
What types of habitats are found at Gray's Reef National Marine Sanctuary?
What physical features make the habitats different?
What organisms can be found at each habitat?
Is one habitat more important than another? Why?

Learning Objectives
- Students will describe the different types of habitats found at Gray's Reef.
- Students will learn and discuss why each habitat is important for organisms that live there.
- Students will sculpt or draw a model of the habitats found at Gray's Reef.

Material Provided
- Pictures of the benthic features (fig. 1)
- Habitat map of Gray's Reef NMS(fig. 2)

Materials Needed
- ✓ 1 package of multi colored modeling clay per team or 1 package of white Crayola modeling clay that can be colored with magic markers per team
- ✓ One set of non-toxic magic markers per team
- ✓ 3' X 2' sheet of cardboard or heavy poster paper for each team
- ✓ Toothpicks and labels or small pieces of paper to serve as labels – allow 25 of each item. The markers are to be placed in each feature for identification purposes.
- ✓ One pair of blunt nose scissors per team to use to cut paper for labels and to affix labels to toothpicks

OR…….
- ✓ One set of non-toxic magic markers per team
- ✓ One pack of plain, white, recycled paper (either drawing or copy paper)

Total Teaching Time
Two 45-minute periods

Seating Arrangement
Sufficient space for each student to draw comfortably

Maximum Number of Students
30

Key Words
Benthic organisms
Densely colonized live bottom
Limestone
Rippled Sand
Undercuts
Benthos
Flat Sand
Live bottom
Sparsely colonized live bottom

Background Information

In this lesson, students will learn about four different habitats found offshore of the Georgia coast.

Gray's Reef National Marine Sanctuary encompasses 22 square miles and is located about 20 miles off the coast of Sapelo Island, Georgia. It is considered to be a "live bottom" which is a hard or rocky seafloor that typically supports high numbers of large invertebrates. This rocky or hard bottom was created between six and two million years ago. It was formed by the rising and falling of the sea water level. This level change caused the marine and terrestrial sediments (shell fragments, sand, and mud) to consolidate, or cement, together. The very briny, calcium-carbonate rich water helped hold the particles together and formed what is now known as the porous limestone found at Gray's Reef.

The ledges found at Gray's Reef are very diverse from one another, ranging from a very few centimeters in height to as tall as six feet. Each ledge can contain any number of crooks and crannies, caves, undercuts, mounds, etc., but all are different. The more available surface area that each ledge has, the more room there is for invertebrates to attach and thus the more productive that area can be.

Live bottoms are hard bottom areas that support life. A densely colonized live bottom habitat is an area of hard bottom that contains 60-100% of invertebrates attached to the substrate. A sparsely colonized live bottom is

an area of hard bottom that contains less than 60% of invertebrates attached to the substrate. The types of invertebrates that attach to the substrate are corals, sponges, and tunicates. Other types of invertebrates, such as sea stars, urchins, shrimp, crabs, and lobsters, can be found around live bottom areas as well as some small vertebrate fish. These mobile animals live in and around the crevices and cracks of the hard bottom structure and will usually feed on the non-mobile (or sessile) invertebrates. The flat sand and rippled sand habitats are areas that are empty of hard bottom structures and therefore do not offer suitable surfaces for sessile invertebrates to attach, but they are not empty of life. The sand can be filled with invertebrates that bury themselves, such as clams, tube worms, and polychaetes. Also, some soft corals and sponges can be found in these areas, but they usually occupy less that 1% of the total area. Vertebrate fish can also be found in these areas, but the ones that lay on the sand or bury themselves in it are the most common.

Period #1: 45 minutes

Seating Arrangement
Sufficient spaces and surfaces for each team to create ocean floor models

Activity Instructions
Ask your students to draw what they think the habitats in Gray's Reef National Marine Sanctuary look like on a blank sheet of paper with either regular leaded or colored pencils. Let them know that their assignment is to draw what they think the features of the ocean floor look like.

Next discuss their drawings and make corrections by referring to the pictures and maps provided.

Period #2: 45 minutes

Seating Arrangement
Sufficient spaces and surfaces for each team to create habitat models

Activity Instructions
Divide the class into teams of two or three. Distribute sheets of cardboard, modeling clay and magic markers. Ask the students to create a model of the habitats seen at Gray's Reef. Make sure they include all four habitat types in the model. Also, have students make their own receiver array and place it in the model near a densely colonized ledge.

Please display the pictures and maps provided for reference purposes.

Extensions:

#1. Visit a public aquarium with your students and observe the various habitat types represented in each of the tanks. Discuss the various types. Emphasize how different organisms are adapted to different habitats and how.

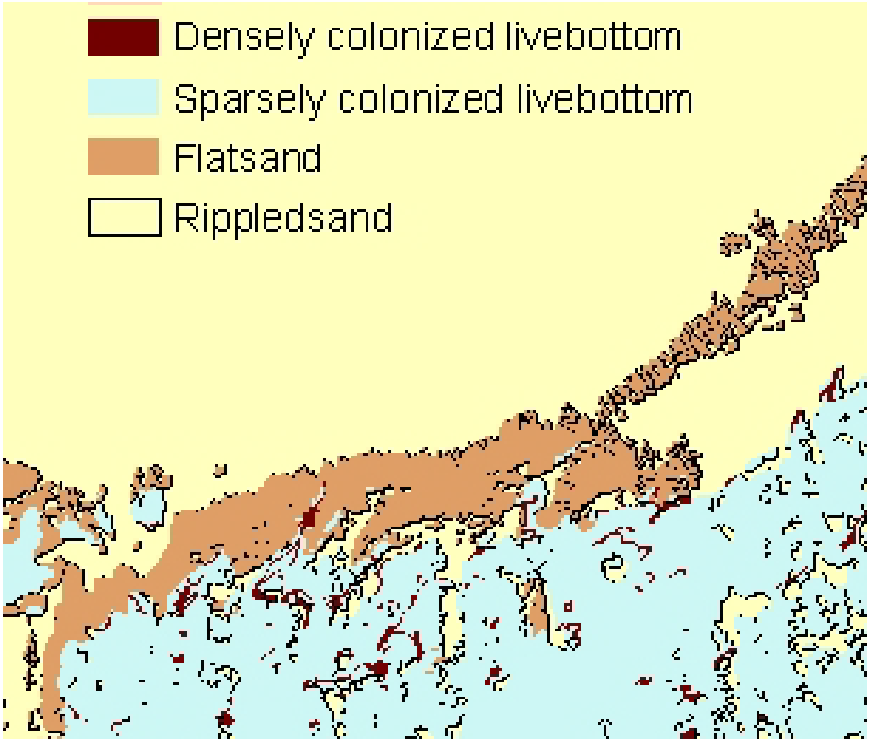
#2. Assign or ask the students to choose a specific habitat (in or outside of Gray's Reef) and write a report on it. The students should be able to use the internet to research and to download images.

#3. Ask students to research and write a report or develop a power-point presentation on a technology used for ocean exploration such as remotely operated vehicles, autonomously operated vehicles, submersibles, autonomous underwater listening stations, passive acoustic monitoring stations, telepresence, etc.

#4. Ask students to design a vehicle they would use to explore the ocean bottom. The model should be to scale. The students will need to specify dimensions of and materials that comprise their vehicles' various parts.

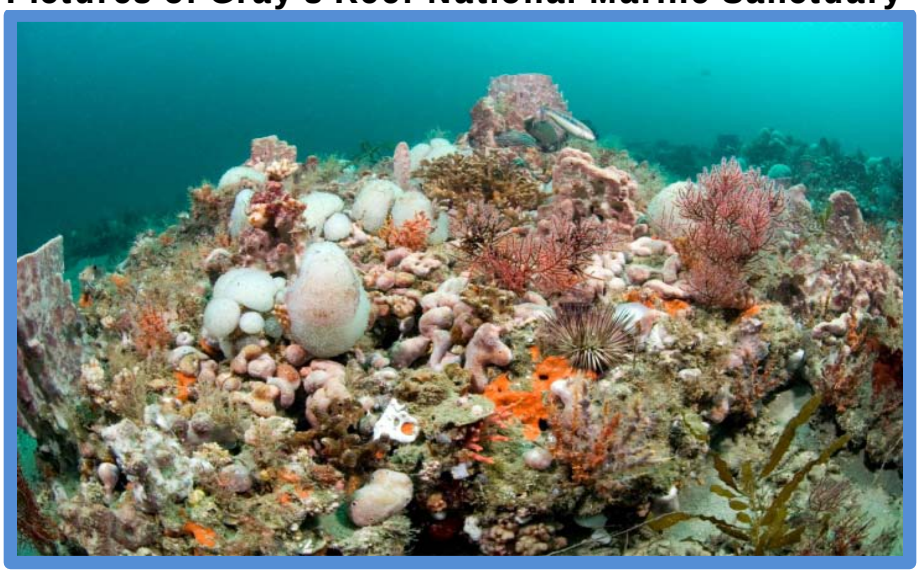
#5. Have students write a newspaper article describing an imaginary expedition to a specific area of the ocean floor using the vehicle they designed. They will need to include all habitats they are likely to encounter and the organisms that inhabit them.

Map of an area of Gray's Reef National Marine Sanctuary and the habitats available there



This is a map of a small portion of Gray's Reef that shows where the four different habitats at Gray's Reef National Marine Sanctuary can be found in relation to one another.

Pictures of Gray's Reef National Marine Sanctuary



This is a picture taken at Gray's Reef National Marine Sanctuary that depicts a densely colonized live bottom habitat. (Photo credit: Greg McFall)

This is a picture taken at Gray's Reef National Marine Sanctuary that depicts a sparsely colonized live bottom habitat. (Photo credit: Greg McFall)

This is a picture taken at Gray's Reef National Marine Sanctuary that depicts a flat sand habitat. The fish in the photo is an oyster toad fish. (Photo credit: Greg McFall)

This is a picture taken at Gray's Reef National Marine Sanctuary that depicts a rippled sand habitat. The fish in the photo is a red grouper. (Photo credit: Greg McFall)