Teacher At Sea – Lesson Plan #2

Carol Glor – 2014
Sea Scallop Survey – 3rd Leg

Activity Title: Image Analysis Classroom Activities

Subject (Focus/Topic): Home & Career Skills students will identify species and different types of substrate found on the seafloor using HabCam images.

Grade Level: 8th grade

Average Learning Time: 1 (40 minute) class period

Lesson Summary: Students will be able to identify species and different types of substrate found on the seafloor using HabCam images collected during a Sea Scallop Survey in the Northwest Atlantic Ocean.

Overall Concept: Why do marine scientists survey the population of Sea Scallops in the Northwest Atlantic Ocean? How do scientists collect data during a Sea Scallop survey? What types of species live near the ocean floor in the Northwest Atlantic Ocean? What types of substrate is the ocean floor composed of in the Northwest Atlantic Ocean?

Specific Concepts: Students will learn about the history of the HabCam project as it relates to the Sea Scallop Survey. Students will be able to identify the species found at the bottom of the ocean floor as well as describing the substrate in each HabCam image.

Focus Questions:

- How does a HabCam work?
- What kind of species are found on the ocean floor of the Northwest Atlantic Ocean?
- What is a substrate?
- What are the differences among bony fish, cartilaginous fish, and invertebrates?

Objectives/Learning Goals:

- Given a substrate and species guide, students will correctly identify the species and substrate found in 20 images with 85% accuracy.

Background Information: This is an introductory lesson. Students should have been exposed to marine science in seventh grade science lessons. Students will be given a substrate and species guide to refer to throughout the activity.

Common Misconceptions/Preconceptions: Students may assume that as a Home & Career Skills teacher; I might not have the experience or skill to teach them about marine science. Many students do not understand that certain species are only found at the seafloor or in specific locations of the ocean.

Materials:

- Marine science educational activities (downloaded from habcam.whoi.edu)

- Image analysis pictures (word document)
- Sample HabCam images (in addition to the laminated images)
- Color copies of species and substrate guide (laminated) – 8 pages (one packet per group of students)
- 20 color HabCam images (laminated)
- Identify species and substrate forms 1a, 1b, and 1c (1 per student)

Technical Requirements:

- Teacher workstation that includes a computer with internet access as well as projection equipment

Teacher Preparation: In order to teach this lesson effectively, the teacher must thoroughly understand the NOAA Teacher at Sea program as well as being able to navigate the NOAA websites. Knowledge in marine science would be helpful as well as an understanding of the ocean as a habitat for marine life.

Keywords:

- HabCam
- Annotating
- Substrate

Pre-assessment Strategy: Introduce the lesson by asking the question: Have you ever wanted to see what lives on the seafloor?
This lesson will help you learn about organisms that live on the seafloor, what substrate they live on and their interactions and behaviors by looking at high resolution images collected by the HabCam.

Fishing has been essential to human life for centuries. We rely on fishermen for supplying fish for our tables and fishermen rely on fish for their income. In order to ensure that the supply of fish stays constant in the ocean, it is important to keep track of how many fish are available as well as how many each fisherman is catching at all times.

The HabCam Project is a collaborative research project among commercial fishermen, the Woods Hole Oceanographic Institution, and independent researchers. The primary use of HabCam has been to count the sea scallops that are in a given place and time so that fishery managers can determine, more accurately, how many scallops fishermen can harvest. Other HabCam projects repeatedly assess certain areas because of the diverse physical and biotic characteristics and their importance to fisheries. We do this so that we can learn more about ecosystem functions.

- Open the image analysis pictures and project the HabCam image for students to view.

The HabCam is a 10 ft camera system that is towed off the back of a research vessel and is “flown” over the seafloor. HabCam takes five images per second so that we can count and measure species and observe what the seafloor is made of.

- Show a sample HabCam image

We often assess every species in an image and the composition of the substrate. This process is called Image Analysis. People that analyze images are referred to as Image Analysts. The goal today is to give each of you a sense of what it is like to be an Image Analyst in the marine science field.

Substrate: the earthy material on the bottom where a marine organism lives and is made up of material such as sand, mud, and rock.

The seafloor off the coast of Massachusetts is primarily made up of sand, gravel and boulder fields. The images that you will be studying will showcase these three types of substrate.

Georges Bank is an underwater shoal that was created by retreating glaciers that moved across North America several thousand years ago. Georges Bank substrate is predominantly sand. On the shallower portions of the Bank, the sand is coarse and has been worked into ridges and dunes by tidal currents and storms. Finer sand is found on the deeper portions of Georges Bank. Gravel is found on the northern edge of the Bank.

The variety of substrates contributes to a range of habitats which support specific communities of organisms.

- Tell students to review the species and substrate guide packet that is on their table

Give students about 5 minutes to look over the 8 pages of the species guide.

- Show an example of an image and ask for volunteers to determine what species are found in the image as well as the composition of the substrate.

<u>Lesson Procedure</u>:

- Class is divided into groups and each group is given a selection of images (1-20) to analyze. As students analyze each image as a group, they will record all of the species found in the image as well as describe the substrate in each.
- The last page of the packet is a review. Students should be able to answer the questions after completing the analysis of all 20 images.

<u>Assessment and Evaluation</u>: A formative assessment includes a brief question and answer session conducted throughout the introduction as needed to check for understanding of the keywords listed above. Students will also complete the 3 pages of the packet individually as their group works together to identify the species and substrate in each numbered image. When all of the groups have completed the activities, go over the answers to check for understanding. Collect all papers to assess results.

<u>Standards</u>:

- National Science Education Standards Addressed:
    - Next Generation Science Standards:
        - Science and Engineering Practices
            - Analyzing and interpreting data
            - Engaging in argument from evidence

            - Obtaining, evaluating and communicating information
            - Asking questions and defining problems
        - Disciplinary core ideas
            - ESS3 – Earth and Space Science 3

- Ocean Literacy Principles Addressed:
    - 5 – The ocean supports a great diversity of life and ecosystems.
    - 6 – The ocean and humans are inextricably interconnected.
- New York State Science Standards Addressed:
    - MST standard 4
- New York State Family and Consumer Science Standards Addressed:
    - Standard 3 – Resource Management
- National Family and Consumer Science Standards Adressed:
    - 1 – Career, community & family connections
    - 8 – Food production & services
- Common Core Career Technical Core
    - Career ready practices
        - 5 – Consider the environmental, social and economic impacts of decisions
        - 7 – Employ valid and reliable research strategies
    - Career technical core
        - Agriculture, Food & Natural Resources Cluster
        - Science, Technology, Engineering & Mathematics Career Cluster

Additional Resources:

- habcam.whoi.edu/education.html

Author: Carol Glor
Camillus Middle School
5525 Ike Dixon Rd.
Camillus, NY 13031
cglor@westgenesee.org

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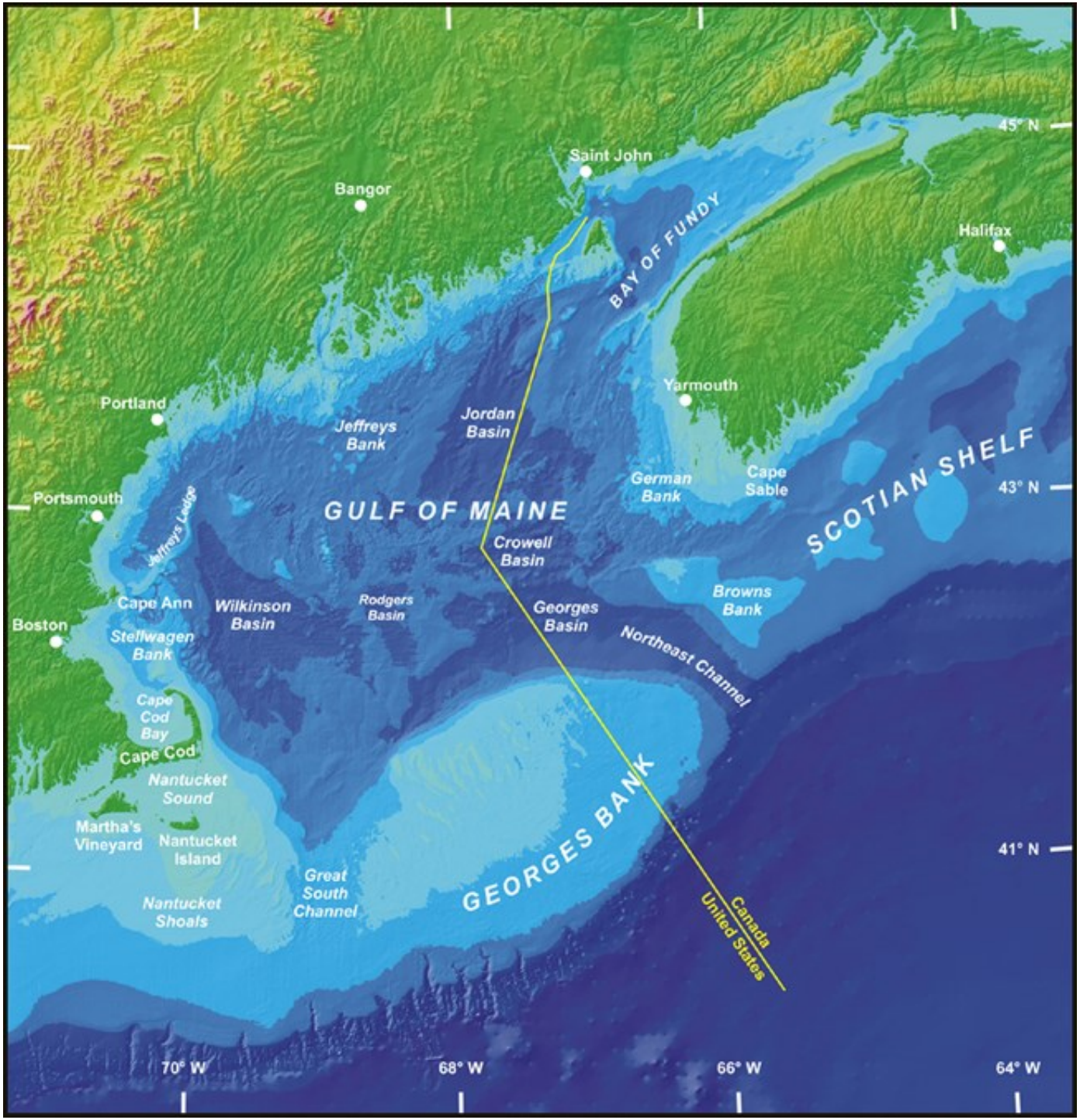

45° N
43° N
41° N
70° W
68° W
66° W
64° W
Saint John
Bangor
Halifax
BAY OF FUNDY
Yarmouth
Portland
Portsmouth
Jeffreys Bank
Jordan Basin
German Bank
Cape Sable
SCOTIAN SHELF
GULF OF MAINE
Jeffreys Ledge
Crowell Basin
Browns Bank
Cape Ann
Wilkinson Basin
Rodgers Basin
Georges Basin
Boston
Stellwagen Bank
Northeast Channel
Cape Cod Bay
Cape Cod
Nantucket Sound
Martha's Vineyard
Nantucket Island
Great South Channel
GEORGES BANK
Nantucket Shoals
Canada
United States

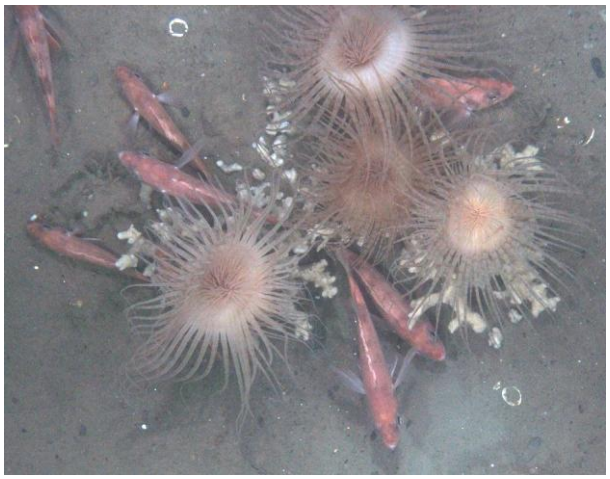
HabCam

HABCAM
Habitat Mapping Camera System

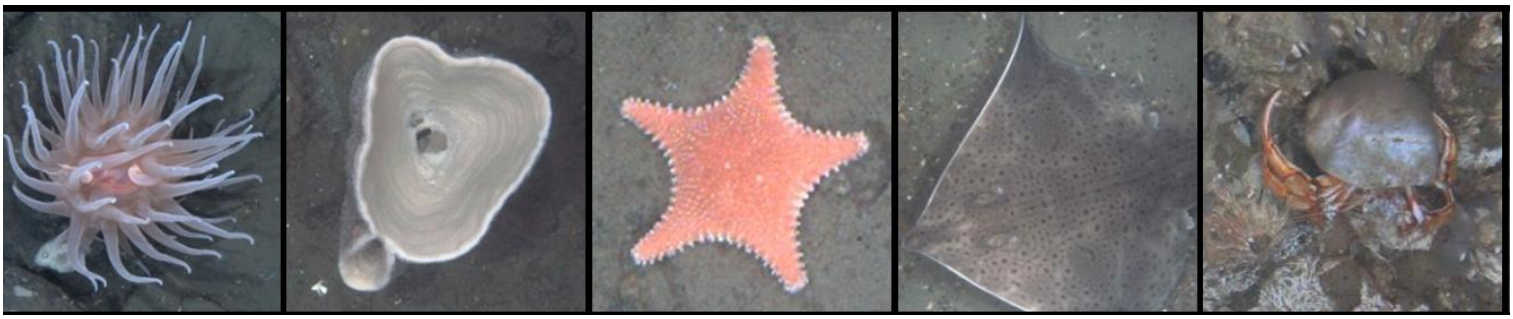
Marine Science Educational Activities

(Adaptable for Grades K-12)

Packet Contents



- Introductory materials and glossary
- Species and substrate guides
- Lessons 1 and 2 materials
- 15 image activity cards (30 images total)
- A CD with all of the above plus a Google Earth image tour



HABCAM

(Habitat Mapping Camera System)

Image Analysis Classroom Activities
Grades K-12

Introduction:

Have you ever wanted to see what lives on the seafloor? These lessons will help students learn about organisms that live on the seafloor, what type of substrate they live on and their interactions and behaviors by looking at high resolution images collected by HabCam.

Getting to Know the Sea Floor

Lesson 1: Identifying Species and Substrate Type

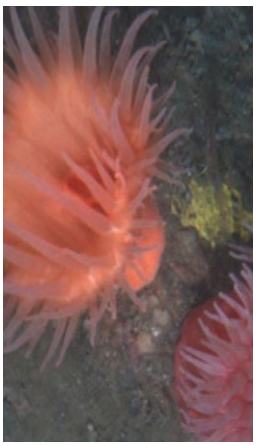
Goals: Students will identify species and different types of substrate found on the seafloor using 20 images (Grades 3 – 6).

Lesson 2: Identifying Animal Behaviors

Goals: Students will identify animals and describe their behaviors using 10 images (Grades 6 - 12).

Both lessons can be modified and adjusted to suit other grade levels. To go further, more images can be added to make the activity more challenging.

For more information go to:
http://habcam.whoi.edu/education.html



Massachusetts Frameworks:

Earth and Space Science

Grades 3 – 5

4. Explain and give examples of the ways in which soil is formed (the weathering of rock by water and wind and from the decomposition of plant and animal remains).
5. Recognize and discuss the different properties of soil, including color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.

High School

1.8 Read, interpret, and analyze a combination of ground-based observations, satellite data, and computer models to demonstrate Earth systems and their interconnections.

Biology

Grades 3 – 5

1. Classify plants and animals according to the physical characteristics that they share.
6. Give examples of how inherited characteristics may change over time as adaptations to changes in the environment that enable organisms to survive, e.g., shape of beak or feet, placement of eyes on head, length of neck, shape of teeth, color.

Grades 6 - 8

13. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.
15. Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.

More frameworks can be addressed with these lessons. Here are a selected few.

HABCAM

(Habitat Mapping Camera System)

Background

The HabCam Project is a collaborative research project among commercial fishermen, the Woods Hole Oceanographic Institution, and independent researchers. The primary use of HabCam has been to count the sea scallops that are in a given place and time so that fishery managers can determine, more accurately, how many scallops fishermen can harvest. Other HabCam projects repeatedly assess certain areas because of the diverse physical and biotic characteristics and their importance to fisheries. We do this so that we can learn more about ecosystem functions.

HabCam System

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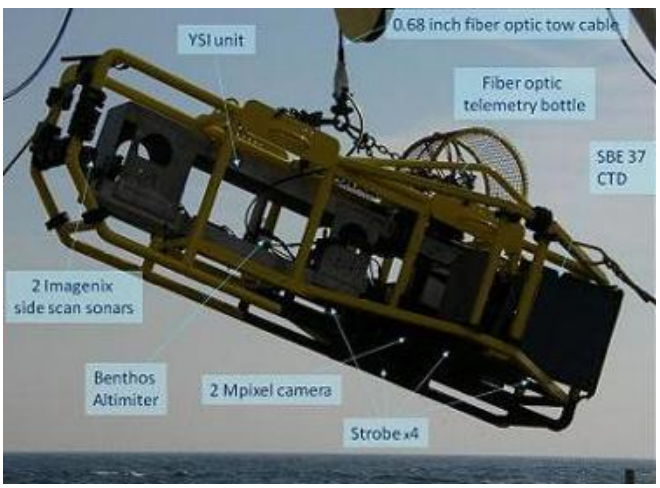

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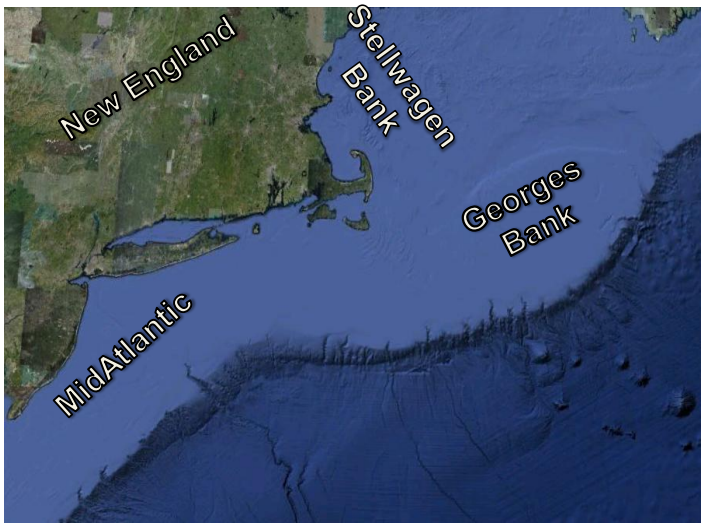


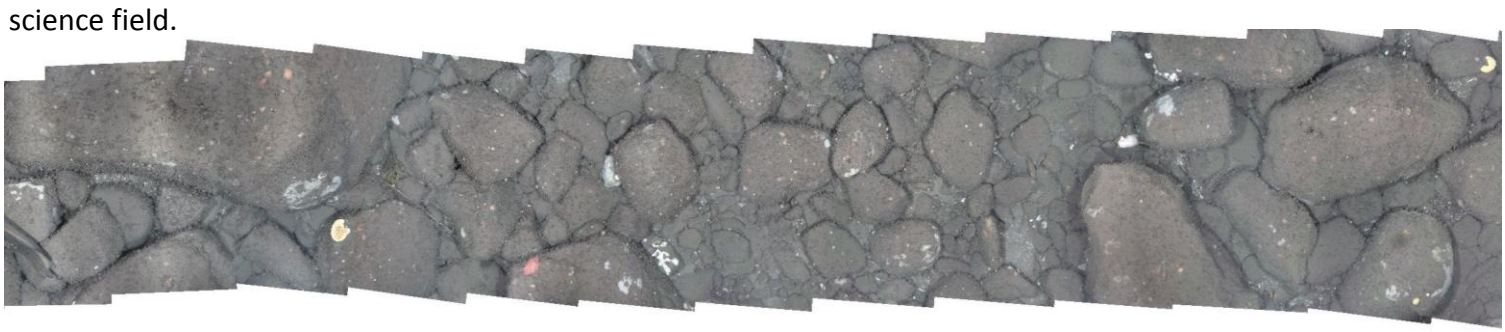
Understanding Substrate

Substrate: the earthy material on the bottom where a marine organism lives and is made up of material such as sand, mud, and rock.

The seafloor off the coast of Massachusetts is primarily made up of sand, gravel and boulder fields. The images in these lessons will showcase these three types of substrate.

Georges Bank is an underwater shoal that was created by retreating glaciers that moved across North America several thousand years ago. Georges Bank substrate is predominantly sand. On the shallower portions of the Bank, the sand is coarse and has been worked into ridges and dunes by tidal currents and storms. Finer sand is found on the deeper portions of Georges Bank. Gravel is found on the northern edge of the Bank.

It is this variety of substrates that contributes to a range of habitats which supports specific communities of organisms.

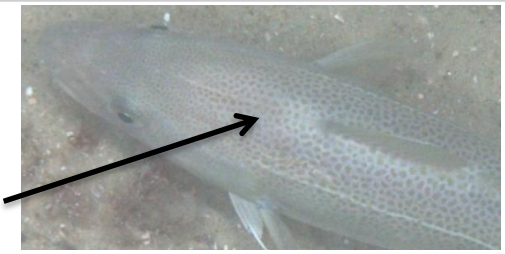


Glossary of Terms

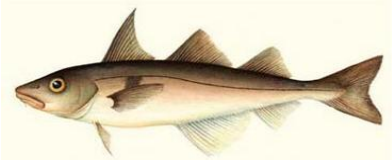
TERM	DEFINITION
Bivalve	A class of mollusks with two-part shells (e.g. scallops and clams).
Bony fish	Fish that have a skeleton made of bone.
Cartilaginous fish	Fish that have a skeleton made of cartilage.
Cephalopods	A class of mollusks with no external shell. They have large heads and well developed eyes (e.g. squid and octopus).
Cnidarians	A phylum containing thousands of species including sea anemones, coral and jellyfish. They have radial symmetry and sac-like bodies with tentacles.
Community	A community is an assemblage of populations of different species, interacting with one another.
Crustaceans	Arthropods that include lobsters, crabs, shrimp and barnacles.
Echinoderms	Animals in this group are strictly marine and can be found at a wide range of depths. Echinoderms include starfish, sea urchins, sand dollars and sea cucumbers.
Endoskeleton	An internal support structure of an animal, composed of mineralized tissue. Endoskeleton develops within the skin or in the deeper body tissues. The vertebrate is basically an endoskeleton made up of two types of tissues (bone and cartilage).
Exoskeleton	A skeleton that is outside the animal designed to protect the animal's body parts.
Fish Anatomy	See http://www.iowas.co.uk/fish%20anatomy.html
Flounder/Flatfish	A flattened fish that lives in the ocean often found on or buried in the substrate. In adults, both eyes are on one side of their body.
Google Earth	A computer application that allows you to zoom in to any place on Earth. www.google.com/earth
Habitat	The combination of geological, chemical, physical, and biological characteristics of an environment that support specific communities of organisms.
Image Analysis	To assess an image (i.e. picture) and gather information from it that can be analyzed.
Invertebrates	A broad collection of animal groups all of which do not have a backbone.
Left-eyed Flounder	These flounders lie on the seafloor on their right side (both eyes are on the left side)
Right-eyed Flounder	These flounders lie on the seafloor on their left side (both eyes are on the right side)
Skates	Group of cartilaginous fish where there are over 200 species. Skates are closely related to rays.
Substrate	the earthy material on the seafloor where a marine organism lives. Substrate is made up of material (e.g. sand, mud, rock) that is broken up by weathering.
Vertebrates	Animals that possess an internal skeleton (endoskeleton) that includes a backbone made up of a column of vertebrae

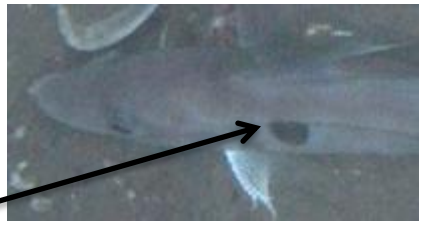
Species Guide: Vertebrates - Bony Fish

Cod
(Gadus morhua)

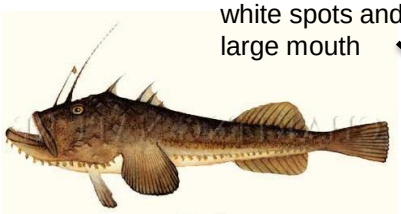


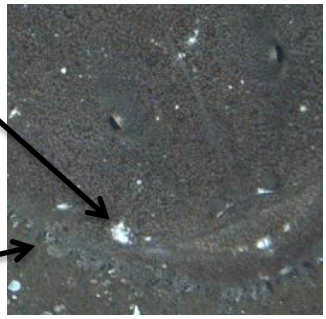
Haddock
(Melanogrammus aeglefinus)



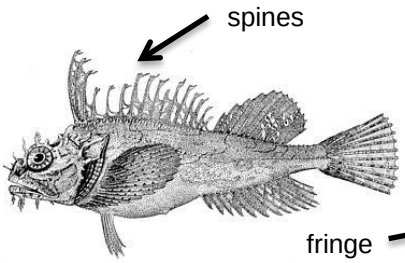


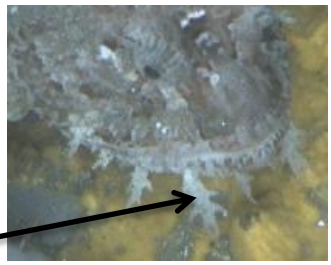
Monkfish
(Lophius americanus)



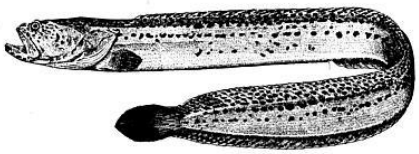


Sea Raven
(Hemitripterus americanus)



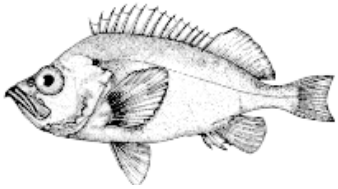


Wrymouth
(Cryptacanthodes aculatus)

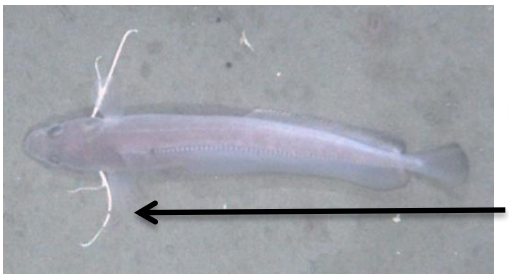


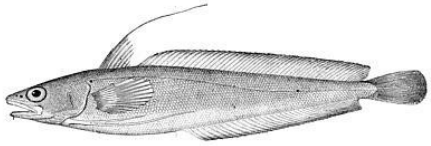
• often seen in burrow

Redfish
(Sebastes fasciatus)



Red Hake
(Urophycis chuss)





thread-like fin

Longhorn Sculpin
(Myoxocephalus octodecemspinosus)

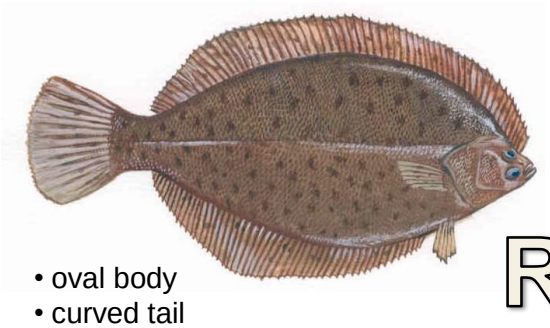
Banded pectoral fins

Species Guide: Vertebrates - Bony Fish

Flounders/Flatfish

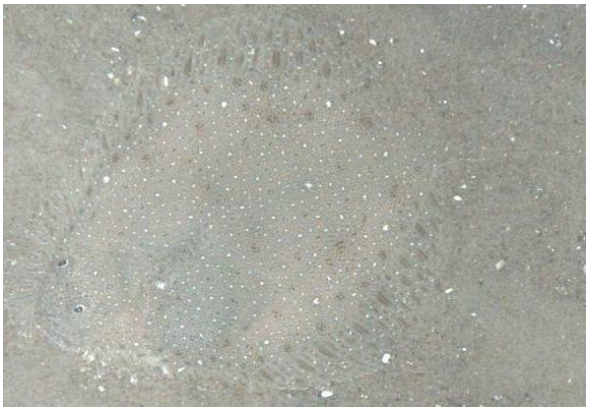
(Flatfish are either Left or Right-eyed)

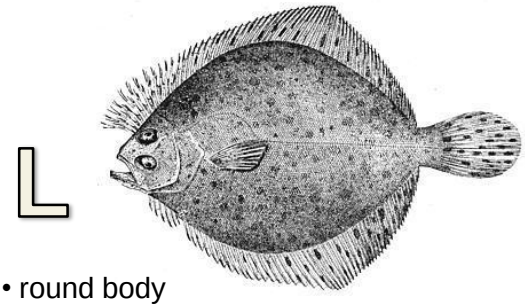
Winter Flounder
(*Pleuronectes americanus*)



- oval body
- curved tail
- many white and brown spots

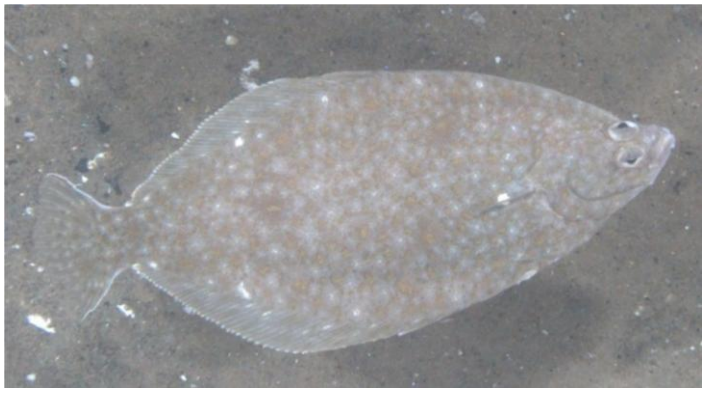
Windowpane Flounder
(*Scophthalmus aquosus*)

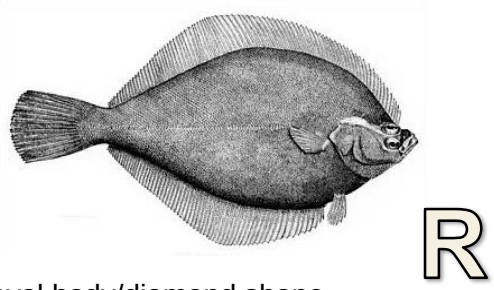




- round body
- almost translucent
- many tiny white and brown spots

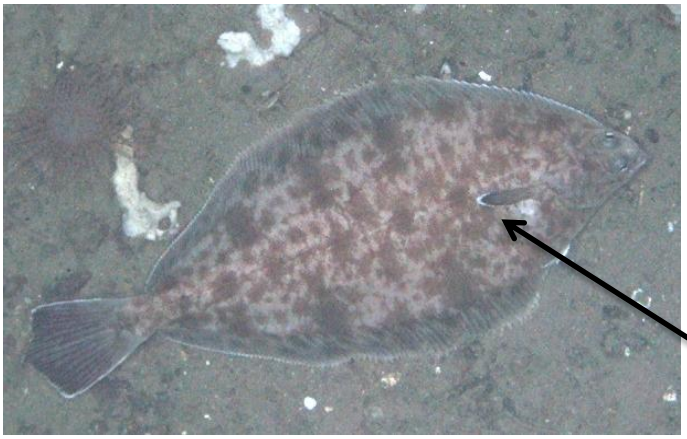
Yellowtail Flounder
(*Limanda ferruginea*)

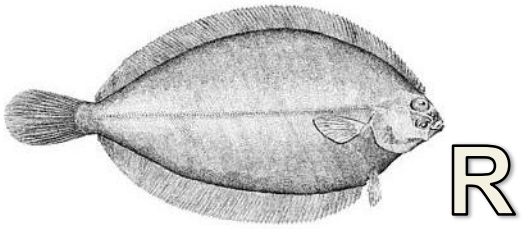




- oval body/diamond shape
- yellow/brown spotted
- protruding mouth

Grey Sole
(*Glyptocephalus cynoglossus*)

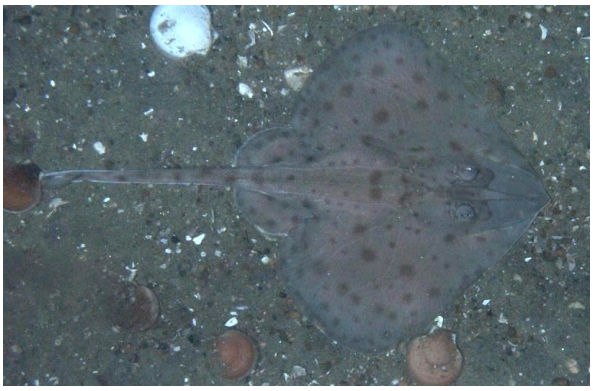




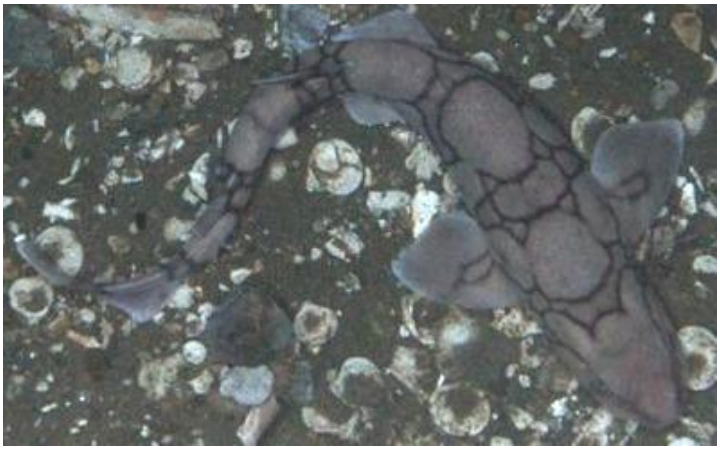
- oval body/pointed tail
- white edges on fins, particularly the pectoral fin

Species Guide: Vertebrates - Cartilaginous Fish

Smooth Skate
(Malacoraja senta)



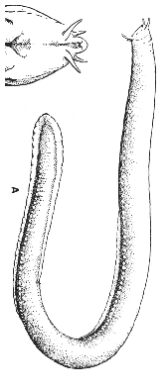
Chain Dogfish
(Scyliorhinus retifer)



Barndoor Skate
(Dipturus laevis)

Spiny Dogfish
(Squalus acanthias)

Hagfish jawless fish
(Eptatretus cirrhatus)



Species Guide: Invertebrates - Crustaceans

Jonah Crab
(Cancer borealis)

Rock Crab
(Cancer irroratus)

Northern Lobster
(Homarus americanus)

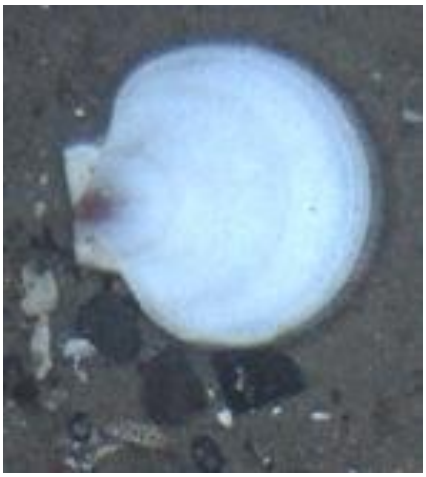
Hermit Crab
(Pagurus spp.)

Northern Stone Crab
(Neolithodes spp.)

NorthernShrimp
(Pandalus borealis)

Species Guide: Invertebrates - Mollusks

Atlantic Sea Scallop
(*Placopecten magellanicus)*



Waved Whelk
(*Buccinum undatum)*

Mussels
(*Mytilidae spp.)*

Brachiopods
(Terebratulina septentrionalis)

Longfin Squid
(Loligo pealeii)

Ocean Quahog
(Arctica islandica)

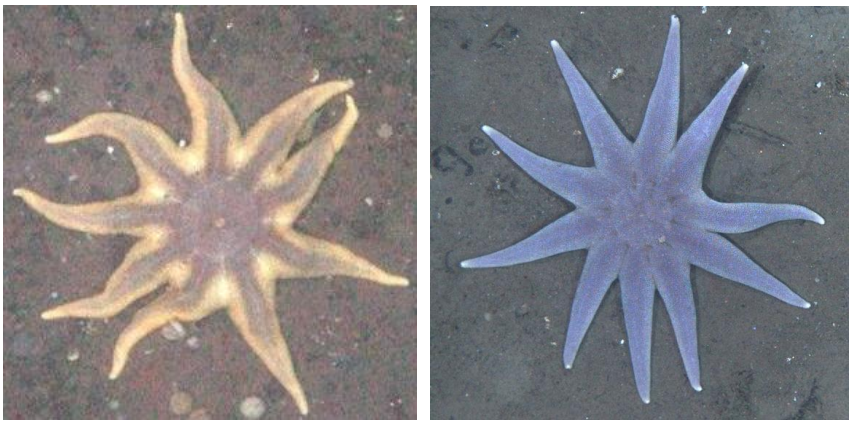
http://www.nmfs.noaa.gov/fishwatch/species/ocean_quahog

Species Guide: Invertebrates - Echinoderms

Northern Seastar
(Asterias rubens)

Sand Dollar
(*Echinarachnius parma)*

Smooth Sunstar
(Solaster endeca)



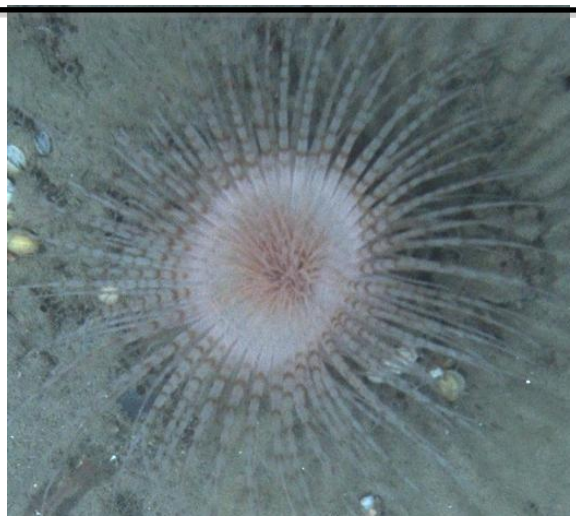
Spiny Sunstar
(Crossaster papposus)

Armored Seastars
(Astropecten americanus)

Blood Stars
(*Henricia sanguinolenta)*

Invertebrates - Cnidarians

Red Anemone
(Urticina felina)



Northern Cerianthid
(Cerianthus borealis)

Species Guide: Invertebrates - Miscellaneous

Lacy Tubeworm
(*Filograna implexa)*

Polymastia Sponge
(*Polymastia spp.)*

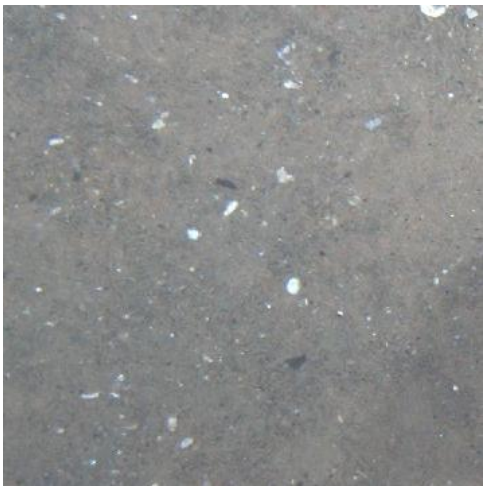
***Iophon* Sponge**
(Iophon spp.)

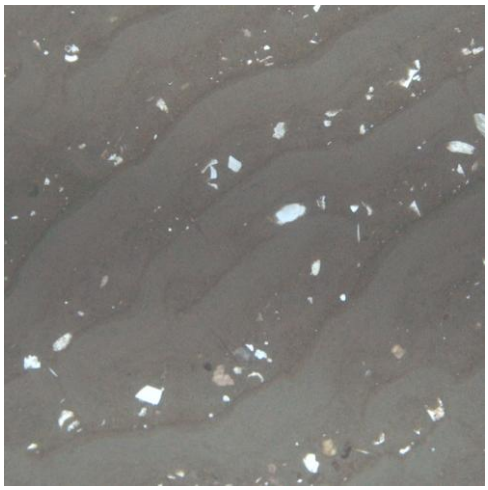
Stalked tunicates
(*Boltenia ovifera)*

Encrusting Sponges
(Porifera spp.)

Seafloor Substrate Guide

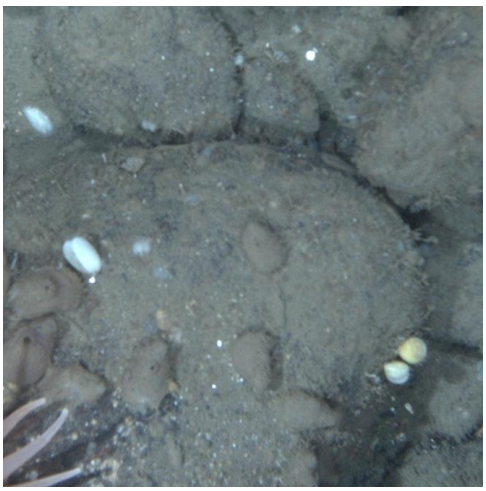
Sand





Gravel

Boulder



LESSON 1.

Getting to know the Seafloor

Identifying Species and Substrate

Goals:
Students will identify species and different types of substrate found on the seafloor.

Objectives:
1. To identify different types of species and substrate on the seafloor.
2. To discuss differences between invertebrates, vertebrates, and major taxonomic groups.

Guiding Questions:
1. What is a substrate? What are some different types?
2. What are the main differences between invertebrates and vertebrates?
3. Describe some of the characteristics that make each taxonomic group unique?

Discussion:
The seafloor consists of many different types of substrate, including rock outcrops, gravel, sand, clay, boulders, deposits of broken shells and more. Understanding substrate type helps scientists learn more about the plant and animal communities that may live there. For example: What type of substrate do you think mudstars would live in? What substrate do you think would be easiest for seastars to bury themselves in? Why do you think that animals may prefer a particular substrate (e.g. food availability, temperature, reproduction)?

Use HabCam Project images on the CD (or on activity cards) labeled "Seafloor Educational Activities" to complete the following lesson.

Materials:
- Activity Cards with Numbered Images 1-20
- Species and Substrate Guides
- Student Forms (1 A, B and C)
- Teachers Answer Sheets

Procedure:
1. Separate the class into groups of students or have students work individually.

2. Introduce topics by asking the group what they think lives on the seafloor. Discuss some differences they might see in species and what kinds of substrate they will find while analyzing the images.

3. Give each student/group a copy of the Species and Substrate Guides and provide a brief overview of the species they may encounter. Explain the differences between vertebrates and invertebrates and major taxonomic groups (e.g. Crustaceans, Echinoderms).

4. Hand out Student Forms 1 A, B and C to each group. Ask them to identify the species and substrate they see and write down their answers on the forms.

5. Each group will use the same method for the rest of the images. Teacher answer sheets for each of these forms are provided.

Name _____
Date _____

Identify Species & Substrate
Form 1A

Directions: Look at images 1-10 and identify the one main species as well as any other species you see and the substrate type(s). You have a choice of 3 substrates (see guide).

Image #	Species Identified	Substrate Type
Image 1		
Image 2		
Image 3		
Image 4		
Image 5		
Image 6		
Image 7		
Image 8		
Image 9		
Image 10		

Name _____
Date _____

Identify Species & Substrate
Form 1B

Directions: Look at images 1-10 and identify the one main species as well as any other species you see and the substrate type(s). You have a choice of 3 substrates (see guide).

Image #	Species Identified	Substrate Type
Image 11		
Image 12		
Image 13		
Image 14		
Image 15		
Image 16		
Image 17		
Image 18		
Image 19		
Image 20		

Name _____
Date _____

Review Questions
Form 1C

Lesson 1C
Species &
Substrate

Directions: After completing Forms 1A and B, answer the following questions.

1.Name three types of substrate found in these images.

A._____ B._____ C._____

2. What is a unique physical characteristic of a crab?

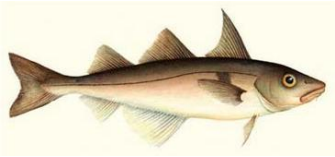
_____

3. What is a unique physical characteristic of a fish?

_____

4. Which are most similar in appearance? Circle the answer

Cod Hagfish Haddock



5. Circle all the animals you think are invertebrates below:

Sponge Cod Crab Dogfish Sand Dollar

Monkfish Lobster Sea scallop Skate

6. List 3 new species you didn't know about before looking at these images.

_____
_____
_____

7. Sea scallops are bivalves. They have two shells used for protection, for pumping water in an out to move, and for gas exchange. Circle all of the organisms that are bivalves in the list below:

Sea anemone Mussel Cod Monkfish Sea scallop

Whelk Sand Dollar Sponge Lobster Skate

Identify Species & Substrate
Form 1A [ANSWERS]

Directions: Look at images 1-10 and identify the one main species as well as any other species you see and the substrate type(s). You have a choice of 3 substrates (see guide).

Image #	Species Identified	Substrate Type
Image 1	Jonah Crab (also in image: Ocean Quahog, Red hake, and some small unknown seastars)	Sand
Image 2	Northern Seastar (or red hake)	Sand
Image 3	Sand Dollars	Sand
Image 4	Grey Sole	Sand (or Gravel)
Image 5	Chain Dogfish	Sand
Image 6	Codfish (also in image: Brachiopods, Polymastia and Iophon and Encrusting Sponges)	Sand (Gravel or Boulder)
Image 7	Northern Stone Crab (Stalked Tunicate, Brachiopods, Encrusting Sponges and small unknown seastars are also in image)	Boulder
Image 8	Hagfish (Sea Scallop also in image)	Sand
Image 9	Sea Scallops	Gravel
Image 10	Northern Lobster (also in image: Iophon Sponge, a Red Anemone, Encrusting Sponges and a Blood Star)	Boulder (or Gravel/Boulder)

Identify Species & Substrate
Form 1B [ANSWERS]

Directions: Look at images 1-10 and identify the one main species as well as any other species you see and the substrate type(s). You have a choice of 3 substrates (see guide).

Image #	Species Identified	Substrate Type
Image 11	Monkfish (also in image: 2 Sea Scallops and a Hermit Crab)	Sand (and some shell)
Image 12	Haddock (also in image: Lacy Tubeworm on rocks)	Sand (or Sand/Gravel)
Image 13	Smooth Sunstar (also in image: Lacy Tubeworm on rocks and 1 Blood Star)	Gravel (with Lacy Tubeworm and one Henricia Seastar)
Image 14	Barndoor Skate (with one Sea Scallop)	Gravel
Image 15	Spiny Sunstar (also in image: 1 Blood Star, 1 Sea Scallop, and an unknown sponge)	Gravel (or Gravel/Sand)
Image 16	Yellowtail Flounder (also in image: 1 Hermit Crab)	Gravel (or Gravel/Sand)
Image 17	Longfin Squid	Sand
Image 18	Smooth Skate	Sand
Image 19	Spiny Dogfish (Iophon Sponge and a Northern Cerianthid also in image)	Gravel (or Gravel/Sand)
Image 20	Northern Shrimp	Sand

Review Questions
Form 1C [ANSWERS]

Directions: After completing Forms 1A and B, answer the questions below:

1.Name three types of substrate found in these images.

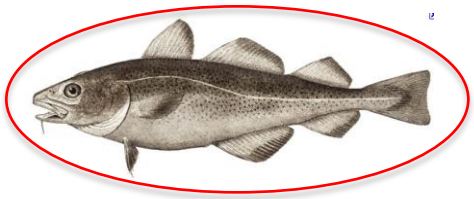
A. Sand **B. Gravel** **C. Boulder**

2. What is a unique physical characteristic of a crab?
Answer: Crabs have an exoskeleton

3. What is a unique physical characteristic of a fish?
Answer: Fish have an endoskeleton

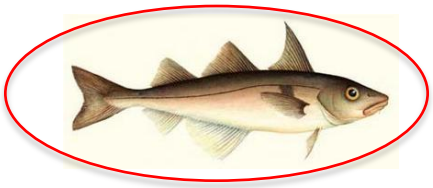
4. Which are most similar in appearance? Circle the answer
Answer: Cod and haddock are in the Gadidae Family

Cod



Hagfish

Haddock



5. Circle all the animals you think are invertebrates below:

Sponge Cod Crab Dogfish Sand Dollar

Monkfish Lobster Sea scallop Skate

6. List 3 new species you didn't know about before looking at these images.

_____

_____

_____

7. Sea scallops are bivalves. They have two shells used for protection and for pumping water in an out to move. Circle all of the organisms that are bivalves in the list below:

Sea anemone Mussel Cod Monkfish Sea scallop

Whelk Sand Dollar Sponge Lobster Skate

LESSON 2.

Identifying Animal Behaviors

Goals:
Students will identify animals and be able to describe their behaviors from HabCam images.

Objectives:
1. To identify and describe species behaviors and answer review questions.

Discussion:
Scientists use HabCam images to learn about how species interact. A lot can be learned from a still image even if the entire interaction can't be seen. Some behaviors you may see in these images are: 1) predation, 2) camouflaging and 3) burrowing

Use HabCam Project images on the CD (or on activity cards) labeled "Seafloor Educational Activities" to complete the following lesson.

Materials:
1. Activity Cards with Numbered Images 21-30
2. Species and Substrate Guides
3. Student Forms (2 A and B)
4. Teachers Answer Sheets

Procedures:
1. Ask the students why scientists care about how species interact. What would that tell us about how the ecosystem works?

2. Ask if they can explain two or three different ways they think species interact.

3. Explain that the goal of this lesson is for students to identify the main animal behaviors displayed in images 21-30.

4.Handout the 10 images (or images on CD) and have the students review these.

5. Once they are finished identifying and describing each behavior, review the images as a class and discuss what students discovered. This discussion and their completed Student Forms can be used for evaluation.

Name _____
Date _____

Identify Behaviors
Form 2A

Directions: Look at images 21-30, circle the main behavior. Write notes about what you see in the image.

Image #	Behavior	Notes about the image
Image 21	a) Predation b) Camouflage c) Burrowing	
Image 22	a) Predation b) Camouflage c) Burrowing	
Image 23	a) Predation b) Camouflage c) Burrowing	
Image 24	a) Predation b) Camouflage c) Burrowing	
Image 25	a) Predation b) Camouflage c) Burrowing	
Image 26	a) Predation b) Camouflage c) Burrowing	
Image 27	a) Predation b) Camouflage c) Burrowing	
Image 28	a) Predation b) Camouflage c) Burrowing	
Image 29	a) Predation b) Camouflage c) Burrowing	
Image 30	a) Predation b) Camouflage c) Burrowing	

Name_____
Date _____

Identify Behaviors - Questions
Form 2B

Directions: Answer the questions below.

Image #	Questions	Answers
Image 21	Which species is demonstrating the behavior you circled? How does this behavior help this animal?	
Image 22	Which species is demonstrating the behavior you circled? Guess which species is being affected in a negative way?	
Image 23	Which species is demonstrating the behavior you circled? Do you think there may be competition within this group of animals?	
Image 24	Why do you think this animal is acting this way?	
Image 25	How would this behavior help this fish?	
Image 26	Can you identify the smaller animals in the image? How would this behavior help this fish to capture its prey?	
Image 27	Can you identify this animal? What other kind of home might this animal have?	
Image 28	Can you identify both fish in this image?	
Image 29	Can you guess what this animal is eating? What other kinds of food items do you think this animal eats?	
Image 30	Can you identify what animal this is? Hint: Look at the body shape and eyes.	

Identify Behaviors
Form 2A [ANSWERS]

Directions: Circle the main behavior in the image (NOTE: dotted circles are also appropriate answers).

Image #	Behavior	Notes about the image
Image 21	a) Predation b) Camouflage c) Burrowing	
Image 22	a) Predation b) Camouflage c) Burrowing	
Image 23	a) Predation b) Camouflage c) Burrowing	
Image 24	a) Predation b) Camouflage c) Burrowing	
Image 25	a) Predation b) Camouflage c) Burrowing	
Image 26	a) Predation b) Camouflage c) Burrowing	
Image 27	a) Predation b) Camouflage c) Burrowing	
Image 28	a) Predation b) Camouflage c) Burrowing	
Image 29	a) Predation b) Camouflage c) Burrowing	
Image 30	a) Predation b) Camouflage c) Burrowing	

Identify Behaviors - Questions
Form 2B [ANSWERS]

Directions: Answer the questions below.

Image #	Questions	Answers
Image 21	Which species is demonstrating the behavior you circled? How does this behavior help this animal?	*A monkfish camouflaging in sand. Allows the fish to hide so they can capture their prey.*
Image 22	Which species is demonstrating the behavior you circled? Can you guess which species is being affected in a negative way?	*Northern seastar (preying on a sea scallop). The sea scallop is being effected in a negative way.*
Image 23	Which species is demonstrating the behavior you circled? Do you think there may be competition within this group of animals?	*Waved whelks preying on sea scallops (also in image: 2 Armored Seastars, 1 Cancer irroratus). There is potential intra-species competition among the Waved Whelks.*
Image 24	Why do you think this animal is acting this way?	*Sea ravens camouflage so they can ambush their prey. Also, in image: 1 Longhorn Sculpin, Encrusting Sponge,*
Image 25	How would this behavior help this fish?	*Burrowing gives the wrymouth fish a home from which it can ambush prey and hide from predators.*
Image 26	Can you identify the smaller animals in the image? How would this behavior help this fish to capture its prey?	*A Winter Flounder camouflaging. Covering themselves with sand helps the flounder hide from predators as well as ambush their prey. The smaller animals in this image are shrimp and hermit crabs; also there are stalked tunicates in this image.*
Image 27	Can you identify this animal? What other kind of home might this animal have?	*A Northern Lobster. Lobsters can live under boulders. There are 2 shrimp here too.*
Image 28	Can you identify both fish in this image?	*Sea raven preying on redfish. Polymastia, Brachipods, Encrusting Sponges and 1 Northern Cerianthid are also in image.*
Image 29	Can you guess what this animal is eating? What other kinds of food items do you think this animal eats?	*A dead fish. A lobster will eat almost anything alive or dead.*
Image 30	Can you identify what animal this is? Hint: Look at the body shape and eyes.	*A flounder (flatfish or windowpane flounder are also correct).*