Hands-on Science with NOAA

"Cool Catch" Game INSTRUCTION SHEET & HANDOUTS

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Email address = Elizabeth.martz@fcps.org
Audience = 6th - 8th gr. Science class; General, Merit, Honors, or Special Ed. students

Instructions for Presenter/ Teacher

- **TITLE:** "Cool Catch" = Organism Game

- **THEME:** Marine Life

- **OBJECTIVE:** Students will understand the importance of the diversity of life in the Atlantic Ocean. Students will discover facts about the different aquatic organisms and their existence in the marine ecosystem.

- **Maryland State Curriculum Connections :**
  - **SC.600.10 C = Communicating Scientific Info.**: 1. Develop explanations that explicitly link data from investigations conducted, selected readings, & when appropriate, contributions from historical discoveries. A. Organize & present data i.Tables iii.graphs & illustrations B. Interpret tables & graphs and describe relationships
  - **SC.600.30 A = Diversity of Life :** 1. Compile evidence to verify the claim of biologists that features of organisms connect or differentiate them b. Identify general distinctions among organisms that support classifying some things as plants, some as animals, & some that don't fit neatly into each group. i.animals consume food ii.Plants make food.
  - **SC.600.30 E= Ecology : 1.** Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions & resources available. A. Explain that populations increase or decrease relative to the availability of resources. C. Explain that within any environment organisms with similar needs may compete with one another for resources.
  - **SC.600.60 Environmental Sci. A**.2.Recognize & explain impact of a changing human population on use of natural resources & on environmental quality. **A**. Based on data describe the +/- impacts of an increasing human population on use of natural resources. **B.** Environmental issues 3. Recognize & explain how human activities can accelerate or magnify many naturally occurring changes. A. Based on data from research, identify & describe how natural processes change the environment. iii. population cycles.

- **OVERVIEW:** Students will participate in a "memory/ matching game" activity. Students will discover facts about diverse organisms found in our Atlantic Ocean.

Students will examine pictures taken from the NOAA boat, ALBATROSS IV, at various locations in the Atlantic Ocean. Students will record information on data charts, learn about aquatic species, analyze research, reflect about their knowledge, graph results, and assess their understanding.

- **TOTAL TIME:** 30 -45 minutes (based on discussion/ learning time)
- **SUPPLIES NEEDED:** organism picture cards (2 of each photo) & data charts

- **SAFETY PRECAUTIONS: none**

- **TEACHER PREP and PROCEDURE:**

1. Students will play a memory game where you flip over pictures & see if they match. Students, in groups of 2, will need the organism pictures and each student will need a data chart.
    a. Make copies of the "Cool Catch" game photos for the students. **Each group of 2 students will need 2 of each different photo.** (17 photos x 2= 34 photos for each group)
    b. Cut out each photo and place the photo on an index card.
    c. Make copies of the "Cool Catch" Memory Game Lab. Each student should have their own copy of the lab.
    d. Students will play the game. Students will observe the photos and learn information about each photo (see the facts on the photos). Students will record the photos that they matched.
    e. Students can learn about ecosystems. (See the information below.)
    f. Students can learn about the diversity of life found in the Atlantic Ocean. Students can discover amazing details about each organism. They can observe how organisms have a different shaped mouth, tail, head, body, and so much more. It is exciting and educational.

- **DISCUSSION POINTS:**

Students are fabulous scientists and they love pictures. In this activity, students will be able to observe, examine, and discuss the diversity of our Atlantic Ocean. This activity is an awesome introduction to a discussion of ecosystems and biomes. Students can learn information about organisms, species, populations, communities, ecosystems, and the marine Biome. One **organism** is one animal (example= ocean pout). A **species** is a group of organisms that mate & produce offspring. (Ex. an ocean pout & another ocean pout.) All of the same type of organisms in one area, it is a **population** (Ex. = all the ocean pout along the coast of Massachusetts). Many different types of organisms in an area are a **community** (Ex: ocean pout & longhorn sculpin along the coast of Massachusetts). All the diverse organisms and abiotic (non-living) objects found in an area is an **ecosystem**. (Ex.= the Atlantic Ocean along the coast of Massachusetts.) The many ecosystems in the Atlantic Ocean are a **Marine Biome**.

Students will observe, discuss, and research many organisms in this activity. Students can **learn about diverse organisms found in the Atlantic Ocean.** Students can use encyclopedias, books, internet, and other resources to learn about diverse species found in the "Cool Catch" memory game.

- **SCIENCE BACKGROUND:**

= Onboard the NOAA boat, ALBATROSS IV, I participated in a Sea Scallop Survey in August 2007. The Sea Scallop Survey is an annual series of quantitative cruises to determine the distribution and abundance of sea scallops. There are 2 parts of the survey: Part I : Cape Hatteras/ South New England; Part II : Southern New England/ Georges Bank. It was an outstanding opportunity to learn about sea scallops and their distribution in the Atlantic Ocean.

= **Information from the Aug. 2007 Sea Scallop Survey.**

Sea scallops are interesting organisms that move, live, and survive in our Atlantic Ocean. Onboard the ALBATROSS IV, numerous tests were completed on the sea scallop. The research vessel collected data on sea scallops at about 500 different stations. Sea scallops were measured in length and their weight. Inside the sea scallop is a fleshy, white material. The fleshy, white material is consumed by humans. Scientists conducted tests on the organs of the sea scallop. In the picture "Male Sea Scallop" and "Female Sea Scallop", you see details of the scallops. Students can learn many characteristics and information about the scallops. The pictures also show the scallop gonads (reproductive organs). Male gonads are white & female gonad are red. During the sea scallop study onboard the ALBATROSS IV, the FDA (Food and Drug Administration) conducted tests on the sea scallop gonads to see if they tested positive for toxins. The sea scallop survey helps scientists determine the health of the organisms and analyze the health of an environment. Sea scallops could be indicators of the good or bad conditions in an environment. Sea scallop help scientist learn about aquatic conditions and organism survival.

= Introductory Information: The Dredge of the ALBATROSS IV

The NOAA Vessel, ALBATROSS IV, is a stern trawler built in 1963. The ALBATROSS IV is an amazing NOAA (National Oceanic and Atmospheric Administration) ship. This vessel is 187 feet in length and 38 feet in width. It displaces 1,000 tons when moving across the ocean. The ALBATROSS IV studies environmental factors and conducts a multitude of experiments including an extensive sea scallop survey. The sea scallop survey is conducted in the waters of the Atlantic Ocean from Virginia to Eastern Georges Bank (off the coast of Nova Scotia). Equipment onboard the ship allows scientists to successfully explore the Atlantic Ocean and study sea scallops.

The ALBATROSS IV is equip with a pertinent piece of equipment needed to study sea scallops: a standard dredge. A dredge is 19 feet in length, has an 8-ft. wide opening, and weighs about 1600 pounds. A sweep chain of heavy metal covers the 8-ft. wide opening and the sweep chain is designed to hold the dredge open. The dredge has a strong metal cable & metal pulley

helps to reel it back onto the ship. The metal roller moves the dredge in and out of the water. The dredge is useful in collecting sea scallops.

The dredge moves across the bottom of the ocean floor collecting organisms. The dredge has a net liner that keeps fish and scallops in the dredge. Rings (2 inch in diameter) and links cover the entire dredge. The dredge bag with circle rings & double links is built to withstand rocks & collect organisms from the ocean floor. Observe the pictures "Standard dredge" and "Rings & Links" for details of the dredge. The dredge is useful for many scientific experiments of our Atlantic Ocean.

Scientists are aware of the dredge's movement in the ocean. A piece of equipment called an inclinometer is attached to the dredge. This sensor will measure the dredge's angle relative to the bottom of the ocean floor. The inclinometer will document any disturbances in the movement of the dredge. Observe the picture "CTD": a scientist is collecting information from the inclinometer and results will be analyzed. The dredge's inclinometer & equipment help scientists make conclusions about the health of the ocean.

The dredge travels great distances to collect various organisms including the sea scallops. The dredge goes out three times the water depth of the sample area. The dredge is towed for 15 minutes at a speed of 3.8 knots. The dredge covers about 1.0 nautical miles of ocean bottom. A nautical mile is compared to a 1.15 land mile. The dredge is one of the most important pieces of equipment onboard the ALBATROSS IV.

- **WORKS CITED** (if relevant)**:** I was able to capture all the pictures during my Teacher at Sea Experience in August 5-16, 2007. Any student or teacher may use the photography for science and ecosystem lessons in your classroom. The following websites are resources for finding information about aquatic organisms. The internet has a multitude of websites to help students learn about aquatic life.

www.nefsc.noaa.gov/albatross4/ = information about the Albatross IV

http://www.nefsc.noaa.gov/faq/ = multitude of facts about aquatic organisms

Handouts

- **TITLE:** "Cool Catch" Memory Game
- **SET-UP INSTRUCTIONS** = See the "Procedure" section on the lab paper

Other information ☺

- **SCIENCE EXPLANATION** (see all notes in the instructor instructions & lab)

The students will discover information as they participate in the "Cool Catch" Memory Game. The students will read the information with each photo. The students will discover the existence of diverse organisms in our ocean. Each organism is a unique and important animal in the ecosystem. Our ocean is home to many organisms, populations of organisms, different communities, and many ecosystems. Our marine biome is complex and outstanding. The students will discover that they have an impact on the world and their choices help animals survive.

The students can research these different organisms and learn about the species found in the ocean biome. Students can research animals, plants, and life found in the ocean. If you look at the extension ideas, you will see many organisms that are found in the Atlantic Ocean. Students could discuss these facts as a class.

- **EXTENSION IDEAS**

1. Students will find information about being on a NO**AA boat**. Students will read information from NOAA website about the ALBATROSS IV. Students will go to website : www.nefsc.noaa.gov/albatross4/

2. Students can write their principal a letter about traveling to sea. Students can persuade their principal to allow their class to take "field trip" to the Atlantic Ocean. Students can explain topics of interest, possible experiments, and other information about our ocean.

3. Students can use the illustrations and information from the internet to make their own dredges like the one onboard the ALBATROSS IV. Students can make their own model dredges using toothpicks, string, ribbon, plastic ties, & other materials.

4. Students can create a model of an Atlantic Ocean organism. Student can use construction paper, foam material, cotton balls, pipe cleaners, plastic cups, gravel, sequins, glitter, and so much more to create a model of an underwater organism.

5. Students can organize data from ALBATROSS IV and organisms collected.

= I hope that you can use these wonderful extension activities ☺ You can use the data for the organisms caught or for the organism weight. Or you can learn about both topics and these organisms.

- **REAL WORLD Connections**

The entire lesson relates to the real world. These organisms live in the Atlantic Ocean and they thrive because people take care of them. Students will discover the diversity of the ocean in this lesson. Students can discuss the impact they play in the survival of animals and organisms in our world. The world is a diverse and awesome place.

Ecologist : _____ Date : _____

"Cool Catch" Memory Game

Purpose = Students will discover information about organisms found in the Atlantic Ocean.
Problem = State the names of various species that exist in the Atlantic Ocean.
Hypothesis = _____

_____

_____

<u>Pre-Game Reflection</u> = Students should think about their knowledge.

Illustrate organisms & objects found in the Atlantic Ocean. Label your drawings.

Procedure =

1. Pick a partner. This is your "Cool Catch" Team.
2. Shuffle your stack of 34 photos. Place all the photos on the desk face down. (You should not be able to see any of the pictures.)
3. Decide which student will begin the game. (One idea: the students' whose birthday is closest to this day can begin the game 1st .) You're ready to play: "Cool Catch" game.
4. The first player will flip over two cards. If the cards are identical, they may keep the cards. (This is a "Cool Match".) If the two cards are different, the student will return the cards to their exact locations.
5. If the player finds a "Match", then flip over two more cards. This player will continue until they don't find a match. Then, the next player may begin their turn.
6. The game will continue until all the pictures are matched.
7. The goal of the game is to find all "Cool Catch Matches" & learn about the photos.
8. After all students have found all the "Cool Catch Matches", record the data on the charts and learn about the various photos.
9. Answer the conclusion questions on the following papers.
10. Discuss the information as a class and share scientific knowledge.

"Cool Catch" Match Chart

Record matches during the game. (Make a check mark.)

Items from the Atlantic Ocean	You	Your partner
Ocean Pout		
One Trawl		
Longhorn Sculpin		
Basic Catch with scallops		
Winter Flounder		
Spider Crab		
Skate		
Sea scallop with barnacles		
Male Sea Scallop		
Female Sea Scallop		
Sea Scallop Clappers		
NOAA Sea Scallop Survey		

"Out at Sea"		
Sunrise		
CTD		
Standard dredge		
Rings & links		

Student Reflection

1. **Summarize what you learned from this activity. State 3 or more facts.**

2. Explain what you liked and disliked about the "Cool Catch" game.

"Cool Catch" Information Chart

- Use the photos to record scientific facts on the chart.

"Cool Catch" Picture	*State the size, shape, and details of the organisms*	*Other Details and facts*
Ocean pout & scientist Andrew Norberg		
One trawl = diverse organisms		
Longhorn Sculpin		
Basic catch with sea scallops.		
Winter Flounder		
Spider crab		

Skate		
Sea scallop with barnacles		
Male Sea Scallop		
Female Sea Scallop		
Sea scallop clappers		
Cool Catch Picture	***State the size, shape, and details of the organisms***	***Other Details and facts***
NOAA Sea Scallop Survey		
"Out at Sea"		
Sunrise		
CTD		
Standard dredge		
Rings & links		

Conclusion Questions

1. Describe how our ocean is diverse & amazing. Support your ideas with scientific facts.

2. Explain how scientists identify different species & classify organisms into groups.

3. Imagine your life as a scientist, what would you like to discover & why? Share ideas.

"Cool Catch" Organism game Photos

Ocean pout & scientist Andrew Norberg. Scientist study many organisms & discover new species. **Ocean pout** are bottom dwellers found in sand, mud or rocks. These fish feed on mollusks, crustaceans and other fish. Would you eat an Ocean Pout? Why or why not?

One trawl (organism collection) onboard the ALBATROSS IV. Observe the **diverse** & interesting organisms in this trawl. What could be here? (crabs, fish, sea scallops, starfish, and more…)

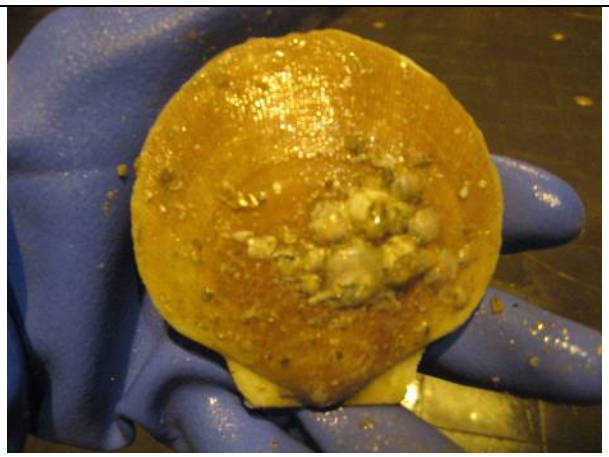
Longhorn Sculpin
These bottom feeders are generally considered edible, and have sharp spines rather than scales. They fed on shrimps, crabs, worms, mussels, squids, & other fish. Observe it. Do you think it is dangerous? (has long spines)

A **basic catch** onboard the ALBATROSS IV in August 2007. On one dredge haul, we collected 350 sea scallops. We found skates, crabs, rocks, plant life, starfish, and more. What would you like to find?

Winter Flounder
Adult winter flounders feed on a great variety of organisms including shrimp, clams, worms, fish & bits of seaweed. Have you ever enjoy flounder for dinner?

This **spider crab** was in the dredge at one station collection onboard the ALBATROSS IV. It is a bottom-dwelling organism that can reach13 ft. They feeds on shellfish and other dead & decaying animals. Wow!

Skate It is upside down & its mouth is on the bottom left side. It is a bottom-dwelling organism that swims over its food and consumes it.



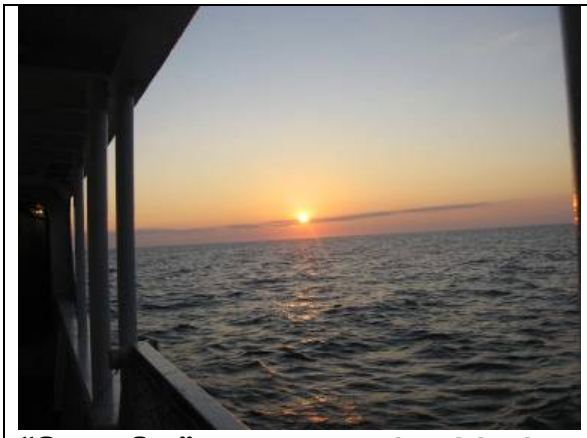
This **sea scallop** has **barnacles** on the outside shell. The sea scallop is not harmed & the barnacles benefit. This is a symbiotic relationship called commensalism.

Male Sea Scallop: collected at a night dredge 8/9/07
The sea scallop is upside down. The top of the scallop is more convex (curves out) & the bottom is more flat. The convex (top side) fits nicely in your hand due the natural curve of the shell. Do you like to eat scallops?

Female Sea Scallop: collected at a night dredge
The female sea scallop organs are red in color. The male scallop organs are off-white in color. Scientists study sea scallops for many reasons & conduct tests to see if they are safe to eat. Would you eat this scallop?

Sea scallop clappers
The sea scallop clappers are empty. The sea scallop had living material that is no longer present inside the shell. Scientists can learn about sea scallops from the clappers.

A multitude of sea scallops were collected at each station during the **NOAA Sea Scallop Survey. A Survey** is an official, scientific data collection of a species. (This 2007 survey studied sea scallops.)



"Out at Sea" August 2007 onboard the ship: ALBATROSS IV. Scientists are working, the sun is shining, & life is exciting. What do you see?

Sunrise over the Atlantic Ocean onboard the ALBTROSS IV in August 2007. Have you ever seen a sunrise or sunset? Record ideas on chart.

The **CTD is a tool** used to study C= conductivity, T= temperature, and D= Depth. The CTD information is collected at every 4th station. What tools do you use in your science classroom?

This **standard dredge** is 19 ft. in length, has an 8-ft. wide opening, & weighs about 1600 lbs. A sweep chain of heavy metal covers the opening & holds the dredge open. What could you catch?

Rings (2 inch in diameter) & links cover the entire dredge. These rings on the dredge move across the bottom of the ocean floor collecting organisms. The net liner keeps fish & scallops in the dredge. It is build to withstand the impact of rocks. Notice the circle rings & double links.

Documented & updated March 8, 2012.
If you have any questions, contact me at:

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Ecologist : _____ Date : _____

Organism Collection Data from the Albatross IV in August 2007

Problem: Students will observe & analyze data of various organisms from the Atlantic Ocean.

Hypothesis: I think these organisms live in the Atlantic Ocean: _____

_____

Materials : Use this chart and use this Key for the data tables in this Lesson

Rec. Catch = recorded number of each organism collected (each species is counted)

Expected Catch = expected number of each organism based on the recorded weight

Rec. weight =recorded weight of each organism collected (each species has a weight)

Exp. weight = expected weight of all the organism of that population

Data Chart

Station 427

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Little Skate	59	59	9.96	9.96
Silver Hake	1	1	0.08	0.08
Red Hake	22	22	1.16	1.16
Fourspot Flounder	4	4	0.90	0.90
Winter Flounder	2	2	1.76	1.76
Windowpane Flounder	4	4	0.30	0.30
Longhorn Sculpin	8	8	0.40	0.40
Northern Sand Lance	2	2	0.02	0.02
Ocean Pout	1	1	0.01	0.01
American Lobster	1	1	1.02	1.02
Sea Scallop Live	60	60	7.62	7.62

Totals:

Station 428

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Little Skate	51	51	6.40	6.40
Silver hake	1	1	0.04	0.04
Red hake	4	4	0.14	0.14
Windowpane Flounder	8	8	1.68	1.68
Sea Scallop Live	6	6	0.58	0.58

Totals:

Station 429

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Barndoor Skate	2	2	7.38	7.38
Little Skate	10	10	0.58	0.58
Silver Hake	1	1	0.03	0.03
Red Hake	14	14	1.54	1.54
American Plaice	1	1	0.04	0.04
Longhorn Sculpin	1	1	0.24	0.24
Sea Raven	1	1	0.22	0.22
Ocean Pout	1	1	0.16	0.16
Sea scallop Clapper	2	2	0.44	0.44
Sea Scallop Live	111	111	37.88	37.88

Totals:

Station 430

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Atlantic Hagfish	3	3	0.16	0.16
Barndoor Skate	1	1	2.54	2.54
Little Skate	1	1	0.76	0.76
Smooth Skate	3	3	0.76	0.76
Silver Hake	5	5	0.14	0.14
Red Hake	4	4	0.18	0.18
Yellowtail Flounder	4	4	1.04	1.04
Longhorn Sculpin	2	2	0.07	0.07
Ocean Pout	3	3	0.16	0.16
Goosefish	1	1	0.20	0.20
Cancer Crab	6	6	0.03	0.03
Asterias Boreal	10	153	0.36	5.57
Sea Scallop Clapper	2	2	0.30	0.30
Sea Scallop Live	207	621	86.66	259.98

Totals:

Station 431

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Little Skate	1	1	0.68	0.68
Smooth Skate	2	2	0.56	0.56
American Plaice	5	5	2.02	2.02
Witch flounder	1	1	0.66	0.66
Longhorn Sculpin	1	1	0.06	0.06
Ocean Pout	3	3	0.20	0.20
Goosefish	1	1	6.30	6.30
Sea Scallop Clapper	4	4	0.85	0.85
Sea Scallop Live	356	356	94.78	94.78

Totals:

Station 432

Species Name	Rec. Catch	Expect Catch	Rec. weight	Exp. weight
Little Skate	3	3	1.70	1.70
Smooth Skate	12	12	2.60	2.60
Silver Hake	1	1	0.02	0.02
Red Hake	3	3	0.24	0.24
American Plaice	6	6	0.70	0.70
Yellowtail flounder	1	1	0.18	0.18
Witch Flounder	1	1	0.42	0.42
Goosefish	1	1	0.20	0.20
Cancer Crab	2	2	0.02	0.02
Asterias Boreal	5	102	0.07	1.51
Sea Scallop Live	104	104	15.56	15.56

Totals:

Summarize the Lab: (What did you learn from the lab?)

Organism Collection Lab Conclusion Questions

1. Have you ever seen any of the species listed in this lab? Where & when did you see them? If you never saw any of these animals, would you like to see them? Why?

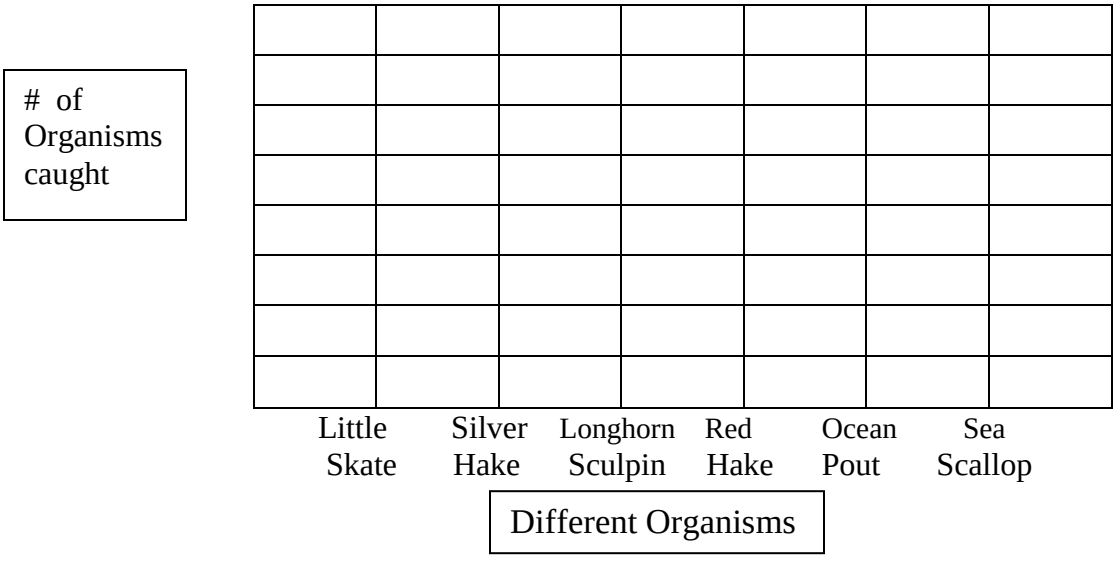
2. Observe the different station data. Which station had the most organisms collected? Which station had the least amount of organisms? Why do you think?

3. Determine what factors might cause animal populations to change over time? What environmental conditions might cause animal populations to change?

4. Graphing fun! Graph the organism populations at the various Stations. (You will need 3 different lines for your graph.)

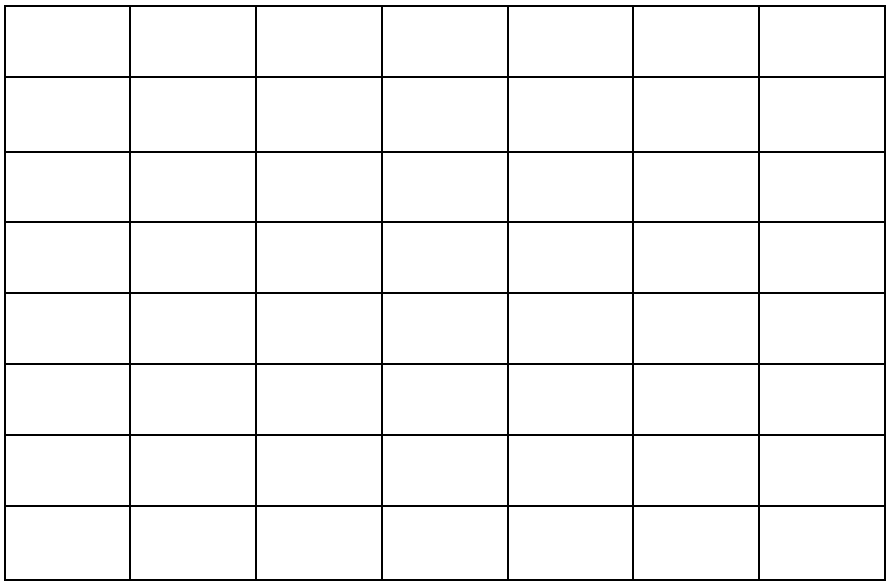
Graph Key
____ Station 427
____ Station 429
____ Station 430

Title = Organism Populations at 3 Stations

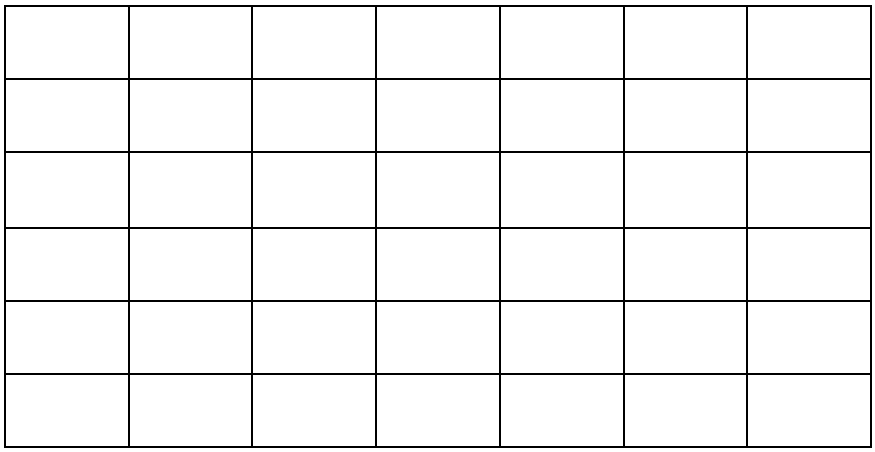


5. More Graphing Fun
    a. Create your own Graphs using the information from the data charts.
    b. Be sure to give your graph a title & label the variables. (x-axis and y-axis)
    c. If you need a key for your graph, include that information.
    d. Try to keep you graph neat and organized.

Graph 1



Graph 2



Student Thoughts

- Describe your life if you were a scientist who studied organisms in the Atlantic Ocean. Explain any adventures and discoveries you might have while living on the ocean. **Record perspectives about your life and what you love about being an ocean scientist. Have fun!**

Student Resource Page **"Cool Catch" Organisms**

Ocean pout & Andrew Norberg

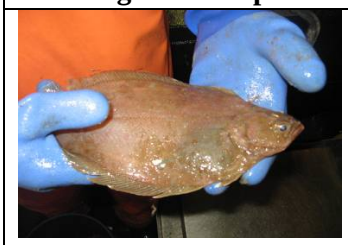
One trawl

NOAA Sea Scallop Survey.

Longhorn Sculpin

Basic catch on ALBATROSS IV.

Female Sea Scallop



Winter Flounder

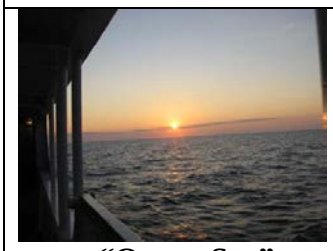
Spider crab

Sea Scallop Clappers

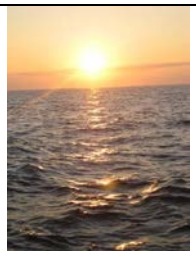
Skate

Sea scallop (with barnacles)

Male Sea Scallop



"Out to Sea"



Sunrise

CTD

Standard dredge

Rings & links

“Cool Catch”
Matching Game


“Cool Catch”
Matching Game


“Cool Catch”
Matching Game


“Cool Catch”
Matching Game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