Bizarre and Beautiful

Objective:

1. Students will demonstrate an understanding of the body structure and function in specific marine organisms.

2. Students will explain the importance of a marine population within the underwater ecosystem.

3. Students will analyze and report on relationships among various marine organisms and their environments.

4. Students will demonstrate an understanding of structural and behavioral adaptations of specific marine organisms being studied.

Performance Objectives:

Grade 6: Strand 4: Concept 1 – PO 6; Concept 3 PO 1-2
Grade 7: Strand 4: Concept 3 – PO 2
Grade 8: Strand 4: Concept 4 – PO 1-6
NGSS: MS-LS2-A

Grade 6 – 8

Key Vocabulary:

- **Omnivores**
- **Cephalopod**
- **Phylum**
- **Nematocysts**
- **Chelipeds**

Related Literature:
Somewhere in the Ocean
Jennifer Ward

Down Down Down
Steve Jenkins

Weird Sea Creatures
Erich Hoyt

Ocean: The World's Last Wilderness Revealed
Fabien Cousteau

Background Information:

The ocean is filled with bizarre-looking creatures that have found a way to survive in a challenging environment. These creatures have developed specialized features because of adaptation to their habitat. Their body and function has changed over time to sustain their species in the ocean world.
The seahorse is an interesting and unusual creature of the ocean. Seahorses are one of the smallest species of vertebrates, which means they have a bony skeletal body. These tiny creatures can range in size from 0.9 inch to 12 inches. They live their

lives in tropical waters around the world and can be found in reef areas with an abundance of food.
Seahorses have a very specialized type of skin that allows them to change colors to mimic their surroundings. The seahorse can camouflage itself on pieces of sea grass to stay protected from predators, thus raising the odds of a longer life. Both tiny and difficult to see, the seahorse can live up to 6 years in its chosen habitat.
Another distinctive characteristic of the seahorse is the shape of the head. The long nose, which looks like that of a horse, is used to suck up food. Seahorses are **omnivores** who eat brine shrimp, plankton, tiny fish particles, and algae. Their eyes can move in all different directions at the same time to help them watch for predators while enjoying a fresh meal. The long **prehensile tail** of a seahorse is used to glide through the water and to cling onto marine plants A prehensile tail is the tail of an animal that has adapted to be able to grasp or hold objects.

Along with all of the amazing characteristics, another interesting thing about the seahorse is that the male seahorse is the one who gives birth to its young. The female lays eggs, but then the male seahorse stores them in a special pouch on the front of its body and carries them around. In about 3 weeks, the dozens to hundreds of eggs hatch and the seahorse pushes the babies out of the pouch. Baby seahorses look just like the adults, except they are very tiny.
Just like their parents, the baby seahorses use their dorsal and pectoral fins to carry themselves to shelter. They will wrap their prehensile tails around a piece of sea grass and begin life on their own.
There are about 47 species of seahorses found in the world. They are considered highly endangered because of loss of habitat, pollution, and over-fishing. Since seahorses prefer the shallower waters, changes in the water quality have a profound

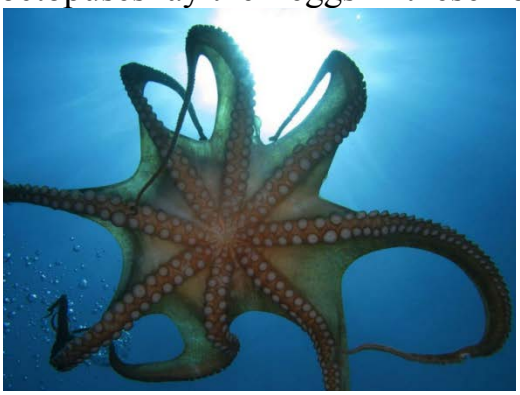
impact on seahorses and their food supply. Conservation and education may be the most important way to protect these bizarre and delicate creatures.

The seahorse has bony plates around its body that protect it from predators. The plates cause the seahorse to move by gliding, unlike how other fish move. On top of the seahorse's head is the 'coronet.' Resembling a crown, the coronet is as unique to the seahorse as a fingerprint is to a human.

Octopus

What is the most intelligent invertebrate in the ocean? You guessed it, the octopus! This eight-legged bizarre creature is known as a **cephalopod** and part of the family of creatures that has flexible movement. Like their friends the jellyfish, octopus move by using propulsion, which means they move in the opposite direction as the water being pushed out of their body. Living mainly on the ocean floor, the octopus can shoot itself quickly through the water or into a small crack in the rock to hide. The soft body allows the octopus to creep into small spaces and escape a predator.

There are about 300 different species of octopuses each species has adapted to different habitats. The largest, the giant octopus, can grow up to 23 feet from arm to arm and weigh about 400 pounds, while the smallest is only about 3/8 of an inch long. The tiny blue ring octopus is considered one of the most dangerous creatures in the ocean because it has a venomous bite. Known for its building skills, the octopus often collects shells to construct a home where it can hide from larger creatures. Oceanographers refer to this type of home as an octopus garden. Female octopuses lay their eggs in these homes for protection.



The octopus has suction cups are on the underside of its arms. There are two rows of suction cups that go all the way to the tip of each arm. These help it to grip tightly to almost any surface. The 'beak' is the mouth of the octopus and is located at the center under the body. The beak is used to break apart the food such as crabs, shrimp and clams.

For example, the suction cups allow the octopus to grab the sides of rocks or coral as they explore their habitat. The eyes of the octopus are located on each side of the head and provide a great view of the surroundings. Octopuses cannot hear but instead very good eyesight. An octopus has three hearts and each serves a purpose. Two hearts pump blood through the gills so the octopus can breathe. These are hearts called branchial hearts. The other heart which is called the systemic heart pumps blood through the rest of the body of the octopus.

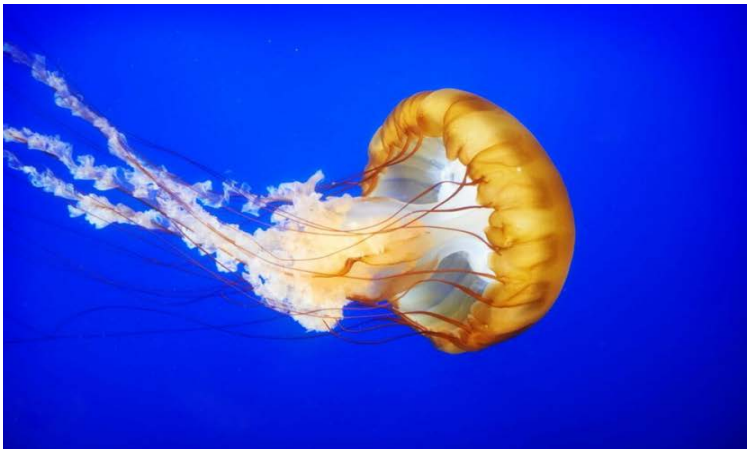
If an octopus feels threatened, it can shoot out black ‘ink’ to cloud the water and make a fast getaway. Another master of disguise, the octopus can mimic its surroundings by altering its shape and color. Chromatophores are the cells in the skin of octopus and other Cephalopods that help them change color and texture.

Jellyfish

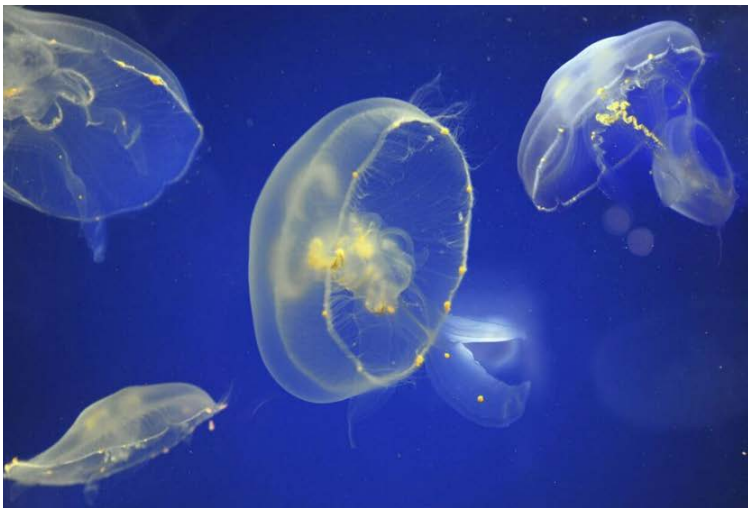
Jellyfish are invertebrates that can live in the ocean without a brain, skeleton, or respiratory system. So, what does a jellyfish have in its body? These creatures are filled with a jelly-like substance called **mesoglea**. The body of a jellyfish can float and bob around the water using a simple set of nerves. They can smell and detect light and are part of the **phylum**, **Cnidaria**, of creatures that also includes sea anemones and corals. Because they are an invertebrate they do not have backbone, this means even though they are called jelly “fish” they are not true fish.

Jellyfish have a central body with long and short tentacles. Most jellyfish have stinging cells on the tentacles called nematocysts. **Nematocysts** are a barbed or venomous coiled thread that be projected in self defense and to capture prey. Its mouth located under the center of the body. The preferred diet for a jellyfish is fish eggs, fish larvae, plankton eggs, small plants, and even other jellyfish. Natural predators of jellyfish are large fish and turtles.

In the wild, jellyfish live about a year, depending on the species. In the medusa (adult) stage of the life cycle, the jellyfish can float with currents as its tentacles hang down into the water. The young produced by both male and female jellyfish float down to the ocean floor landing on rocks or shells and begin to grow quickly. As an adult, the jellyfish will drift along in the ocean. Because they are at the will of the currents this is what classifies them also as a plankton.



Jellyfish can be found around the world and have been seen in some areas floating in large groups of thousands, which scientists call a ‘bloom.’ It is believed that blooms occur when ocean currents come together. While no one is completely sure what causes blooms, scientists are studying them. Scientists are also studying the impact of changes in the ocean. Jellyfish population is affected by the overfishing of natural predators.



Moon Jellies

Lionfish

Among the bizarre marine creatures that swim in the deep are the often-controversial lionfish. These beautifully colored fish are a species to stay away from. These lionfish have venom on the tips of their dorsal fins as well as the tip of their caudal fin (tail) used for self-defense. Their warning coloration (brightly

colored) can also attract prey. These carnivores eat fish and crustaceans, often using a surprise attack to catch prey while swimming and hunting during the day.

Lionfish can grow up to 16 inches long and are known for their beautiful stripes. Lionfish prefer being alone and defending their personal territory. Which may be a small patch or coral or cervices, they will defend it by ether biting or stinging. In the wild, lionfish can live up to 15 years.

Once native to the South Pacific and Indian Ocean, lionfish are now found in many other warm water areas of the ocean like the Caribbean. These slow movers rely on their venom to keep them safe from predators like eels and bigger fish.

Scientists have reported that lionfish produce young rapidly and in large numbers, which can have a negative impact on habitats. Since they have few natural predators, large numbers of lionfish can consume the food supply in a habitat very quickly. For example, lionfish were introduced to the Atlantic Ocean when people released their aquarium pets, and now there are thousands of lionfish that are eating the food supply of other types of fish. Lionfish are consuming native fish that are crucial to the coral reef systems. Lionfish are not currently considered endangered or threatened.

Crabs and Lobsters

Meet one of the members of the Arthropod family. Arthropod translates to "jointed foot" as they are known for their jointed appendages, or legs. Arthropods are also known to have an exoskeleton that they molt, or shed, as they grow. You may think of arthropods as being spiders or insects, and that would be accurate; however, the phylum includes crabs and lobsters too. Crabs and Lobsters are in subphylum Crustacea. There are numerous species of crabs and lobsters living in the oceans of the world.

Crab and lobster have shells called a carapace which functions as an exoskeleton. The shell made mostly of calcium will be shed as the crab grows. The process is called molting, and it takes place often in young crabs and less often as adults. Crabs have many paired walking legs and claws called **chelipeds** for protection

and to catch food. King Crabs chelipeds are not very large and their main defense is their spiny body.
Lobsters are crustaceans that live on the ocean floor. Their natural habitat can be the open sandy floor or in rocky crevices where they can tuck their body away from predators. Characteristic of lobsters are their five pairs of walking legs and poor eyesight. Some lobsters like Maine lobster are known for their very large chelipeds, but California Spiny Lobsters do not have chelipeds and instead have spines covering their body for protection. Using a keen sense of smell, lobsters locate their favorite food, fish, and mollusks. Lobsters also shed their shell to grow and can live in the wild for as long as 50 years.

For many years, lobsters have faced the fate of the dinner plate. Being considered a delicacy, lobsters have been fished and provided as food for humans around the world. The commercial lobster trade may have contributed to the decline in certain species of lobster.
As with any marine species, humans must continue conservation efforts to manage clean oceans and clean air for the balance of life on earth to be maintained.

California Moray

The California Moray for example lives in in the Pacific Ocean off the coast of California in the reef rocks and crevices. While you may only see the moray's head, he has a long snake-like body with no fins or scales. The moray has sharp, pointed teeth that come in handy as he dines on fish, shrimp, and octopus. In the wild, the moray can live about 30 years. They can grow up to be about 5' long.

His skin provides a protective film of mucus to help the moray avoid being injured as he swims in and around rocky areas. These morays share their homes with red

rock shrimp that live in a **mutualistic relationship** with the eel. The shrimp crawl inside the moray's mouth to eat bites of food stuck to his teeth. The moray eel gets his mouth cleaned while the shrimp benefits by the bites of food. Both creatures benefit from this relationship.

Cleaner Shrimp

Sea Anemone

If you look at a Sea anemones you may think it is a plant when it is actually an animal. They are related to jellyfish, because they have stinging tentacles around a mouth. Sea anemones attach themselves to the ocean floor, reef rocks, and corals. Their beautiful tentacles wave in the water attracting prey that will fall victim to the sting of their venom. The venom itself is found within their stinging cells that are called nematocysts. There are over a thousand varieties of sea anemone that all have a stinging touch to paralyze prey before the prey is carried into the anemone's mouth.

Even though they are capable of stinging with their nematocysts, anemones have formed a symbiotic relationship with clown fish. Clown fish are immune to the sting of the anemone and can swim freely in and within the tentacles. The clown fish help keep

the anemone clean while the anemone provides protection for the clown fish.

Sources: National Oceanic and Atmospheric Administration (NOAA); U.S. Fish and Wildlife Services; Alaska Department of Fish and Game; Jellywatch.org; National Geographic; South Carolina Department of Natural Resources; Aquarium of the Pacific; A-Z Animals. Photos: OdySea Aquarium; Public Domain.

Additional Resources:
Sea Horse Birthing Video: https://www.youtube.com/watch?v=b_nEA3dtOZs
Pygmy Seahorse Camouflage Video:
https://www.youtube.com/watch?v=Q3CtGoqz3ww
Mimic Octopus: https://www.youtube.com/watch?v=os6HD-sCRn8
Octopus Squeezing through Hole:
https://www.youtube.com/watch?v=949eYdEz3Es
Jellyfish Life Cycle: https://www.youtube.com/watch?v=U7aqO1L8gXA
Lionfish Hunting: https://www.youtube.com/watch?v=JxSPWOxYu7Y
Crab Molting: https://www.youtube.com/watch?v=4QIgW639Oog
Eel Feeding: https://www.youtube.com/watch?v=taguVjkRXtI

Procedures and Activities:

1. State the learning objective. Review previous instruction as it relates to the topic.
2. Review vocabulary and additional words as needed.
3. Read related literature and follow-up with discussion and open-ended questions.
   Ask students about their experience with the ocean or aquariums.
4. Discuss marine life and have students suggest different marine animals. Review the concept of a habitat and the relationship with certain marine animals.
5. Discuss how aquariums offer an opportunity for people to see marine life and how aquariums are protecting marine species.

6. Discuss the difference between vertebrate and invertebrates as it relates to marine animals. Ask students to give examples of each.
7. Review the terms, adaptations, diversity, mimic, and camouflage as they relate to the topic. Ask students to give examples in the animal world.
8. Review how living organisms are categorized. Ask students to use technology to look up a specific marine animal and discuss the scientific category.
9. Discuss the concept of how animals have a 'niche' in a population and environment. For example, ask students to look up sea snakes and the specific role they play in their community.

 **Indicates 'take along' activity.**

Activity: 'Seahorse Crossword' is an activity to demonstrate an understanding of the unique characteristics of the seahorse.

 **Activity:** A take-along activity, 'Identification Guide,' gives students an opportunity to locate species and document their specific traits. Students can share ideas and discuss the species they chose to list.

Activity: Using their creative side, students complete the activity, 'Create an Animal' following the fieldtrip.

Activity: 'Marine Relationships' can reinforce the use of technology and research to identify specific marine animals and their relationship in the ocean environment.

Activity: 'Careers in Aquarium-Related Fields,' is an activity that involves the use of technology and the application of writing skills. Students select a career they might like and research the details. The presentation can be in expository essay form or expanded into a research project.

 **Activity:** 'Habitat Population' is an activity to take on the visit to the aquarium. Students will need to spend time at one chosen exhibit to observe the population and document what they see. The activity offers an opportunity for students to select an exhibit of interest, take notes on the general description of the habitat, the list of marine plants and animals, and the behaviors. Student will answer the question, how do the various animals co-exist in the habitat? Students

can also share and discuss their observations upon return to the classroom. This activity can be expanded as a writing assignment based on the observations.

 **Activity:** Students select one of the marine species at the aquarium. The species becomes the center of their research into the conservation efforts being made to protect that species. Students include the IUCN Red List information and document organizations dedicated to protecting the chosen species. Students create a poster with a conservation message related to the species they selected. Posters are shared with the class. Option: Hold a school-wide contest to select the poster making that would make the greatest impact on conservation.

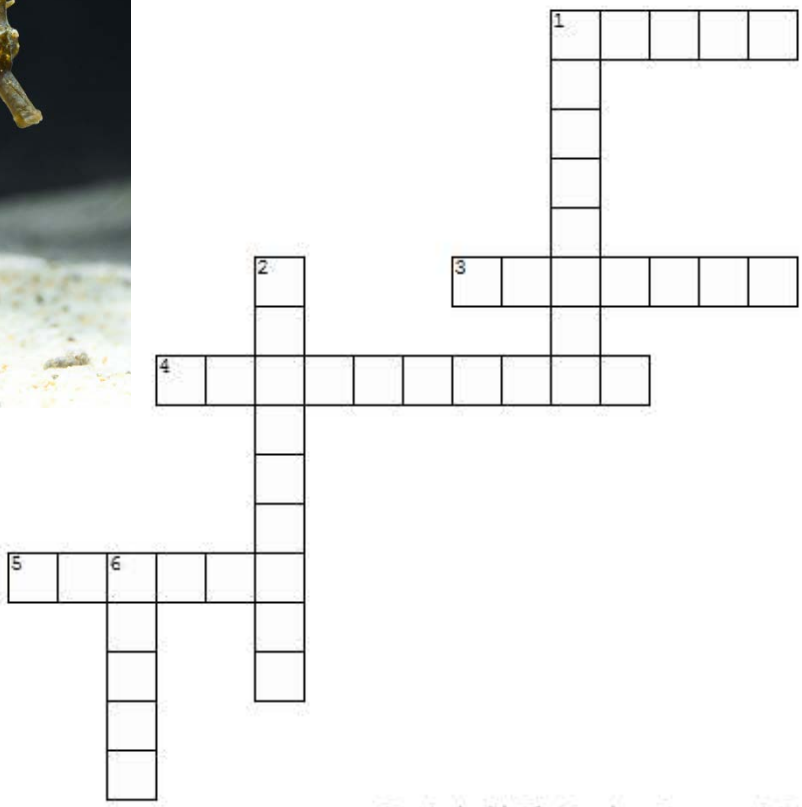
Reflections and Assessments:

Students are assessed on varied levels depending on the activity. Participation, grade standards, and percentages may be applied to each activity. Activities are designed for flexibility and use pre-visit or as a follow-up to the visit.

Most activities meet the STEM guidelines.

Seahorse Crossword

Complete the crossword puzzle below



Created with TheTeachersCorner.net Crossword Puzzle Generator

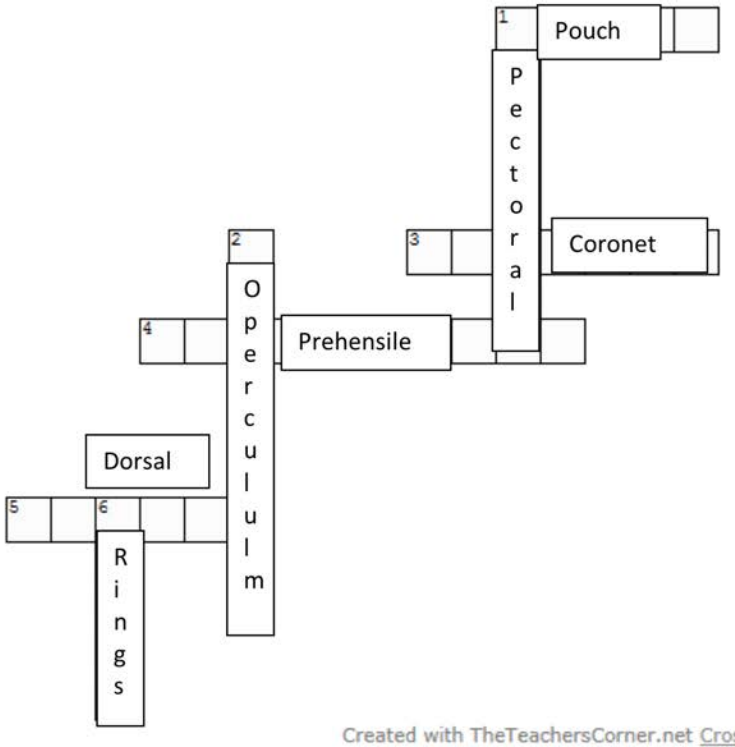
Horizontal

1. Where the males brood the eggs
3. This is the name for the top of the head that resembles a crown.
4. The type of tail that can hold ans grasp objects
5. The fin on their back

Vertical

1. The fins on the side of the head
2. Name of a bony fish's gill cover
6. Pattern of bony plates

Seahorse Crossword Key



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Identification Guide

Animal	Species	Adaptation	Protection
Bony Fish			
Cartilaginous Fish			
Arthropod			
Mollusk			
Cnidarian			

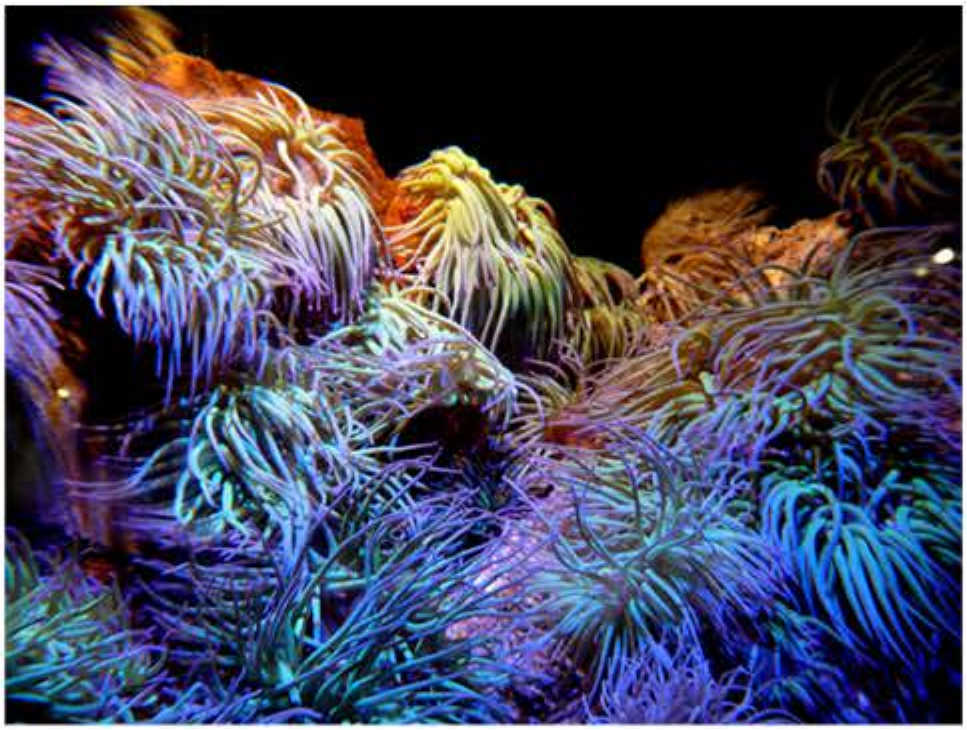
The most unusual _____

The most interesting _____

My favorite _____

Create an Animal

Create a *bizarre* creature to live in this ocean habitat.



Name of animal _____

Habitat and Location _____

Prey _____

Special Adaptations _____

Defense _____

Predators _____

Benefit to habitat _____

Marine Relationships

The oceans house millions of marine plants and animals. Each is an individual, yet each plays a role in the ocean world.

Select a marine creature that you find interesting. Explore all of the characteristics about that creature, how it finds food, shelter, reproduces and contributes to the ocean world.

During your exploration of the marine creature, by sure to investigate the following terms as they relate to your selection:

Competition – when two or more organisms rely on the same environmental resource

Symbiosis – the close relationship of two dissimilar organisms

Mutualism – a symbiotic relationship where both organisms benefit

Predation – behavior of one animal feeding on another

Commensalism – a symbiotic relationship where one organism benefits and one does not benefit but is unharmed

Parasitism – a symbiotic relationship where one organism benefits and one is harmed

Write your report in draft form. Read and revise the draft. It is always helpful to do peer editing before writing a final draft.

Due date _____

Careers in Aquarium-Related Fields

Planning a career is an important part of looking toward the future. Working with ocean life is especially exciting for those who enjoy the all aspects of marine animals and plants.

Select one of the careers below that might be interesting to you. Using technology, investigate the career and write an expository paper to share with the class.

Careers:

- Animal Husbandry
- Marine Mammal Trainer
- Water Quality Technician
- Veterinarian
- Educator
- Conservation Specialist
- Oceanographer
- Biotechnology
- Aquaculture
- Aquarium Manager
- Aquarium Curator
- Aquarium Architect/Designer
- Marine Biologist

In your investigation, include the following information:

Education (what type of degree and how long does it take to complete)
Licensing
Internship
Number of career/job openings in the field
Types of places that hire for the career
Salary
Advancement (how might one position lead to another in the career?)
Why you feel it might be a career for you

OdySea Aquarium Ethogram

Practice what it is like to be a behavioral biologist and study one animal at OdySea Aquarium for two minutes.

An Ethogram is a way we can record the behavior of an animal over time in order to make inferences, or assumptions, about how an animal generally spends its time.

Every 15 seconds, mark what behavior the animal is exhibiting.

Species: _____

OdySea Aquarium Ethogram					
	Resting	Moving	Hiding	Eating	Other
0:15					
0:30					
0:45					
1:00					
1:15					
1:30					
1:45					
2:00					

Inference about animal's behavior:

_____

_____

_____

_____