

NOAA Teacher at Sea Program

Jennifer Daftari, Aboard NOAA Ship *Oregon II*, August 10-August 24, 2011

Shark Longline Survey

Activity Title:

Shark Chalk Walk

Subject (Focus /Topic):

Shark identification

Grade Level:

5th Grade

Average Learning Time:

5- 50 minute class periods

Lesson Summary (Overview/Purpose):

Students will research various shark species. Students will then put their research to the test by sketching sharks for other groups to identify. The groups will identify the sharks by estimating and recording length, observing the type of jaw, looking at the types of prey the shark eats, and noticing other defining characteristics of the sharks.

Overall Concept (Big Idea/Essential Question):

This lesson is designed to help students identify the similarities and differences among various sharks by looking at their length, jaw type, prey, and other defining characteristics.

Specific Concepts (Key Concepts):

- Every shark has characteristics which make it unique.
- The jaws of a shark serve different purposes, such as being used for crushing or tearing, depending on the type of prey eaten by the shark.

- Estimation is crucial for scientific research.
- Metrics is important when measuring sharks.

Focus Questions (Specific Questions):

- How can you identify various types of sharks?
- Are all sharks about the same length?
- What types of jaws do sharks have?
- What types of prey do sharks eat?

Objectives (Learning Goals):

- Students will be able to make a shark drawing to scale by using a measuring tape.
- Students will be able to identify what types of prey a shark will eat by looking at the jaws of the shark.
- Students will be able to identify a shark by observing the length of the shark, type of jaw, prey eaten, and other defining characteristics.

Background Information:

Sharks differ in their size, diet, and physical appearance. For example, the Spined Pygmy Shark averages 7-8 inches (about 18-21 centimeters) while the Whale Shark is about 46 feet (about 14-15 meters).

By looking at a shark's jaw, it can be determined what the shark eats. For example, the Smooth Dogfish Shark has a crushing jaw for eating prey such as crab and shrimp. By contrast a Tiger Shark has tearing teeth in order to eat prey such as fish, turtles, or other sharks.

Just because the shark is larger does not necessarily mean it eats meat. For example, the Whale Shark's main diet consists of plankton, whereas the small Spined Pygmy Shark eats shrimp, Lanternfish, and squid.

Various sharks have defining physical characteristics. The Atlantic Sharpnose Shark can be identified by the white spots on the skin. Nurse Sharks are known for their dorsal fins that are almost the same size. (Most sharks have different sized dorsal fins.)

Below is a brief description of the 7 sharks chosen for this particular lesson.

1. Spined Pygmy Shark:

Length: 7-8 inches (18-21 centimeters)

Fins: 1st dorsal fin has a spine, 2nd dorsal fin has no spine and is smaller

Jaw: Upper teeth are narrow and small, lower teeth are larger and knifelike

Prey: squid, Lanternfish, shrimp

2. Bull Shark:

Length: 7 feet (about 2 meters)

Fins: 1st dorsal fin is much longer than the 2nd dorsal fin

Teeth: Triangular, serrated (saw edged), very sharp

Prey: other sharks, rays, turtles, dolphins

3. Smooth Dogfish Shark:

Length: 3-4 feet (0.9- 1.2 meters)

Fins: no spines on dorsal fins

Teeth: crushing jaw

Prey: shrimp, crab, lobsters

4. Nurse Shark:

Length: 2-13 feet (0.75- 4 meters)

Fins: 1st and 2nd dorsal fins are almost the same size.

Jaw: Crushing, serrated and fan shaped

Prey: shrimp, squid, octopus, crabs, lobster

5. Atlantic Sharpnose Shark:

Length: 4 feet (1.2 meters)

Fins/Skin: white spots on skin

Teeth: sharp, small

Prey: shrimp

6. Tiger Shark:

Length: 10-20 feet (3-6 meters)

Fins/Skin: 1st dorsal fin is much longer than 2nd dorsal fin. Stripes are present on the skin.

Teeth: saw edged, razor sharp, curved

Prey: fish, turtles, crabs, reptiles, sharks

7. Whale Shark:

Length: 46 feet (about 14-15 meters)

Skin: The skin has light yellow markings.

Jaw: about 3,000 very tiny teeth

Prey: Plankton

Common Misconceptions/Preconceptions:

- All sharks are the same length.
- All sharks have jaws that tear their prey.
- All sharks look about the same.
- All sharks are big.
- All sharks are meat eaters.

Materials:

Web-based or library resources on sharks, sidewalk chalk, measuring tapes, shark information sheets, ziplock baggies, student journals, shark jaws

Technical Requirements:

SMART Board and/or access to the internet for student research

Teacher Preparation:

- Research the various types of sharks and what makes them unique.
- Access pictures from library books, personal collection, and the internet to show the class.
- Prepare kits for each group (ziplock bag with measuring tape, 6 pieces of sidewalk chalk, and a shark information sheet). (NOTE: I picked 7 sharks, thus we had 7 groups of 3 to 4 students each hour. For 120 students we went through 60 pieces of sidewalk chalk.

Also, when loading the bags, remember to put in the color needed. Ex. Whale Sharks have yellow spots so yellow chalk is needed in that group's bag.)

Keywords:

Bull Shark, Atlantic Sharpnose Shark, Spined Pygmy Shark, Whale Shark, Tiger Shark, Smooth Dogfish Shark, Nurse Shark, Shark Jaws, Shark Fins, Prey, dorsal fins, caudal fin, pectoral fins, and pelvic fins

Pre-assessment Strategy/Anticipatory Set:

Let students observe a shark jaw. Using a K-W-L chart, have them write down what they **Know** about shark jaws and prey of sharks as well as the length of the body of sharks. Also have them write what they **Want** to learn about sharks.

Lesson Procedure:

1. Show students a jaw from a Smooth Dogfish Shark. Ask them what type of fish would have this jaw. (Note: Most students can't believe this crushing jaw belongs to a shark because it is not the "typical" tearing teeth jaw that is portrayed by the media.)
2. Have students make a K-W-L chart about what they **Know** about sharks and what they **Want** to know about sharks.
3. On the SMART Board, show students the anatomy of a shark, including the caudal fin, dorsal fins, pectoral fins, and pelvic fins so they can properly refer to the body parts when discussing the similarities and differences between shark species.
4. On the SMART Board, show students various species of sharks asking them to make observations about the various species of sharks.
5. Allow students to research various sharks using the internet, library resources, and pictures taken from my NOAA Teacher at Sea trip.
6. Have students write a 1 page summary of the shark research they gathered, including approximate length of the shark, type of jaw, prey eaten, and defining characteristics. Each team will share their research with the class.
7. Each team of 3-4 students will be given a "Shark Chalk Kit" including a shark information sheet, sidewalk chalk, and a measuring tape. They will be given instructions not to show the other groups the shark their team was assigned.

8. Teams will go outside and draw their shark to scale on the sidewalk. They will include the fins, pictures of the jaw and types of prey. After the team has completed the drawing, they will put the number of the station (which can be found on the shark information sheet) and the names of everyone on the team.

9. The students will then take their field journals and walk around to the other 6 stations. In their journals they will record the following:

1. Estimated length of the shark
2. Actual length of the shark
3. Type of jaw
4. Types of Prey
5. Defining Characteristics
6. Conclusion: I think this is a _____ shark.

10. In class the teams will discuss their findings. Each team will be responsible for answering questions about their drawings and then sharing how they solved which shark was represented at each station. (Note: Many students laid down next to the drawings to see the approximate length of the shark!)

Assessment and Evaluation:

- After the teams are done sketching their shark to scale, they will take their journals and travel to the different stations around on the sidewalk to observe and record the following:
 1. Estimated length of the shark
 2. Actual length of the shark
 3. Type of jaw
 4. Types of Prey
 5. Defining Characteristics
 6. Conclusion: I think this is a _____ shark.
- Students will revisit their K-W-L charts to fill in the last part: what I Learned about identifying sharks.

Standards:

National Science Education Standards Addressed:

Content Standard A- Scientific Inquiry

Content Standard C- Life Science:

- Populations and Ecosystems
- Diversity and adaptations of organisms

Program Standard C- Mathematics

- Use mathematics in all aspects of scientific inquiry.

Ocean Literacy Principles Addressed:

Ocean Principle 5: The ocean supports a great diversity of life and ecosystems.

a. Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the Blue Whale.

d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

Principle 7: The ocean is largely unexplored.

b. Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes.

State Science Standards Addressed:

Oklahoma Priority Academic Student Skills:

Process Standard 1: Observe and Measure

1. Observe and measure objects, organisms, and/or events. Measure using tools.
2. Compare and/or contrast similar and/or different characteristics in a given set of objects, organisms, or events.

Content Standard 2: Organisms and Environments

1. Organisms in an ecosystem depend on each other for food, shelter, and reproduction.
 - a. Ecosystems include food chains and food webs.
 - b. Relationships exist between consumers, producers, and decomposers within an ecosystem.
 - c. Predators and prey relationships affect populations in an ecosystem.

Additional Resources:

- For templates to print off of sharks go to

<http://www.enchantedlearning.com/subjects/sharks/classroom/sharktemplates/Templatelist.shtml>

- To see our class on our Shark Chalk Walk go to

<http://room8jay.blogspot.com/2011/10/shark-chalk.html>

- To see research from my NOAA Teacher at Sea trip aboard NOAA Ship *Oregon II* go to

<http://teacheratsea.wordpress.com/category/noaa-teacher-at-sea-2/jennifer-daftari/>

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