NOAA Teacher at Sea Program
Lesson Plan

Activity Title:

Subject (Focus/Topic):

Grade Level: 6-8

Average Learning Time: Three 45-minute periods

Lesson Summary (Overview/Purpose):
Students will learn about sharks through slides, video, and touch kit items (including by-catch, and shark skin samples) in order to understand the diversity of the species. Students will then learn about finning and overfishing practices and the threats they pose to the species through a non-fiction reading and game activity. Finally, students will understand how dwindling populations of shark species affect the food chain and write an essay describing how humans can help conserve the diversity of shark species.

Overall Concept (Big Idea/Essential Question):
How do human decisions and activities have an impact on the physical and living environment? What is the flow of energy and matter through food chains and food webs?

Specific Concepts (Key Concepts):
- There are hundreds of species of sharks with unique characteristics
- "By-catch" is the unintended catch of species during fishing
- Shark "finning" practices have negatively impacted shark populations, leading to endangered status for some species
- Sharks are apex predators on the food chain and this can be demonstrated by a food web
- Students can be proactive in voicing an opinion on shark conservation

Focus Questions (Specific Questions):
- What is shark "finning"?
- How have humans affected the shark population through decisions and activities?
- How can we represent sharks on the food chain/food web?

Objectives/Learning Goals:
Students will be able to:
- Articulate what is shark "finning" and over-fishing
- Understand the differences in extinction threats (endangered vs. threatened)

- Describe ways we can help conserve shark species
- Draw an accurate food chain/web to include sharks
- Articulate their thoughts through writing on an author's opinion on shark conservation by citing evidence from a non-fiction text

Background Information:
There are over 350 species of sharks, some of which are classified as vulnerable or threatened for extinction. Scientific studies are necessary to help know how the abundance of species. When conducting these studies, sometimes we encounter by-catch – or unintended catch. Sharks are apex predators on the top of the marine food chain. Many sharks are threatened for extinction due to over-fishing and finning practices. Humans have a responsibility to help conserve the diversity of shark species in order to maintain the food chain.

Common Misconceptions/Preconceptions:
Students may believe that sharks are aggressive towards humans, or are not important to conserve due to this aggression. Students also may not have background knowledge about the delicate balance of the marine ecosystem and the roles sharks play in that ecosystem. They also may has misconceptions about the abundance of shark species globally.

Materials:
- Photos and videos of shark species/longline fishing techniques
- Teacher-created article on shark finning
- A ball for the Game of Life activity

Technical Requirements: n/a

Teacher Preparation:
- Prepare photocopies of the shark finning article
- Prepare an essay template with a performance task for students to write an essay on human interventions to conserve shark species
- Move desks as appropriate to play the game of life
- Prepare K-W-L chart

Keywords:
By-catch, apex predator, food chain, food web, endangered species, threatened species

Pre-assessment Strategy/Anticipatory Set:
Before beginning the lessons and activities, ask students to list some facts they know about sharks. This can be a simple "Do Now" upon entering the room for 5 timed minutes. Ask students to share out what wrote down. The teacher will scribe in a K-

W-L chart under "Know" for what students know. S/he may also ask students what they want to know about sharks and begin to fill in that section as well.

Lesson Procedure:

- **Day 1:** Explain the Teacher at Sea program and show a brief slide show of the procedures involved in catching and tagging sharks, along with the scientific mission of the survey. Explain to students the diversity in shark species caught through pictures and video. Students will then look at objects in a touch kit provided by the teacher (examples of by-catch such as starfish, urchins, and examples of shark skin). Discuss by-catch and its definition.
- **Day 2:** Students will read an article about shark finning, including its history and its effects on shark populations, and how humans can help conserve shark species. Students (20) will then play a game called "The Game of Life". Students will be assigned colored cards (2 red, 4 green, 6 blue, and 8 yellow). Students will spread out enough to toss a ball to each other with slight difficulty. Explain how the ball represents life and have them toss it around for a minute. Over time, explain how certain fish are hunted from the waters too much, have the red cards sit down. Continue tossing the ball around and give similar scenarios until only the green cards are left standing. Discuss what happens to the game when many people can no longer participate. Hold a whole class discussion on what problems could occur for the remaining fish (green cards) that are spread out?
- **Day 3:** Students will construct a food chain/food web that contains sharks as apex predators. Students will write an essay explaining why it is important for humans to help conserve shark species, using evidence from the article read, game played, and experiences in class. Finish completing the K-W-L chart for the "Learned" section with students.

Assessment and Evaluation:

Both formative and summative assessments will be used. One-on-one and group conversations along with teacher questioning will help assess the lesson objectives. Students' essays will be used as a formative assessment of knowledge gained.

Standards:

- **National Science Education Standards Addressed:**
    - 6.3 Life Science Standards: Populations and ecosystems
- **Ocean Literacy Principals Addressed:** # 5 (Ocean supports great diversity of life and ecosystems) specifically 5d (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. # 6 (The ocean and humans are inextricably interconnected) specifically 6e (humans affect the ocean in a variety of ways) and 6g (everyone is responsible for caring for the ocean).
- **State Science Standards Addressed:**

- Physical Environment 6.1: Describe the flow of energy and matter through food chains and food webs

  Major Understandings:
  6.1b Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.
- Physical Environment 7.1: Human decisions and activities have had a profound impact on the physical and living environment.

  Major Understandings:
  7.1b Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem.

- **National Common Core Standards Addressed:** Seventh grade writing: W.7.1. Write arguments to support claims with clear reasons and relevant evidence.
  - Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.
  - Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
  - Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.
  - Establish and maintain a formal style.
  - Provide a concluding statement or section that follows from and supports the argument presented.

Additional Resources:
Adapted "Game of Life" courtesy of NOAA (http://sanctuaries.noaa.gov/education)

Author: Maureen Anderson, MS 442, 317 Hoyt Street, Brooklyn, NY, 11231, moanderson77@yahoo.com

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