



## Sharks on the Move

### How migration, nursery habitat, and fisheries affect populations of an apex predator

**Introduction:** Sandbar sharks are one of the most common and recognizable shark species in North Carolina waters, but have recently experienced severe population declines. In this activity students will learn how reproductive strategies, habitat, and interactions with other species (including humans) affect survival to adulthood for marine animals, with an emphasis on the long-lived, slow-growing sandbar shark. Using data from juvenile sharks tagged and tracked by East Carolina University researchers off of Cape Hatteras, students will follow the migratory path of young sandbar sharks as they leave (and hopefully return to) their overwintering grounds along the coast of North Carolina. They will then put all this together by identifying both environmental factors and human activities that the juvenile sharks may encounter in their travels, and propose ideas to encourage juvenile shark survival while still allowing for use of the ocean by humans.

**Grade Level:** High school (9-12)

**Class Size:** 10-30 students formed into 3-5 groups

**Time Requirement:** Two class sessions:  
Session 1 – 30-40 minutes  
Session 2 – 40-50 minutes

**North Carolina Essential Standards:** Bio 2.1 (Clarifying objectives 2.1.2, 2.1.3)  
Bio 2.2 (Clarifying objectives 2.2.1, 2.2.2)

**Next Generation Science Standards:** HS-LS2-7 (LS2.C, LS4.D, ETS1.B)

**Learning Objectives:**

- 1 Interpret shark detection data to identify migration patterns.
2. Compare information on North Carolina fisheries with data on sandbar shark biology.
3. Use these data to devise and present a mock fishery management plan to balance protection of juvenile sharks with fishery needs.

**Resources Needed:** Powerpoint presentation with background information, information packets for students, in-class presentation or poster presentation capabilities. All lesson materials are available for download at:

<http://yalikedags.southernfriedscience.com/teaching-resources/>

### **Lesson Activity:**

1. During the first session, show the accompanying Powerpoint presentation, which provides background on sandbar sharks, North Carolina fisheries, and acoustic telemetry of sharks off of Cape Hatteras (approximately 20 minutes).
2. Break students up into 3-5 groups (number and size of groups should be tailored to class size). Each group will be provided with an information packet that includes data on fisheries in the Cape Hatteras region, shark bycatch and survival information, and maps showing where sharks have been detected by month from February-October 2013. Using this information, the groups will devise a mock fishery management plan designed to both protect juvenile sharks and allow Hatteras fisheries to remain open. Allow 10-20 minutes for group discussion (time may be adjusted as needed).
3. In the second session, each group will give a 10-minute presentation on their fishery management plan, describing the biological and human dimensions considered and the pros and cons of their plan. Alternatively, each group can create a poster showing the data and options considered for their management plan to be presented at an in-class poster session

**Assessment/Evaluation:** Each group will produce either a 10-minute in-class presentation or a poster describing their fishery management plan (depending on the needs and preferences of the instructor). There are intentionally no “right answers” for fishery management plans, instead this lesson is intended to encourage critical thinking among the students and give them an idea of how research can be used to inform policies. Presentations or posters should instead be evaluated based on thoroughness and creativity. A good fishery management plan should include:

1. A clear description of the information used to develop the plan.
2. Correct use of fisheries science terms.
3. The potential benefits and drawbacks of their plan to both sharks and fishermen.
4. As an optional extension, groups can also include possible alternatives to their plans and compare their plans with existing shark fishery management policies.

*For questions, comments, and in-class assistance, contact:*

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