



Sharks in the Sound



How An Apex Predator Chooses Habitat

Introduction: Organisms use a combination of environmental preferences (abiotic factors) and species interactions (biotic factors) to choose habitat. This lesson plan will use shark presence within Back Sound, North Carolina as a charismatic example of the factors influencing habitat choice, and allow students to manipulate a data set to learn how to interpret and draw conclusions from raw data. The lesson will consist of a short lecture outlining how abiotic and biotic factors can structure a local community of coastal sharks and provide students with a data set and short instruction on basic statistical methods in Microsoft Excel. Students will calculate mean environmental factors for each shark species with measures of uncertainty, and use those results to interpret where the sharks would settle into a North Carolina nursery habitat.

Grade Level: High School (9-12)

Class Size: 10-30

Time: One class session (40-50 minutes)

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

Common Core Math Standards: CSS.MATH.CONTENT.HSS.IC.B.4
CSS.MATH.CONTENT.HSS.IC.B.6

Next Generation Science Standards: HS-LS-2

Learning Objectives: Over the course of this lesson, students will learn to:

1. Identify the biotic and abiotic factors influencing the distribution of marine species.
2. Demonstrate the use of basic statistical methods to gather important information from raw field data.
3. Analyze and interpret raw data to determine important habitat use differences between species.

Resources Needed: Powerpoint presentation and Excel spreadsheet capabilities, access to Powerpoint and raw data files.

Powerpoint and data files available at

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

Lesson Activities:

1. Show the accompanying Powerpoint presentation providing background information on the shark habitat study, the definition of abiotic and biotic factors (with examples), a short introduction to basic statistical methods (mean, standard deviation), and a tutorial for finding these values in Excel. Approximately 20 minutes will be needed.
2. Allow students to open and analyze the included raw data in Excel, finding the mean, standard deviation, minimum, and maximum values for each variable under each species. Students can be broken into groups or asked to accomplish this individually. Groups or students can also be assigned one of the species. At the end, compile the data into a table for the whole class. 10-20 minutes should be enough for this step.
3. Students should answer the included questions either directly or in a short essay as a homework assignment. See Assessment/Evaluation below for the questions. At the instructor's discretion, students can discuss their results either in class before the homework assignment or in the next class period.

Assessment/Evaluation: Each student should be able to answer the following questions, either as a series of short answers or in one short essay (500-1000 words):

1. What do the statistical values tell you about the habitat preferences and behavior of each shark species?
2. What environmental variables differ between each species?
3. How might habitat use differences allow these sharks to coexist in the same estuary?
4. Based on habitat preferences, which of these sharks might be most affected by habitat loss?
5. (Optional advanced analysis question) A large (2.5 m/ 8.2 ft) bull shark was captured at a site 3.8 m deep, 1.2 km from the nearest inlet, 490 m from a seagrass bed, at a temperature of 29 ° C, salinity 38.6 ppt, and dissolved oxygen 8.38 mg/L. Based on habitat preferences, which species is most likely to encounter this potential predator? Which species has habitat preferences that would keep it from encountering the large bull shark?

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

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