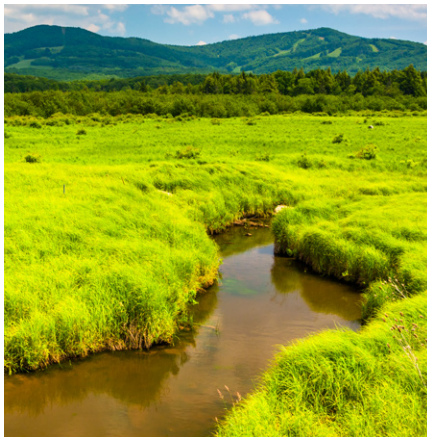# GO FURTHER!

There's No Place Like Nest

Bog Turtles

Bog turtles Glyptemys muhlenbergii are the tiniest North American turtle. Their brown or black carapace (shell) is only about 11 cm (4 inches). You can identify them by yellow patches on the side of their heads.

Bog turtles are found from North Carolina to New York, and in the Blue Ridge Mountains of Georgia. They love boggy areas where there is cool, shallow water.

Like all reptiles Bog Turtles mature slowly. Females may lay two or three eggs, but most are eaten by predators because the female doesn't remain to protect the nest or nurture the baby turtles.

There are more endangered turtles than any other groups of animal—207 of the 328 species we know. They descend from millions of years of reptile evolution. The Bog Turtle is one of the most endangered, listed as threatened in 1997.

Bogs are places where thick, matted vegetation covers watery areas. What looks like soil may actually be a partially-rotted mat of plants with water underneath. In some places the water may flow around and between "land" mats. That's where this species lives and thrives. Because this habitat is so unique, it must be protected.

Nesting is an art for a female bog turtle. They must find just the right place. It must be camouflaged, and near flowing water. That's why bogs are ideal. The mother leaves the eggs after they are laid, so they must be warmed by the environment.

Predators are a constant threat to turtles, too. Unfortunately, humans are in this group—collecting turtles as pets. So helping people understand their importance is another important goal of environmental scientists.

Female bog turtles are picky about where they nest. The ideal site has both water and lots of sedge (a grass-like marsh plant above). They lay eggs in early summer and the eggs hatch in the warm bog.

Range

✓ Tracking Bog Turtles

1. Look at the range of the bog turtles in the map. Why do you feel they live in some places and not in others?

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2. What kinds of predators might threaten a bog turtle? _____

_____

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3. What advantage would sedge have for a turtle nest? _____

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Look at the Data:

Study #1

How many turtle eggs hatch?

Survival Factors of Nests
in Two Sites in Maryland

	Site 1	Site 2
Nests	8	10
Eaten by mammals	15	18
Eaten by insects	1	5
Didn't hatch	0	3
Hatched	0	13
Unknown	3	8

*http://www.academia.
edu/8793069/Nesting_Ecology_
of_the_Bog_Turtle_Glyptemys_
muhlenbergii*

Study #2:

Radio transmitters were attached to turtles in Maryland in 2013. Each turtle had an ID number. We've listed the number of turtles that moved each month. Then we've averaged the distance they moved.

Month	Number of Observatons	Average Distance
April	5	3.65
May	70	16.51
June	246	17.37
July	26	28.55
August	24	34.41
September	2	25.7
October	9	15.77
November	4	29.36

More Data

Here are the average temperatures (in Fahrenheit degrees) for Maryland for each month in 2013.

Jan	42		Jul	83.4
Feb	39.8		Aug	81.7
Mar	46.6		Sep	81.3
Apr	66.5		Oct	66.4
May	73.2		Nov	50.2
Jun	82.1		Dec	44.2

☑ Questions about the Data:

4. At what stage in the life cycle of a bog turtle is it in most danger from predators?

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5. Why would fewer female turtles move in some months than in others?

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Claim, Evidence, Reasoning

Choose one of the claims below. Use some of the information in the reading and some of the data in the studies to formulate a claim, show your evidence and explain your reasoning:

■ Bog Turtle females move farthest when the temperatures are warmest.

■ Bog Turtle females move farthest during the month when they are looking for nesting sites.

■ Bog turtles move farthest when they are trying to avoid predators.

Go Further:

■ Imagine you lived in a community near a large bog, where bog turtles lived. Your town council wants to authorize the building of a mall in that area. Prepare a poster or presentation to your council arguing why bog turtles are valuable.

Teacher Page

About the activities

Summary:
After watching the video featuring researcher Christine Peterson and graduate student, Nathan Beyer, who study the bog turtle habitats, students use the data provided to answer questions, create habitat conservation presentation for the bog turtle, and learn the how bog turtles behavior makes them a useful wetland indicator of water quality and habitat health.

Learning Objective(s):
After completing "There's No Place like Nest" core activities, students will be able to 1) compare data sets 2) formulate a persuasive argument using differences in the data, and 3) extend the data to construct new hypotheses.

Method:
The core activities center on student watching the video episode and completing the activities: 1) interpreting data on a habitat range map, 2) reading data tables from the datasets, 3) constructing bar graphs to determine where patterns exist in the datasets, 4) and drawing conclusions from the data to construct new hypotheses.

Considerations:
Student access to computers to create bar graphs of the data sets and organize and visualize data, to identify patterns, and to develop conclusions and new hypothesis for future analysis.

Student access to library/websites and other resources to conduct the research to "Go Further".

Possible Answers

1. Look at the range of the bog turtles in the map. Why do you feel they live in some places and not in others? The turtles need very unique habitats. These habitats cannot exist easily where people build.

2. What kinds of predators might threaten a bog turtle? People and any animal that eats eggs (fox, raccoon, snake, insects)

3. What advantage would sedge have for a turtle nest? Camouflage

4. At what stage in the life cycle of a bog turtle is it in most danger from predators? Nesting

5. Why would fewer female turtles move in some months than others? One hypothesis; they are looking for good nesting sites. These are reptiles and they would be very slow in the winter.

Claim, Evidence, Reasoning

Student answers will vary. Here are some possible paths to argument:

1. Bog Turtle females move farthest when the temperatures are warmest. Add the total movement of each turtle each month and then find the longest travel and the hottest month.

2. Bog Turtle females move farthest during the month when they are looking for nesting sites. Add the total movement of each turtle each month and see if June (nesting month) is the highest.

3. Bog turtles move farthest when they are trying to avoid predators. Since predators are active all year long, the total movement probably wouldn't follow a pattern.

For the "Go Further section, remind students that good investigations often lead to more questions. Their ideas should be logical, related to some evidence they've collected, but there is no 'right answer"- not even for the researchers. Here are a few ideas suggested by the researchers: Answers will vary but students should realize that turtles have a unique niche, and that biodiversity is important. They might also argue the contribution of bogs to climate.

Integrate!

Integrating literature with math and science lessons enhances academic achievement in all areas. The National Science Teachers Association (NSTA) Recommends review team identifies great books to use, and provides a searchable database for K-12 educators. The system includes Outstanding Science Trade Books. Educators may choose these or other related materials to supplement the episodes to deepen the learning experience for students. Learn more about wildlife species and habitats using keyword searches in the NSTA Recommends database, which has more than 10,000 reviews, at http://www.nsta.org/recommends/. Use the key word "turtle" in the "word in title" to find content that relates to this educational resource.

Common Core Mathematics

Develop understanding of statistical variability.

CCSS.Math.Content.6.SP.A.1

Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

CCSS.Math.Content.7.SP.A.1

Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

Next Generation Science Standards

Students who demonstrate understanding can:

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Common Core Language Arts

CCSS.ELA-Literacy.RST.6-8.7

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).