



Who Cares for These Turtles?

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Length of Lesson: 2 or more days depending on teacher preference of activities.

Intended audience: This lesson can easily be adapted for use in grades 6-12.

Appropriateness for Middle and High School Students: As students mature in the middle and high school years, they are developing their awareness of issues on a more global scale. As they grow in their ability to reason and solve problems, it is important for students to be introduced to the idea that most of the problems we face as a society are complex. Conservation of marine turtles is the perfect platform to introduce the idea that for most solutions to be reached, cooperation among several different groups of people is essential.

This activity uses scientific data collected by marine turtle researchers as an engaging way to show students some of the ways endangered species are being studied and protected. Students are given the opportunity to do an authentic scientific investigation using data collected in real time to make discoveries alongside some of the world's foremost sea turtle scientists. Using technology to display and interpret data, and conduct research related to this collected data gives students a sense of purpose context for the concepts to be taught.

Concepts: Conservation of endangered species is often more complicated than people realize. While it may be a challenge to raise public opinion and political will within a given country to pass legislation that will protect a species, in many cases, the species we aim to protect do not have any awareness of international boundaries. This is especially true with marine organisms. Sharks, whales, migratory fish and sea turtles all move around the globe, crossing national boundaries throughout their migrations. If we hope to protect these species, we need to be aware that no one country can work in isolation. There needs to be international cooperation to work towards a common set of conservation and management goals.

One important concept in this lesson is the idea of "international waters." Management of marine organisms, as well as legal jurisdiction on sea-faring vessels is subject to laws defining the boundaries of a nation's internal and territorial waters, as opposed to international waters (or "high seas"). This definition varies by nation, but is usually within six to twelve miles. For the sake of simplicity in this activity, the teacher will probably prefer to set an estimated boundary (say 12 miles), rather than asking students research the boundary of each country.

In order for students to grow into productive citizens, it is increasingly important that they be able to interpret scientific data. Rather than rely on believing other's interpretations, students must be able to draw their own conclusions based on their own interpretation of data and research findings. Students must also learn how to judge the validity of a data source, especially when using the internet as a tool for research.

Sources:

<http://people.howstuffworks.com/cruise-ship-law2.htm>

<http://www.arri.org/maritime-mobile-operation-in-international-waters>

Common Core State Standards (CCSS) and Florida State Standards (NGSSS) with Cognitive Complexity:

Benchmark Number	Benchmark Description	Cognitive Complexity
LACC.6.RI.1.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	Level 2: Basic Application of Skills & Concepts
LACC.6.RI.3.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.	Level 3: Strategic Thinking & Complex Reasoning
LACC.7.W.1.1	LACC.7.W.1.1 Write arguments to support claims with clear reasons and relevant evidence. a. Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.	Level 3: Strategic Thinking & Complex Reasoning
SC.(6,7,8).N.1.1	Define a problem from the (sixth, seventh, eighth) grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	Level 3: Strategic Thinking & Complex Reasoning
SC.912.L.17.13	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.	Level 3: Strategic Thinking & Complex Reasoning
SC.912.N.4.1	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	Level 2: Basic Application of Skills & Concepts

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Performance Objectives: *Students will be able to:*

- Use printed and / or internet sources of information to differentiate among the types of protection offered to marine turtles at local, national and international levels.
- Use maps of sea turtle migrations to determine the national boundaries crossed by the turtles during the time that they are tracked.
- Conduct research to determine the local, national and international marine turtle policies that would apply to a selected turtle during each part of her migration.
- Cite evidence to support claims and formulate conclusions as to the levels of risk or protection face by a given turtle during her migration.
- Apply lessons learned about the complexities of sea turtle protection to different species.

Materials List and Student Handouts

- One internet-connected computer per student group. If technology is limited, this may be used as a full class activity using a single computer connected to a projector. If there is no access to an internet-connected computer, students may use data points and plot their own graphs of previously tracked turtles.
- These may be downloaded from: <http://conserveturtles.org/educators.php?page=activities>

Advance Preparations

- Google Earth must be installed on the computers students will be using. This application may be downloaded for free from the internet: <http://www.google.com/earth/index.html>
- If no computers are available, teacher should photocopy the following:
- Information for students to read regarding local, national and international regulation of endangered species (or marine turtles, specifically)
- 1 set of data points per student group and one copy of the map per student. These may be downloaded from: <http://conserveturtles.org/educators.php?page=activities>

Safety

- Any time students are using computers connected to the Internet, it is important that they be closely monitored to ensure that they are only accessing educationally appropriate websites.

5E Lesson:

Engagement (10-20 minutes or more)

Students read about and discuss varying conservation regulations from local to international perspectives.

The STC website is a great place to begin:

<http://www.conserveturtles.org/seaturtleinformation.php?page=conservation>

More specific, in depth information may be found here:

<http://www.conserveturtles.org/cites.php>

<http://www.nmfs.noaa.gov/pr/species/turtles/>

<http://www.wcl.american.edu/environment/iel/sup5.cfm>

- If you want to make this a more comprehensive lesson, you could assign jigsaw groups focusing on the following types of legislation: Local (if you live in an area where sea turtles feed and or nest), National, and International.
- After each group does some research or reads a teacher- selected article and discusses their findings, new groups form with one member from each specialty as the “expert” to report what they have learned to the others.

Exploration

Using actual data from satellite tagged sea turtles, students will follow the track of a turtle of their choice; noting where she travels during her migration. At each point along her journey, students will note whether a turtle is in “international waters” or whether she is swimming within the waters governed by a particular country. Special attention will be given to which particular countries the turtle passes through. As the turtle enters a new country’s waters, students will research that country’s policies on sea turtle (marine turtle) conservation, protection, management or harvest. Depending on the teacher’s preference, this can be an ongoing activity as students follow currently tracked turtles (student groups may be asked to report to the class every 1-2 weeks throughout the semester as the Tour de Turtles progresses) or it may be a more compact unit using the tracks of previous year’s Tour de Turtles competitors.

- Each student or student group will choose a turtle from the current Tour de Turtles Competition (or past turtles may be used if you would like to have all of the data points at once). Once you get to a turtle’s map page, select the link below the map that says “Google Earth KML File (full track)”
 - To track current Tour de Turtles Competitors:
<http://conserveturtles.org/satelliteturtles.php>
 - To track past year’s turtles: <http://conserveturtles.org/educators.php?page=activities> to download Google Earth files of previously tracked turtles, or <http://conserveturtles.org/seaturtletracking.php> for Tour de Turtles competitors from 2011 and later.
- Using the Google Earth application students will track the journey of their chosen turtle, making note of the international boundaries their turtle crosses as she migrates. If possible, each group of students should select a different turtle so that each group is researching a different set of international policies. (Note that the turtles are satellite tagged from several different locations).
- For each country’s waters the turtle enters, students will investigate the conservation and / or management policy of that country as it relates to sea turtles.

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- Questions for students to consider as they work: Have students record their predictions before the tracking begins, then revisit these questions as the lesson continues to see if their predictions were accurate.
 - Does our turtle cross international boundaries during her migration?
 - Do all turtles follow common migration paths?
 - Do regulations and policies for sea turtle management and conservation vary widely from one country to another?
 - Are there parts of the turtle’s migration that are more “safe” for the turtle than others?
 - Which countries are the “safest” for our species of turtle?
 - Which countries are the “least safe” for our species of turtle?

Explanation

As students follow the migration of their chosen turtle, they should be given opportunities to report their findings to the class. If real time tracking of current turtles is used, you may want to have students give a brief “status update” every one to two weeks during the semester. If previous year’s tracks are used, a “final report” may be appropriate. Depending on time constraints and teacher preference, these reports may be oral presentations, posters, written lab reports, etc.

Once all groups have completed tracking and researching and reporting on the international regulations pertaining to their turtle, the teacher should lead a group discussion in which the students have an opportunity to discuss the evolution of their answers to the questions asked at the beginning of the exploration:

- Does our turtle cross international boundaries during her migration?
- Do all turtles follow common migration paths?
- Do regulations and policies for sea turtle management and conservation vary widely from one country to another?
- Are there parts of the turtle’s migration that are more “safe” for the turtle than others?
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Elaboration

There are many ways this concept could be extended with your students. For example, students could choose different species and research the complexities of managing them due to the large size of their home ranges. Other relevant marine issues include management of Bluefin tuna fisheries, International Whaling, even piracy on the high seas. Some terrestrial issues that would complement this lesson would include international trade of ivory, rhino horn, or animal products (such as bear gall bladders) used in traditional medicines. Even looking just within the United States, controversies arise when organisms traverse state borders, such as the recently re-introduced gray wolf population in the western United States, or migratory animals like songbirds or monarch butterflies (which actually extend their migration into Mexico).

Evaluation

By tracking student responses to the Questions to consider, a teacher is able to monitor the growth of understanding of students as they progress through this lesson.
