

Sea Turtle Threats



Objectives:

- Students will be able to explain ways in which fishing practices, marine debris and global warming impact sea turtle populations.
- Students will be able to list ways in which people can help decrease the threats to sea turtles.

Suggested Grade Levels: 6-10

Subject Area: Science

Timeframe: Two to four 50 minute class periods

Teacher Information:

There are a number of threats to sea turtle species including poaching, fishing practices, development, pollution, and global warming. This lesson teaches about three of these: fishing practices, global warming, and marine debris.

Many of our current fishing practices cause animals, including sea turtles to become part of bycatch. They are accidentally caught, and many times drown since the nets or hooks hold the turtles underwater for longer than they are capable.

Marine debris is a hazard for turtles. Plastic, in many forms, pollute our oceans and has even accumulated in a mass larger than Texas into what we call the Great Pacific Garbage Patch. Turtles can get caught on the plastic or mistake it for food, causing digestive problems that eventually kill them.

National Education Standards:

- NS.5-8.1
- NS.5-8.3
- NS.5-8.6
- NS.9-12.1
- NS.9-12.3
- NS.9-12.6



Global warming, or global climate change, is a wide-reaching issue, having effects that are difficult to predict. We know that sea levels are rising due to the melting of the polar ice caps, which pushes back beaches to the point that some disappear. Temperatures of beach sand has increased in some areas where eggs are laid, causing hatching rates to decrease or the female to male ratios to change (more females are born when sand temperatures reach 85 degrees Fahrenheit). Ocean temperatures are rising, killing organisms that are temperature sensitive, many which serve as prey to other species. Ocean currents are also changing with the change in water temperature, throwing off migration patterns. In addition, warmer ocean temperatures are a cause of coral bleaching, affecting key habitat for hawksbill turtles (right).



Extensions:

- For conservation efforts, do the Sea Turtle Conservation lesson.
- Allow students to research other threats to sea turtles (check www.seeturtles.org for a list).
- Extend the learning to other organisms. Have students find out ways in which land animals or plants are threatened.
- This lesson only explores one type of fishing net used (trawl), but other types also cause turtles and other organisms to become part of bycatch. Have students explore other nets or fishing methods used and ways, if any, bycatch is reduced.
- After completing the third lesson, teach the students about the connection between carbon dioxide emissions and global climate change.

Materials:

- Computers with internet access
- Copies of investigation sheets for students

Lesson:

1. Write the words “threatened,” “endangered,” and “extinct” on the board. Ask students to tell you what each of the terms mean.
2. Share the following with them:

Endangered species – a species in immediate danger of extinction.

Threatened species – a species present in its range, but threatened because of a decline in numbers.

Extinct species – a species that no longer exists.

3. Relate this to sea turtles by asking the students if they know which are endangered or threatened. (If you did the “Get to Know a Sea Turtle” lesson, the students should already know this.)
 - loggerhead – threatened
 - green – endangered (breeding populations in Florida and the Pacific coast of Mexico) and threatened (everywhere else)
 - leatherback – endangered
 - hawksbill – endangered
 - Kemp’s ridley – endangered
 - Olive ridley – endangered (breeding populations on the Pacific coast of Mexico) and threatened (everywhere else)
 - Flatback - listed as Vulnerable under the Australian Commonwealth’s Endangered Species Protection Act
4. Allow students to react to this information.
5. Ask the students: why are sea turtles in jeopardy? Make a list of their ideas or prior knowledge.
6. Tell them that they are about to do a lesson in which they will investigate 3 of the main reasons why turtle populations have declined. (At this point, you should not tell them which of the 3 you will be investigating.)
7. It is up to the teacher at this point to decide if each student will work on each investigation or if the students will work on one and share.
8. Give the students part one of the investigation(s). As they work through part one, check to be sure they are on the right track. Once they have finished part one to your satisfaction, give them part two, then part three and, for investigation 3 only, wait to give them the second page of investigation three as it contains the answer to a part on the first page.
9. After the students have finished all parts, assign the projects. This can be as involved or as simple as the teacher determines.



These materials are provided by SEE Turtles, a non-profit project that protects sea turtles through conservation travel. Please see our website, www.seeturtles.org for other lesson plans, fundraising ideas, in-class presentations, and field trips. For more information, please contact Brad Nahill, SEE Turtles Director, at brad@seeturtles.org or 503.608.9679.

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Sea Turtle Investigation 1

Part 1

You are a college student who has accepted a summer internship in a biology lab specializing in sea turtle research. Your boss is out for a long lunch and has left the lab in your control. Minutes after your boss leaves, a concerned citizen comes by to tell you of sea turtles in a dumpster. Confused, you follow this person to an area near the docks. On the way, you are thinking that a dead turtle must have washed ashore and someone just threw it away.

You finally get to the dumpster in question only to find not one, but four green turtles inside. It would be too coincidental for 4 dead green sea turtles to wash up on the same morning, so you suspect that something else is going on. Why was it this week that your boss chose to leave you alone? You could surely use her help.

You decide to collect the turtles and take them back to the lab for further examination. When you look the turtles over, you find no markings or injury of any sort.

What are your initial thoughts, how may these turtles have died?

Sea Turtle Investigation 1

Part 2

Your boss has returned from lunch, so you explain all that has happened. She feels that you should continue to lead the investigation. Upon further examination of the turtles, your boss and you find that each has died due to a lack of oxygen. In other words, they have drowned.

Based upon this new piece of evidence, what do you think may have happened to the turtles?

What should you do next?

Sea Turtle Investigation 1

Part 3

You know that the bodies of the turtles were dumped at the docks, so you feel that you should check there. In looking around, you find that there are a large number of commercial fishing boats in the area. You wonder if the boats could have caused the turtles to drown somehow. You begin asking questions of the fishermen passing by. A few refuse to speak with you, but a few others give you valuable information. One in particular tells you that his boat uses something called a trawl to catch fish, but the men on his boat had a great deal of bycatch to go through. In one month he can remember catching a number of sea turtles along with the fish. He felt guilty about this and changed his nets over to ones that use a turtle excluder device (or TED) to decrease the number of accidental turtle deaths. The fisherman tells you that a number of the other boats use them as well, but not all do. You are about to ask him to explain some of the words he used, but the fisherman excuses himself to get to his boat. You head back to the lab, notes in hand, to do a little research.

The fisherman said that he uses a trawl. You are unsure what this is, so you look this up to find that a trawl is _____.

He also discussed the word bycatch. You use this website to find out some information on this term: <http://www.seeturtles.org/1129/fisheries-bycatch.html>. Bycatch is _____.

Lastly, the fisherman talked of something called a TED. In looking at <http://www.nmfs.noaa.gov/pr/species/turtles/teds.htm>, you learn that a TED is _____.

This device helps turtles by _____.

Based upon the evidence and what you have learned from the fishermen, you determine that the green sea turtles were caught in the fishing nets and drowned. You feel that you would like to do more to help the turtles and decide to create a campaign to convince more people in the fishing industry to use TEDs. Design a poster or video campaign designed to persuade fishermen to use fishing practices that are turtle-friendly.

OR

Design a campaign to convince people to do their part to reduce turtle deaths due to fishing practices based upon suggestions from <http://www.seeturtles.org/1129/fisheries-bycatch.html>.

OR

Design a controlled experiment in which the effectiveness of the TED is tested.

Sea Turtle Investigation 2

Part 1

You are on vacation with your family in Florida. As you stroll along the beach, keeping a nervous watch for jellyfish, you come across beautiful sea shells near the water line. You are startled when something brushes your right arm, but you realize, relieved, that it is only a plastic bag, not a jellyfish. As you continue to walk, you notice something on the beach up ahead. Much to your delight, it is a sea turtle. You have always had a fascination with them, and now you get to see a real one.

As you approach the turtle, you notice that it is not moving. A knot forms in your stomach along with the thought that it may be dead. You bend down to look closely at the turtle now next to you. It slowly lifts its head. The turtle is alive, but appears to be sick. You wonder what to do or who to tell. Aside from other tourists, you notice no one of any sort of authority except for a teenage lifeguard. You decide to take a shot with the lifeguard anyway.

To your surprise, the lifeguard knows just who to call. She pulls out a cell phone and dials the number for the FWC Wildlife Alert Hotline. The lifeguard tells you that the scientists will be here in a few minutes. You decide to stick around to see what happens.

While you wait, your mind begins to wonder about what could make a turtle sick.

Make a list of what you think could make a turtle fall ill.

Sea Turtle Investigation 2

Part 2

The scientists arrive and ask you some questions: where did you find the turtle? Did you touch the turtle? Were any other animals around it? They then thank you for making the lifeguard aware of the turtle. You explain to the scientists that you have always been interested in sea turtles. One of the scientists hands you a business card and says that you can give their Marine Lab's Sea Turtle Hospital a call in a few days to check in on the turtle.

You do just that. In two days you call the Marine Lab. The scientists invite you to come and see the turtle since it is in stable condition.

At the lab, the scientists tell you that the turtle is a Kemp's ridley sea turtle, which is endangered. You ask why the turtle was sick. They tell you that the turtle ate a plastic bag; it is not uncommon for turtles to die from eating plastic. They add that plastic and other marine debris are a major threat to sea turtles. You wonder to yourself about how a bag could make a turtle sick.

What are your initial thoughts? Why do you think this turtle may have eaten a balloon?

How could eating a balloon make a turtle ill?

Sea Turtle Investigation 2

Part 3

During your visit, the scientists are called away before you can ask any questions, so you go home to do a bit of research.

According to these articles, why would a turtle eat a balloon and how would this make it sick? (http://www.gloucestertimes.com/pulife/local_story_202165820.html?keyword=topstory and <http://www.sciencedaily.com/releases/2009/03/090315224258.htm>)

One of the articles tells of something called the Great Pacific Garbage Patch. To find out more, you watch a video (<http://www.youtube.com/watch?v=uLrVCI4N67M>) and watch an animation (http://www.greenpeace.org/international/news/trashing-our-oceans/ocean_pollution_animation?12). What is the Great Pacific Garbage Patch, and how did it get there?

Sea Turtle Investigation 3

Part 1

Dr. James is a world class scientist who specializes in studying population trends in sea turtles. Every year, she publishes a report showing trends in population size and possible or known causes of increases or declines. Since marine turtles are found in many different parts of the world, Dr. James relies on the work of fellow scientists who supply her with data and reports from their own studies.

You are shadowing Dr. James as a part of a project in which you need to find out and report on a job in which you have some interest in pursuing. Your role over the next few weeks is to be a fly on the wall, taking in as much as you can.

Dr. James begins her work by calling various scientists to get their input. Her first call is to Dr. Smith who studies leatherback sea turtles in Playa Negra, Costa Rica. For your benefit, Dr. James uses the speakerphone.

Dr. Smith: Remember how thrilled we were in the spring of 2008 because of the outstanding hatch of almost 10,000 hatchlings?

Dr. James: I remember. I also seem to recall that this was due to the shading you put over the hatchery.

Dr. Smith: Correct. Temperatures of the sand are so hot in some places that the eggs were essentially becoming hard-boiled, while in some areas just hot enough to throw off the ratio of females to males. We had another great hatch this year, but I am concerned about the turtles that nest in other parts of Costa Rica where hatcheries such as this one aren't there to help them.

Dr. James: Thanks for the information. Will you email me any data that you have?

Dr. Smith: Sure. Talk to you later.

You are left puzzled after listening to this conversation. You understand that really hot sand temperatures could cook an egg, but you are wondering how temperatures play a role in female to male ratios. You pull out your laptop and read an article that states:

Sea turtles lack sex chromosomes, and it is temperature instead that dictates the sex of hatchlings. When sand is 85 degrees or warmer, the majority of the hatchlings will be female.

What problems could turtles face if the number of females to males continues to rise in some areas?

Sea Turtle Investigation 3 Part 2

Dr. James continues to call scientists from around the world, allowing you to listen in on the conversations. You take notes on these conversations.

Conversation with scientist studying turtles in the area of the Yucatan Peninsula, Mexico:

-The area is experiencing a dramatic decline in the nesting population of hawksbill sea turtles. Several turtles with satellite transmitters were followed, showing that the turtles have abandoned a once popular foraging area.

-Upon further investigation of the foraging area, it is found that many of the sponges, a mainstay of the hawksbill diet, are dying due to increased water temperatures.

Conversation with a turtle researcher working out of a Pennsylvania university:

-Nesting beaches are being destroyed in two main ways. First, the rise in sea levels has destroyed beaches that turtles return to year after year. Second, the extremes in weather are causing some beaches to erode at a high rate and can flood nests already laid.

Conversation with scientist studying turtles in the area of Papua New Guinea:

-The area has seen a recent decrease in hawksbill sea turtles.

-Another group of scientists in the area keeping watch on the corals, an important marine turtle habitat, tell of an increase in coral bleaching.

You wonder about coral bleaching. You grab your laptop and go to this website:

http://www.reefed.edu.au/home/explorer/hot_topics/coral_bleaching.

Explain coral bleaching.

Sea Turtle Investigation 3 Part 3

Dr. James suddenly exclaims, "I see a connection! Each of these scientists describes happenings that have resulted from one main cause."

Make a list of important facts from each of the conversations.

Review your list. What would you guess is the underlying cause of each of these happenings? Provide evidence to explain your answer.

You are can't believe global warming could have this many negative side effects on sea turtles. You wonder if there is anything that just one person could do to help. You have heard that carbon dioxide emissions are the main cause of global warming, but you are not sure how just one person could help reduce the amount emitted.

Visit these two sites to learn more:

- <http://www.epa.gov/climatechange/wycd/actionsteps.html>
- http://www.epa.gov/climatechange/emissions/ind_calculator.html

Design a website, blog, or poster educating people ways to reduce the amount of carbon dioxide emitted into the atmosphere.

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