

9-12 South Carolina Aquarium Sea Turtles Activity



Overview

Focus Question

How can you help sea turtles?

Activity Synopsis

Students will learn about current patients in the South Carolina Aquarium's Sea Turtle Hospital. They will also learn ways they can help prevent sea turtle strandings.

Time Frame

60 minutes

Objectives

The learner will be able to:

- Communicate information concerning current sea turtle patients
- Identify ways they can help prevent sea turtle strandings

Student Key Terms

- Cold-stunned
- Debilitated turtle syndrome
- Endangered species
- Epibiont load
- Floater syndrome
- Reptile
- Stranding
- Sea turtle
- Threatened species

Teacher Key Terms

- Carapace
- Cold-blooded
- Dredging
- Plastron
- South Carolina Department of Natural Resources

Standards

South Carolina College- and Career-Ready Science Standards 2021

Biology: B-LS2-2, B-LS2-7, B-LS4-5, B-LS4-6

*** Bold standards are the main standards addressed in this activity**

2014 Academic Standards and Performance Indicators for Science

Biology: H.B.1A.1, H.B.1A.6, H.B.1A.8, **H.B.1C.1, H.B.6D.1**

*** Bold standards are the main standards addressed in this activity**

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South Carolina College- and Career-Ready Science Standards 2021

Biology Performance Expectations

B-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

B-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.

B-LS4-5 Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

B-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

2014 Academic Standards and Performance Indicators for Science

Biology Performance Indicators

H.B.1A.1 Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge scientific arguments or claims.

H.B.1A.6 Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

H.B.1A.8 Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.

H.B.6C.1 Construct scientific arguments to support claims that the changes in the biotic and abiotic components of various ecosystems over time affect the ability of an ecosystem to maintain homeostasis.

H.B.6D.1 Design solutions to reduce the impact of human activity on the biodiversity of an ecosystem.

Cross Curricular Standards

South Carolina College and Career Standards for ELA

Inquiry (I) – 2.1

Writing (W) – 1.1, 2.1, 3.1

Communication (C) – 1.1, 1.2, 1.6, 3.2, 5.2, 5.3

Background

Key Points

Key Points will give you the main information you should know to teach the activity.

- An animal stranding is when the animal swims or floats into shore and becomes stuck in shallow water.
- **Sea turtles** become stranded for many different reasons. Some of the reasons are human-induced, such as boat strikes, and some are natural such as shark attacks.
- Data is taken at the site of a stranding and put into a sea turtle stranding report
- When a stranded sea turtle is found, **South Carolina Department of Natural Resources** is called to come out to the scene. Then, the turtle is brought to the South Carolina Aquarium's sea turtle hospital.
- The sea turtles will remain in the hospital until they are healthy enough to be released back into the wild.

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- All sea turtles are listed as either **threatened** or **endangered** by the Endangered Species Act. Sea turtles are an integral part of the ocean's food chains and they need to be protected around the world in order to save their populations.
- The sea turtle hospital was created in order to put healthy sea turtles back into the ocean so that they can contribute to sea turtle populations.

Detailed Information

Detailed Information gives more in-depth background to increase your knowledge, in case you want to expand the activity or you are asked detailed questions by students.

Sea Turtles are **reptiles**. They have a top shell called the **carapace** and a bottom shell called the **plastron**. Sea turtles have a shell for protection, but they cannot pull their limbs inside. Along with their shell, their large size helps protect them from most predators once they are adults. The front legs are flippers shaped and help to propel the turtle in the water. The back legs are used mainly as rudders for steering.

Like all reptiles, sea turtles are air breathers, lay leathery shelled eggs and are **cold-blooded**. They can be found throughout the world and are listed as **threatened** or **endangered species** internationally.

There are 7 species of sea turtles in the world. The 7 species are Flatback, Green, Hawksbill, Kemp's Ridley, Leatherback, Loggerhead and Olive Ridley sea turtles (http://www.ccturtle.org/seaturtleinformation.php?page=species_world.) US Atlantic Ocean sea turtles species live their entire lives in the ocean except when they are developing in the egg and when females come on shore to lay their eggs.

Stranding

Marine mammals and sea turtles have been known to strand, which means they swim or float into shallow water and become stuck. Once a sea turtle hatches from its nest as a baby, if it is a female, it should not return to a beach until it is time to lay a nest. If it is a male, it will never return to the beach. He will stay out in the ocean. It is abnormal for a sea turtle to return to the land if it is not nesting. Therefore, when a sea turtle strands it most likely means that something is wrong with the sea turtle.

There are many different causes of sea turtle strandings. These causes can be both natural and human-induced. Some main natural causes of sea turtle strandings are shark attacks, stingray barb punctures, floaters syndrome and **cold-stunning**. The following are causes of human-induced sea turtle strandings: boat strikes, fishing gear entanglement, pollution, marine debris ingestion, and floater's syndrome. Many turtles get struck by boats and the propeller of the boat can cause great damage to their carapaces. Fishing gear is also a leading cause of strandings. Sea turtles can get caught on a hook or have fishing gear wrapped around their bodies. They can also get caught in large fishing nets. Pollution such as oil spills can make sea turtles sick and this causes them to strand. Sea turtles can also get sick from ingesting marine debris. They will eat trash that resembles their prey and this can cause them to starve. Floater's syndrome is when a sea turtle has too much gas or air built up internally. This causes the turtle to become too buoyant and it is unable to dive. **Floater syndrome** can be caused by bacterial infections (natural) or by objects the sea turtle ingested (human-induced). Many stranded turtles have a heavy **epibiont load** (organisms living on the skin and shell) which means they have not been feeling well for a while. A lot of algae covering the shell means the turtle has been spending a lot of time on the surface (near the sun). A lot of barnacles on a turtle means the turtle has been still and not moving much (barnacles mostly live on stationary objects or objects moving slowly)

The last cause of a sea turtle strandings is somewhat of a mystery. It is known as **debilitated turtle syndrome (DTS)**. The turtles that have this syndrome are very lethargic, underweight, have low blood glucose and are just very sick. The cause(s) of debilitated turtle syndrome has not been determined.

Stranding Events

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When a sea turtle is found stranded on the beach, the **South Carolina Department of Natural Resources** (SC DNR) is called. If you ever find a stranded turtle, call 1-800-922-5431. When a SC DNR person arrives on the scene they fill out a stranding report. This is a data sheet where all of the information about the turtle is documented. The important pieces of information to gather are the species of sea turtle, the approximate age, if it is tagged, and the extent of the injuries or condition. It is also very important to document where the sea turtle stranded and the type of activity that is occurring. For instance, are a large number of people fishing or boating?

Sometimes a sea turtle is found on the beach already deceased. Whether a turtle is found dead or alive, DNR should be notified immediately. Injured turtles will be taken to the South Carolina Aquarium for rehabilitation and hopefully a release back to the ocean.

Patients in the Hospital

When a sea turtle comes to the hospital it is examined by a veterinarian and the sea turtle hospital staff. Treatments begin immediately. Blood samples are taken and fluids are given. Newly admitted sea turtles are soaked in freshwater to kill any organisms living on them. This is called the eubiont load. The amount and type of organism living on a sea turtle can provide information. A sea turtle that is densely covered in organisms has been lethargic. It has not moved very much so many organisms were able to settle on it. The freshwater does not harm sea turtles, but it kills the organisms living on the sea turtles. All of the organisms will then be picked off of the sea turtle. When a sea turtle's condition improves, it is moved into a saltwater tank.

A sea turtle is released when it has a good appetite, a normal weight, and healthy blood work. The hospital's goal is to continue to return healthy sea turtles back to the ocean. The shortest length of time a turtle would stay in the hospital is 3 months. The longest so far is over 2 years. Since all species of sea turtles are either threatened or endangered, it is important to return healthy turtles to existing populations so that they may help grow populations of sea turtles.

Conservation

Sea turtles have been in existence for 65-145 million years according to fossil records. Today, they face many natural and human induced threats throughout their life. Strandings are not the only threats to sea turtles. They have many obstacles to overcome even before they hatch from the eggs. This is a breakdown of some sea turtle threats:

Eggs:

- Natural threats to eggs include predators (fire ants, raccoons, domestic cats and dogs and ghost crabs), vegetation (roots smother eggs) and storms (high tides washing over nests).
- Human threats to eggs include poachers, vandalism, beach nourishment and **dredging**.

Hatchlings:

- Natural threats to hatchlings include predators (ghost crabs, raccoons, fire ants, birds and fish), disease and weather.
- Human threats to hatchlings on the beach include poachers, beach obstacles (sand castles, holes and beach litter) and beach front lights (can confuse hatchlings to go in opposite direction of the ocean)
- Human threats to hatchlings in the sea include fishing gear, litter and boats.

Juveniles:

- Natural threats to juveniles include predators such as large fish and diseases such as Fibropapillomatosis (skin tumors), internal parasites (heavy loads of flatworms), external parasites (heavy loads of leeches, barnacles, worms or algae).
- Human threats to juveniles include litter, boats and fishing gear (fishing line, ropes, nets and crab traps).

Adults:

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- Natural threats to adults include predators such as shark and diseases such as Fibropapillomatosis (skin tumors), internal parasites (heavy loads of flatworms) and external parasites (heavy loads of leeches, barnacles, worms or algae).
- Human threats to adults include litter, boats and fishing gear.

Some people may wonder why it is so important to protect sea turtles. Sea turtles, just like all living things have their place in the ocean ecosystem. Without a balance of animal populations through food chains, communities and ecosystems could become unbalanced. People around the world rely on the ocean for food, oxygen, the earth's climate and medicines.

About 16% of the world's food comes from the ocean. This might not seem like a large percentage, but it equals about 200 billion pounds each year. It is thought that about 90% of the world's oxygen is produced by the phytoplankton of the ocean. This is important because all living things need oxygen to breath. The ocean also plays a huge role in the climate of the earth. The ocean collects and mixes carbon dioxide, heat and water which in turn will control the climate patterns around the world. Researchers are always discovering more about the living things in the ocean. New discoveries could lead to medical breakthroughs in cures for diseases and medicines.

Sea turtles are known as keystone species, a species that if removed could cause dramatic changes to the community. An example of this is the leatherback sea turtle and jellyfish keystone species interaction. Fishermen have noticed an increase in jellyfish populations in the Atlantic Ocean. Jellyfish feed on fish larva. With more jellies there is less fish growing to adult size and therefore less fish for fisherman to catch. The reason is most likely because of the dramatic decrease in the leatherback sea turtle populations. Leatherback sea turtles eat jellies and without them the jelly populations are increasing. The main cause of the decrease in leatherback sea turtle population is from being caught in fishing nets. It's a cycle that went on for so long that without drastic changes could mean an end to many fishing industries.

Many efforts are being done to protect sea turtles around the world. Protecting sea turtles must include the protection of the beaches as well as the ocean. Sea turtles are federally protected by the Endangered Species Act.

The following list of some things that can be done to protect sea turtles:

1. Never touch a sea turtle if you see one in the wild (this is illegal).
2. Call your local Department of Natural Resources (DNR) if you find an injured or stranded sea turtle
 - o South Carolina DNR – (800) 922-5431
3. Turn off beach front lights during nesting season (May-Oct.)
4. Fill in sand holes on the beach during nesting season
5. Knock down sand castles at the end of the day during nesting season
6. Don't let your dog dig in the sand dunes (this is illegal)
7. Don't walk on sand dunes (this is illegal)
8. Use canvas bags instead of plastic to reduce trash
9. Don't litter
10. Use caution when boating and always watch out for turtles
11. If you catch a turtle while fishing, call DNR
12. Fisherman must use Turtle Excluder Devices (TED's) on all fishing/shrimping nets so turtles can get out if caught (this is law in the US)
13. Join an Island Turtle Team
14. Support a Conservation Organization (like the South Carolina Aquarium)
15. Leave No Trace (be respectful of nature while you are enjoying it)

Procedure

Materials

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- Computers w/ internet access
- Blank paper
- Markers/colored pencils/crayons
- Other fun materials for creating a brochure (stickers, glitter,...)

Procedure

1. Inform the students that in South Carolina a stranded sea turtle is taken to the Sea Turtle Hospital at the South Carolina Aquarium.
2. Ask the students to hypothesize the type of injuries or illnesses that patients may have in the hospital. (See the Sea Turtle Strandings activity for more information).
3. Inform the students that they are going to visit the SC Aquarium's Sea Turtle Rescue website (<http://scaquarium.org/sea-turtle-rescue/>). Have students research one of the patients in the hospital. It is okay if more than one student choose the same sea turtle because there will not be enough patients for each student to have a different turtle.
4. Information they need to gather:
 - Name of the sea turtle
 - Species
 - Why did the turtle strand
 - Was a natural cause or a human-induced cause
 - How has the turtle improved while being in the hospital
5. Explain to the students that they are going to create a brochure that informs people about the patient they researched. They must include the information in the previous step and any other information that they think is relevant. One part of the brochure should be dedicated to how people can help sea turtles.
6. Instruct the students that they should use colored pencils/markers and anything else available to them to decorate their brochures.
7. Pass out a blank piece of paper to the students and instruct them to fold it in half like a book. They should cover all four sides of the paper with information.
8. When they are done, have the students pass around the brochures so they can all learn about the sea turtles in the hospital. Brochures could also be put up in the front office for visitors of the school to see.

Follow-up Questions

- How can people help reduce the number of sea turtle strandings?
- What device would you invent to help sea turtles?

Assessment

Grade the student's brochures.

Scoring rubric out of 100 points

Turtle's name clearly written:

10 points

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Sea turtle species listed:	10 points
Reason turtle stranded explained:	20 points
Explanation of whether it was a natural or human-induced stranding:	20 points
Description of how the turtle is improving:	20 points
Explanation of how people can help sea turtles:	20 points

Cross-Curricular Extensions

STEM Extension

Have students become the sea turtle biologists who take care of the injured turtles at the South Carolina Aquarium Sea Turtle Care Center. They should create a presentation with information on how to care for the turtles. In order to care for the turtles they need to:

- Figure out what kinds of food they need to feed the turtles based on species.
- Devise the best way to deliver the food and prepare it.
- Decide how often the turtles should be fed.
- Determine how long the food may be stored.
- Decide if vitamin and mineral supplements must be added to the food.
- Figure out how many grams of food must be provided to each turtle per kg of turtle weight.
- If the turtle has an obstruction in its digestive tract, they must devise the best means of delivering nutrition.
- Decide how often to weigh the turtles to check their progress.

All of their decisions must be based on research from at least three legitimate resources.

Resources

Teacher and Student Reference Books

Bolten, Alan B. and Blair E. Witherington. Loggerhead Sea Turtles. Smithsonian Institution, Washington, D.C., 2003.

Gulko, David and Karen Eckert. Sea Turtles: An Ecological Guide. Mutual Publishing, Hawaii, 2004.

Lutz, Peter L and John A. Musick. The Biology of Sea Turtles. CRC Press, Boca Raton, 1997.

Lutz, Peter L., John A. Musick and Jeanette Wyneken. The Biology of Sea Turtles, Volume II. CRC Press, Boca Raton, 2003.

Ruckdeschel, Carol and C. Robert Shoop. Sea Turtles of the Atlantic and Gulf Coasts of the United States. The University of Georgia Press, Georgia, 2006.

Safina, Carl. Voyage of the Turtles: In pursuit of the Earth's Last Dinosaur. Henry Holt and Company, 2007

Spotila, James R. Sea Turtles: A Complete Guide to Their Biology, Behavior and Conservation. Johns Hopkins University Press, 2004.

Witherington, Blair. Sea Turtles: An Extraordinary Natural history of Some Uncommon Turtles. Voyager Press, St. Paul, 2006.

Teacher and Student Reference Websites

Caribbean Conservation Corporation

<http://www.cccturtle.org/seaturtleinformation.php>

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This site has many links to sea turtle information. You will be able to link to basic sea turtle biology about life history, species information, nesting and behavior as well as learn why sea turtles are important.

Defenders of Wildlife

http://www.defenders.org/wildlife_and_habitat/wildlife/sea_turtles.php#

Good Site for information on sea turtle status on the Endanger Species List.

Marine Bio

<http://marinebio.org/Oceans/Ocean-Resources.asp>

Good site for understanding ocean resources.

National Oceanic and Atmospheric Association (NOAA)

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

This site is a great resource for basic sea turtles information, but has many links to more in depth information as well. You will be able to click on links to each sea turtles species and get details information as well as click to other resource websites.

<http://graysreef.noaa.gov/tw/turtles.html>

Life history and basic information of the five sea turtle species found on the east and gulf coasts of the United States.

Sea Turtle.org

<http://www.seaturtle.org>

This website has all sorts of information to look through and updates the records daily (nesting numbers, stranding numbers,...). It also gives you the needed information to report sick or dead sea turtles found as well as satellite tracking maps.

http://www.seaturtle.org/documents/ID_sheet.pdf

Species dichotomous key pdf. Download this resource and it will show you how to identify each sea turtles species.

South Carolina Department of Resources (SCDNR)

<http://www.dnr.sc.gov/seaturtle/outreach.htm>

Good site for resources (curricula, field trip sites, links to other sea turtle sites and list of resource books).

<http://www.dnr.sc.gov/marine/pub/seascience/pdf/seaturtle.pdf>

Sea turtle life history and general facts as well as threats and conservation tips designed as a easy to print, pdf.

US Fish and Wildlife Service (USFWS)

<http://www.fws.gov/northflorida/SeaTurtles/turtle-facts-index.htm>

Information on each sea turtles species.

http://www.fws.gov/northflorida/SeaTurtles/20090700_You_Can_Help_ST.pdf

Link to brochure on ways people can help protect sea turtles. Brochure can be printed and folded as tri-fold or you can contact the USFWS to send you some.

Online Curricula

SEA K-12 Lesson Plans

<http://www.sea.edu/academics/k12.aspx>

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NOAA's Aquarius Lesson Plans

<http://www.uncw.edu/aquarius/education/lessons.html>

NOAA's Learning Ocean Science through Ocean Exploration Curriculum

<http://oceanexplorer.noaa.gov/edu/curriculum/welcome.html#curriculum>

Project Oceanica Lessons

<http://oceanica.cofc.edu/LoggerheadLessons/LoggerheadHome.htm>

Project WILD

<http://www.projectwild.org/resources.htm>

Videos

Wildlife Survivors: A Tale of Two Turtles/Dolphins in Danger

National Geographic – Tales from the Wild: Cara the Sea Turtle

Nature – Voyage of the Lonely Turtles

The Sea Turtle: Threatened Vagabond of the Indian Ocean

Journey of the Loggerhead

<http://www.envmedia.com/production/loggerhead/index.htm>

Last Journey for the Leatherback

<http://vimeo.com/7782397>

The Turtle Ladies of Charleston County

http://www.scetv.org/index.php/carolina_stories/show/the_turtle_ladies_of_charleston_county/