Nest Observation and Relocation

Created by the NC Aquarium at Fort Fisher Education Section

Essential Question:

How do scientists move sea turtle nests when it is necessary to protect them?

Lesson Overview:

Students will learn why scientists might need move a sea turtle nest and how they do it without damaging the eggs. Students will simulate this procedure using "eggs" in "sand", taking all the precautions and care that scientists would to move the "eggs" without damaging them.

Learning Objectives:

Students will learn how sea turtles create their nests. Students will be able to:

- Explain why sea turtles nest on land.
- Use math to create a model of a sea turtle nest.
- Relocate a sea turtle nest.

North Carolina Standards:

Kindergarten:

Art:

- **K.V.2** Apply creative and critical thinking skills to artistic expression.
  - **K.V.2.2** Use sensory exploration of the environment as a source of imagery.
- **K.V.3** Create art using a variety of tools, media, and processes, safely and appropriately.
  - **K.V.3.1** Use a variety of tools safely and appropriately to create art.
  - **K.V.3.2** Use a variety of media to create art.
- **K.CX.2** Understand the interdisciplinary connections and life applications of the visual arts.
  - **K.CX.2.2** Identify relationships between art and concepts from other disciplines, such as math, science, language arts, social studies, and other arts.
- **K.CR.1** Use critical analysis to generate responses to a variety of prompts.
  - **K.CR.1.1** Identify the lines, colors, and shapes in works of art.

Math:

- **K.MD.A.1** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

First Grade:

Art:

- **1. V.3** Create art using a variety of tools, media, and processes, safely and appropriately.
  - **1.V.3.1** Use a variety of tools safely and appropriately to create art.
  - **1.V.3.2** Execute control of a variety of media.
- **1.CX.1** Understand the global, historical, societal, and cultural contexts of the visual arts.
  - **1.CX.1.3** Classify art into categories, such as landscapes, cityscapes, seascapes, portraits, and still life.
- **1.CX.2** Understand the interdisciplinary connections and life applications of the visual arts.
  - **1.CX.2.2** Identify connections between art and concepts from other disciplines, such as math, science, language arts, social studies, and other arts.

Science:

- **1.L.1** Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.
  - **1.L.1.1** Recognize that plants and animals need air, water, light (plants only), space, food and shelter and that these may be found in their environment.
  - **1.L.1.2** Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world.

Second Grade:

Art:

- **2.V.1** Use the language of visual arts to communicate effectively.
  - **2.V.1.3** Understand the "story" in works of art.
- **2.V.2** Apply creative and critical thinking skills to artistic expression.
  - **2.V.2.2** Use personal point of view of the environment as a source of imagery.
  - **2.V.2.3** Create art from real and imaginary sources of inspiration.
- **2.V.3** Create art using a variety of tools, media, and processes, safely and appropriately.
  - **2.V.3.1** Use a variety of tools safely and appropriately to create art.
- **2.CX.1** Understand the global, historical, societal, and cultural contexts of the visual arts.
  - **2.CX.1.5** Understand that artists use natural resources in creating art.
- **2.CX.2** Understand the interdisciplinary connections and life applications of the visual arts.
  - **2.CX.2.2** Understand relationships between art and concepts from other disciplines, such as math, science, language arts, social studies, and other arts.
  - **2.CX.2.3** Recognize that some artists work in teams to create art.
- **2.CR.1** Use critical analysis to generate responses to a variety of prompts.
  - **2.CR.1.1** Use art terminology to describe art in terms of subject and physical characteristics.

Math:

- **2.MD.A.1** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Science:

- **2.L.1** Understand animal life cycles.
  - **2.L.1.1** Summarize the life cycle of animals:
    - Birth
    - Developing into an adult
    - Reproducing
    - Aging and death

Third Grade:

Art:

- **3.V.2** Apply creative and critical thinking skills to artistic expression.
  - **3.V.2.3** Create art from realistic sources of inspiration.
- **3.V.3** Create art using a variety of tools, media, and processes, safely and appropriately.
  - **3.V.3.3** Use the processes of drawing, painting, weaving, printing, collage, mixed media, sculpture, and ceramics to create art.
- **3.CX.2** Understand the interdisciplinary connections and life applications of the visual arts.
  - **3.CX.2.2** Understand how to use information learned in other disciplines, such as math, science, language arts, social studies, and other arts in visual arts.

Math:

- **3.MD.B.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Fourth Grade:

Art:

- **4.V.2** Apply creative and critical thinking skills to artistic expression.
  - **4.V.2.2** Use ideas and imagery from North Carolina as sources for creating art.
- **4 CX.2** Understand the interdisciplinary connections and life applications of the visual arts.
  - **4.CX.2.2** Apply skills and concepts learned in other disciplines, such as math, science, language arts, social studies, and other arts, in the visual arts.
- **4.CR.1** Use critical analysis to generate responses to a variety of prompts.
  - **4.CR.1.1** Use visual clues to interpret the content of art.

Science:

- **4.L.1** Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
  - **4.L.1.2** Explain how animals meet their needs by using behaviors in response to information received from the environment.

- **4.L.1.4** Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.

Fifth Grade:

Art:

- **5.V.2** Apply creative and critical thinking skills to artistic expression.
  - **5.V.2.2** Use ideas and imagery from the global environment as sources for creating art.
  - **5.V.2.3** Create realistic, imaginative, abstract, and non-objective art.
- **5.V.3** Create art using a variety of tools, media, and processes, safely and appropriately.
  - **5.V.3.3** Use the processes of drawing, painting, weaving, printing, collage, mixed media, sculpture, and ceramics to create art.

Science:

- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
  - **5.L.2.3** Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

Engineering Connection:

- **EG K-2 D 1** Use the engineering design process of Ask-Imagine-Plan-Create-Improve.
  - **EG K-2 D 1.1** Design product to solve a stated problem.
- **EG K-2 P 1** Use a systematic approach to solve several different types of problems.
  - **EG K-2 P 1.1** Identify problems that need to be solved.
- **EG K-2 P 2** Use critical thinking to suggest solutions to problems.
  - **EG K-2 P 2.3** Solve a problem that requires a picture to be drawn.
- **EG 3-5 D 1** Use the engineering design process of Ask-Imagine-Plan-Create-Improve.
  - **EG 3-5 D 1.2** Design product to solve a stated problem.
  - **EG 3-5 D 1.3** Contrast multiple designs for a specific challenge.
- **EG 3-5 P 1** Use a systematic approach to solve several different types of problems.
  - **EG 3-5 P 1.2** Identify several problems that need to be solved in daily life.

Time Frame:

Preparation: 30 minutes
Activity: 40 minutes

Supplemental Background Information for Teachers:

A sea turtle's life begins on the beach. Sea turtles nest, or lay eggs, throughout the summer. Nesting season usually lasts from May to September, reaching peak activity in late June and July. The female loggerhead comes ashore at night and drags her body far up the beach above the high tide line. Here she digs a hole about 18" deep with her rear flippers and begins laying her eggs. The nesting process is a complex and vulnerable time for a mother sea turtle. She carefully selects a nest site and may sometimes be frightened away by bright lights and beach

activity. Predators such as foxes, raccoons, and ghost crabs abound on the beach and may devour her eggs even as they are deposited into the nest.

On average, 120 golf ball-sized, tough, leathery eggs are laid in the nest. The turtle covers her eggs completely with sand and returns to the sea. The average female may nest three to five times during the summer months at roughly two-week intervals. Since most nesting occurs at night, scientists rely on using trails and tracks to identify where a nest has been laid and by what species. A track is an impression of a single flipper. Long lines of tracks showing an animal's movement and behavior are called trails. Scientists measure the width of a sea turtle's track, called the straddle, as well as note the crawl pattern of each species to tell what kind of turtle laid a nest.

Unfortunately, sea turtles are threatened by people and their activities in coastal areas. What were once long stretches of open beach where turtles could nest are now developed areas. Bright lights discourage females from coming ashore at night, and confuse young turtles after they leave the nest. Debris and other ocean pollution also create life-threatening problems for these ancient reptiles. Although sea turtles have always fascinated people, we still know little about their migrations, nesting habits, and life spans.

If you see a sea turtle nesting or hatching:

- Enjoy this event from a distance. Many turtles scare easily and may stop the nesting process and return to the sea, which will stop the development of the eggs.
- Take note of the location and report it to the local police department. They will contact the area's sea turtle coordinator.
- Please do not take flash photos of her! Scientists use infrared cameras to get photos so they do not disrupt her night vision.
- Do not put your hands on or near the turtle. Any distractions may frighten and disorient her, causing her to return to the ocean before completely covering and camouflaging her nest.
- Also please refrain from giving out the location of a nesting turtle to anyone other than the authorities.
- If you see a nest hatching, leave them alone. You can report it to the local police department. They will contact the area's sea turtle coordinator to assist in the hatching.

On occasion, sea turtle nests need to be relocated. This could be due to the location relative to high tide: if turtle eggs are frequently submerged, they will not hatch. It could also be due to the location near a high traffic area. The actual relocation process can vary from state to state but many follow a similar protocol. In North Carolina, turtle groups must receive permission from the North Carolina Wildlife Resources Commission to relocate a nest. No one should relocate a nest except certified turtle organizations.

When a sea turtle nest needs to be relocated, the scientists take great care to create a nest nearly identical to the original. Many groups measure from the surface of the sand down to the top of the eggs. Then they measure the width of the nest. The scientists will remove the eggs one at a time. Many groups mark the top of the egg so they do not interfere with the

development by placing the eggs in a different orientation. The eggs are placed into a bucket or commercial egg cartons. The scientists make sure they place the eggs in the order they were removed so they can be placed back in the same order. When the bottom of the nest is reached, the scientists take another measurement.

Once all of the relevant nest data is collected, the scientists will move to the new location. They will then dig a nest that has the same measurements as the first nest. They will then, carefully, replace the eggs into the nest. They start with the eggs that came from the bottom and return them in the exact same order. Then they will cover the nest with sand. Finally they will mark the nest with stakes and a sign warning visitors away from the nest. Then it's a sixty day wait for the hatching to begin.

Materials:

Activity 1:

- 2 ten pound bags whole wheat flour (may need more depending on your container)
- 8 cups vegetable oil
- Two clear plastic bins (clear file totes work well)
- 85-100 ping-pong balls
- Rulers
- Observation worksheet
- Pencils
- Bucket or commercial egg cartons (from school cafeteria)
- Washable markers
- Gloves (optional)

Activity 2 (Optional):

- Construction paper
- Markers
- Glue
- Dot stickers
- "Sand" from activity 1

Preparation:

In each bin, mix one bag of flour with 4 cups vegetable oil. If you have a different amount of flour based on the size of your bin, the ratio is 8 cups of flour mixed with one cup oil. This will make "sand". Leave one bin empty except for the "sand". In the other bin, scoop out the "sand" in the middle of the bucket to insert the ping-pong balls. You can do any number of ping-pong balls based on the age of your students. Nests typically have 85-150 eggs if you want to be realistic. Cover the ping-pong balls so that they are not visible. The extra flour can go into the second bin. Both bins should look like buckets of sand.

Procedure:

Activity 1:

1. Set the bin with the sea turtle nest on a surface where the class can see it.
2. Give each student an observation worksheet.
3. Have the students make observations about the bin. What do they see? What is in the bin? How do they know? How can they find out more?
4. Have the students draw a sketch of the bin.
5. Ask the students what they think might be in the bin. Have them create a hypothesis and write it on their worksheet.
6. As a class, discuss ways to find out what is in the bin. Have them write down their ideas.
7. Help the students uncover the eggs. Stop once the first egg is uncovered. Ask the students what they think the bin might contain.
8. Explain to the students that they are uncovering a sea turtle nest on the beach. As scientists, the students will have to be very careful as they uncover the nest.
9. Ask the students what types of information they might need to collect as they uncover the nest. They will need to know the depth to the top of the eggs, the width of the nest, and the depth to the bottom of the eggs.
10. When scientists work with sea turtle eggs they often wear gloves. If having your students use them, have them put them on now.
11. Have the students take measurements as they uncover the eggs. They should write the dimensions on their worksheet.
12. As they remove each egg, have one student carefully mark the top of the egg with the washable marker.
13. The nest student should place the egg in the bucket or egg carton. The students should carefully place the eggs in the order they are removed from the nest.
14. Once the students have emptied the nest and measured to the bottom of the nest, explain to them that the turtle laid her eggs too close to a pier at the beach. It needs to be moved further away from people. Ask the students how they might move the eggs to a new nest. Have them write their ideas on their sheet. Use the Ask-Imagine-Plan-Create-Improve design plan to engineer a way to move the eggs.
15. Once they have come up with an idea as a class, explain how scientists move sea turtle nests. Explain that scientists try not to interfere too much with development. Because of this, they try to recreate the nest as it was originally.
16. Have the students use the second bin to dig a nest with the same dimensions as the first.
17. Next have students carefully replace the egg one at a time with the dot facing upwards.
18. When the nest has been recovered, ask the students if it looks like their original drawing.
19. Have the students answer the last question on their sheet.

Activity 2 (Optional):

This activity is great if you do not want to reuse the flour.

1. Give each student a piece of construction paper, a marker, and glue.
2. Have the students draw the shape of their nest on their construction paper (typically the nests look like an upside down light bulb) using their marker.
3. Give the students each a sheet of dot stickers (or they can draw using their markers). They should fill their nest with 85-100 stickers to represent eggs.
4. Once their nest is filled with eggs, have them cover the rest of the paper outside of their nest with glue. (If you want to save time, the students can cut the paper down to an inch around the nest outline).
5. They should cover the glue with leftover "sand" from activity 1 to create their own sea turtle nest.

Extensions:

1. Watch our video on sea turtle nest relocation.
2. Instead of ping-pong balls, you can use Easter eggs and fill them with model sea turtles. The students could remove an egg to identify the nest. Research the work that is being done on sea turtle eggs and mitochondrial DNA: http://www.seaturtle.org/nestdb/genetics.shtml

Observations

Today we are making observations of a bin. Write down your observations and make a sketch of the bin.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Draw a sketch of the bin:

Create a hypothesis for what might be in the bin:

_____
_____
_____
_____

How might we figure out what is in the bin?

_____
_____
_____
_____

Nest Measurements:

Depth 1	
Depth 2	
Width 1	
Width 2	

How could we move the eggs to a new nest?

_____
_____
_____
_____

Why must scientists be so careful when moving sea turtle eggs?

_____
_____
_____
_____
_____
_____