



WAVE on Wheels Outreach

Turtle Time Presentation

Grades 3-5

Time requirement

1 Hour

Group size and grade

Up to 50 students maximum

Materials

3 species of turtle & tortoise

Turtle Artifacts Bin

WAVE Tablecloth

Goal

Through live turtle and tortoise encounters, students will be excited, engaged, and educated about the wonders of turtle life and the importance of conservation.

Objectives

1. Students will be able to list 5 adaptations a turtle has including a combination of internal and external body parts as well as behaviors.
2. Students will be able to identify the difference between a turtle and a tortoise.
3. Students will be able to list at least 5 species of turtle and identify a unique characteristic to that species.
4. Students will be able to describe that all energy in a food web originated from the sun.
5. Students will be able to discuss turtle conservation efforts as well as how they can help save turtles and other aquatic animals.

Theme

Turtles and tortoises have similar but distinct adaptations to survive in their environment.

Kentucky Core Academic Standards – Science

Third Grade – 3. Interdependent Relationships in Ecosystems

3-LS2-1. Construct an argument that some animals form groups that help members survive

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

LS2.D: Social Interactions and Group Behavior

Third Grade – 3. Inheritance and Variation of Traits: Life Cycles and Traits

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment

Fourth Grade – 4. Structure, Function, and Information Processing

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

LS1.A: Structure and Function

Fifth Grade – 5. Matter and Energy in Organisms and Ecosystems

5-PS3-1. Use models to describe that energy in animal's food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

PS3.D: Energy in Chemical Processes and Everyday Life

Fifth Grade – 5. Earth's Systems

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ESS3.C: Human Impacts on Earth Systems

Background

Turtles are Reptiles

Turtles and tortoises are reptiles. Reptiles are cold-blooded or ectothermic animals, which means they depend on external sources to maintain their body temperatures. Scales or scutes protect reptiles from abrasions and loss of body moisture. Reptiles breathe air through lungs. Most reptiles hatch from eggs which are typically covered in soft, leathery shells. Reptiles include crocodilians, snakes, turtles, and lizards.

A Turtle or a Tortoise

All tortoises are turtles, but not all turtles are tortoises. Tortoises are a specific group within the larger turtle classification. Tortoises and turtles are similar; however, a turtle lives mainly in water and a tortoise lives on land. Since turtles spend most of the time in water they have webbed feet for swimming. Turtles can live in the ocean or in freshwater, like ponds and lakes. Tortoises do not have webbed feet since they walk on land. Another difference is their shells. A tortoise shell is large and dome-shaped while most turtle shells are flat and hydrodynamic.

Turtle (including Tortoises unless Specifically Stated) Adaptations

Turtles have a shell that is made up of 59-61 bones covered by plates called scutes which are made of keratin, like human fingernails and hair. They cannot crawl out of the shell because the spine and rib cage are connected to the shell. They also feel pain and pressure through the shell as nerves run throughout the shell. The upper shell of a turtle shell is called the carapace, and the bottom portion is called the plastron. These sections are connected on the side by bony structures called bridges. A specie's shell shape is an adaptation to environmental factors. Dome-shaped shells are more difficult for predators to crush. Flat, streamlined shells aid in swimming and diving. Small, cross-shaped plastrons give more efficient leg movement for walking along the bottom of ponds and streams. In addition to the protection of their shell, various types of turtles have a variety of defensive adaptations. Box turtles have a hinged shell capable of encapsulating their entire body, while many tortoises have bulky, tough, and sometimes spurred front legs that will protect their head once pulled into the shell. Snapping turtles have a smaller plastron but are more aggressive, and some turtles, like musk turtles, can emit a foul smelling odor.

Turtles also have a built-in navigation system in the form of tiny magnetic particles in their brain that help the turtle process unique magnetic signatures. The planet's core contains iron and is surrounded by a layer of molten metal which moves slightly causing fluctuations in the magnetic field. This creates unique signatures which allow female sea turtles to relocate their birth beach in order to lay eggs at their place of birth.

Turtles are typically thought of as being solitary animals; however, this is an understudied area of animal behavior. One study trained Florida Red-bellied Cooters (*Pseudemys nelsoni*) to dislodge clear plastic bottles to obtain food pellets. These turtles not only showed rapid learning, but required minimal retraining. Additionally, they investigated whether turtles could vicariously learn by observing other experienced turtles that had learned the task. All turtles showed evidence they learned not only to follow others to the bottles but also to approach the correct bottle that contained food reinforcement. This study of social behavior, learning, and cognition of turtles will hopefully spark interest in turtle behavior and cognition. Pancake tortoises are surprisingly social and stay in larger groups as long as there is adequate food. As many as ten tortoises have been found sharing the same crevice. Turtles also show symbiotic relationships with other species including mutualistic relationships with cleaning species including remoras and tangs.

Turtle Diets

Most turtles are omnivores, which means they eat plants and animals, such as fish, snails, worms, and insects. Most tortoises are herbivores eating grasses, leafy plants, flowers, fruits, and even cacti. Some sea turtles prefer eating jellyfish. Turtles lack teeth but have a large beak specifically shaped to their dietary needs. Carnivorous turtles usually have sharp ridges for slicing through their prey. Herbivorous turtles have serrated ridges to cut through tough plants. Turtles use their tongues to swallow food, but they cannot stick their tongues out to catch food.

Turtle Predators

Sea turtles are mostly preyed on by large sharks, for example tiger sharks. Some turtles can be eaten by crocodilians, canines, cats, raccoons, and types of birds that will pick up smaller turtles and drop them onto a rock which breaks the shell so they can eat them. One of the biggest predators of all species of turtle is humans.

Food Web Connections

As with most predators, turtles play a critical role in their ecosystem as a top down control mechanism for the environment's food web. Apex predators consume tertiary and/or secondary consumers, which consume primary consumers, which consume producers, which produce energy from the sun through photosynthesis. The main source of energy for all ecosystems initiates from the sun in the form of solar energy. Through the process of photosynthesis, plants convert this energy into oxygen and glucose. Because of this conversion, green plants, some bacteria, and algae are labeled as producers. An animal, such as an herbivorous fish, who consumes the plant, is known as a primary consumer, because it receives the energy from the plant which converted the energy from the sun. The turtle who eats the fish that feeds on the plant which converted the sunlight is known as a secondary consumer, hence a process that directly related back to the sun as the primary energy source. An apex consumer is the top of the food chain or web with few to no natural predators at adult size such as an alligator, shark, or large cat.

Turtle Conservation

It is important to dispose of trash properly. Recall that turtles have small brains and can easily be confused by food items. Sea turtles eat jellyfish, and if a plastic bag gets into the water it resembles a jellyfish. The turtle may think it is food and consume it causing severe issues to their body. It is also important to avoid bright lights by beaches because sea turtle hatchlings use the light of the moon to find water. They will seek to brightest horizon which may sometimes be in the wrong directions thanks to human influences.

The WAVE Foundation's Aquatic Conservation Fund supports a variety of organizations whose chief mission is to protect natural resources and environments. Each year, the Newport Aquarium, in partnership with the North Carolina Wildlife Resources Commission's Sea Turtle Project, receives a hatchling loggerhead sea turtle that needs rehabilitation. Newport Aquarium biologists care for this turtle for about a year, and then return the young sea turtle to

the ocean. The fund also supports a small island in Florida that is doing big work toward protecting sea turtles. They placed billboards on the island to educate vacationers about how they can protect the nesting sea turtles during their visit. To take further action, the Conservation Fund also adopted a sea turtle nest and covered the costs of the protection until it hatches.

Vocabulary

Adaptation – the process by which an animal or plant species becomes fitted to its environment through body parts and behaviors

Carapace - the hard upper shell of a turtle, crustacean, or arachnid

Conservation – the study of the loss of Earth’s biological diversity and ways this loss can be prevented

Consumers – organisms of an ecological food chain that receive energy by consuming other organisms

Diversity – the variety of life found in a place on Earth or the total variety of life on Earth

Environment – the external conditions, resources, stimuli etc. with which an organism interacts

Habitat – the place where an organism or a community of organisms lives, including all living and nonliving factors or conditions of the surrounding environment

Mutualism - two organisms of different species exist in a relationship in which each individual benefits from the activity of the other

Photosynthesis - process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water

Plastron - the part of a turtle shell forming the underside

Predator – an animal whose diet consists of other animals

Prey – an animal who is eaten by other animals, or predators

Producers – an organism that produces its own food (i.e. using photosynthesis) serves as a source of food for other organisms in a food chain

Symbiotic - organisms that live together; however, the relationship is not necessarily beneficial to both. (ie parasite-host)

Extension Activities

Project WILD Activities. Please contact your state Project WILD coordinator for more information. See <http://projectwild.org/KentuckyCoordinator.htm> (for Kentucky) or <http://www.projectwild.org/ProjectWILDCoordinators.htm> (for other states).

- Energy Pipeline – Students will (1) explain why energy dissipates at each trophic level, (2) contrast the transfer of energy and the recycling of organic material within an ecosystem, and (3) relate the role of each trophic level to ecosystem dynamics.
- Grasshopper Gravity – Students will (1) describe the relationship between the structure and function of grasshopper; (2) generalize that wildlife ranges from small to large organisms and exists in a variety of forms; and (3) recognize that people have influence on other animals, and with that influence comes the responsibility to act with compassion.

- Graphananimal – Students will identify characteristic life forms in two different environments.
- Playing Lightly on the Earth – Students will (1) distinguish between games that are damaging and not damaging to the environment, and (2) invent games with a benign effect on the environment.
- Surprise Terrarium – Students will (1) identify camouflage as an example of an adaptation, and (2) describe the importance of adaptations to animals.
- Too Close for Comfort – Students will (1) describe possible negative consequences for people and wildlife under conditions of crowding, and (2) identify ways people can behave in order to reduce negative consequences of crowding for wildlife.
- What Bear Goes Where? – Students will (1) identify three species of bears and their habitats, and (2) generalize that animals have adapted in order to live where they do.

Turtle Craft - <http://www.first-school.ws/activities/shapes/animals/turtle-craft.htm>

Book - Tommy the Trustworthy Turtle - <http://www.lsuagcenter.com/NR/rdonlyres/472FF8F4-BE41-4602-8E09-D8CAD17A03F9/59405/TommytheTrustworthyTurtleStory.pdf>

Book - What kind of turtle Am I? Donna Zappala

Book - Carolina's Story? Donna Rathmell

Book - Living Green: A Turtles Quest For a Cleaner Planet, Artie Knapp

Resources

WAVE Foundation <http://www.wavefoundation.org>

Project Wild <http://www.projectwild.org>

Project Wet <http://www.projectwet.org>

Project Learning Tree <http://www.plt.org>

Endangered Species Information -

<http://education.nationalgeographic.org/media/endangered/>

Turtle Information - <http://ocean.si.edu/slideshow/meet-seven-sea-turtle-species>

Turtle Information - <http://animals.sandiegozoo.org/animals/turtle-tortoise>