MOVE IT!

A program by Oklahoma 4-H Youth Development & Oklahoma Water Resources Center

SKILL: SCIENCE TIME: 20-30 MIN

OBJECTIVES:

Students will learn:

- About the different types of water bodies.
- How currents affect the movement of soil, rocks, plant material and living creatures.

VOCABULARY

- Currents
- Friction
- Coriolis Effect
- Gyres
- Topography
- Headwaters
- Stream
- Lake
- Dam
- Rapids
- Bay
- Gulf of Mexico

LESSON ACTIVITY:

How many of you have ever been in the river, lake or ocean and felt the force of the current?

Was that current strong enough to move you around in the water?

What causes currents?

Currents are caused by several things: solar heating, wind, gravity, and the Coriolis Effects are a few examples. The sun heats the water which evaporates some of the water. As we know, oceans have a high salt concentration, so when some of this water evaporates it leaves behind very salty water. This makes the water very dense and causes it to sink below less salty water. This process creates ocean currents.

Wind creates currents by blowing on the surface of the water. **Friction** between the wind and the water's surface causes water to pile up in the direction the wind is blowing. The energy created in this process produces currents.

Currents are also made through an event called the Coriolis Effect. A circular pattern due to the Earth's rotation causes currents to move one way (clockwise) in the northern hemisphere, and the opposite way (counter-clockwise) in the southern hemisphere. Through this process, large mounds of water build up and water is forced to flow around the mounds. These mounds and the surrounding flow are called **Gyres**. The Coriolis Effect produces large circular currents in all the ocean basins.

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Other causes of currents include tides, rain, runoff, and ocean bottom topography. **Topography** is the surface features of a place. Ocean topography includes slopes, ridges, valleys, and mountains! All these things are found at the bottom of a body of water and can influence currents.

What happens to the sand/soil, rocks, shells, vegetation, living creatures when the current is strong? The current can move the sand/soil, rocks, shells, vegetation and living creatures by carrying them in the water.

Is this a good thing or a bad thing? Both! Currents move the water and things in the water to help keep oxygen levels stable. The currents can also help keep the water or an area clean. Currents can be dangerous when flooding occurs because the power of the water can uproot trees, move heavy boulders, sweep away vehicles, even destroy a house or building.

How are the currents different in a stream, lake, river, bay, and ocean? The larger the body of water, the stronger the currents can be. The currents also travel at different speeds depending on the forces that are impacting the current. For example, strong winds will increase the force of the current.

Today we are going to experience the effects of currents by conducting an obstacle course. We have nine stations set up and I'm going to walk through and explain what you will do at each station. The signs at each station also give instructions so if you forget what to do at a station, stop and read the sign!

MATERIALS

- Inner Tube (hula hoop can be used)
- 6—6 ft. 2" X 4" boards
- 5 hula hoops
- 55 gallon trash can with bottom cut out
- Tarp (optional)
- 14 aluminum pie pans, boxes or another container
- 3 lengths of rope, 30-50 feet each
- Rocks (will need at least 10 per participant — river rocks about the size of a bite size candy bar work well)
- Seashells (will need 6 per participant)
- Bucket
- Hand pump sprayer or spray bottle
- Water
- 9 wooden stakes
- Water obstacle course signs, laminated (in lesson)
- Staple gun
- Hammer or mallet
- Water Obstacle Course Layout Diagram (in lesson)

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Lesson Instructions

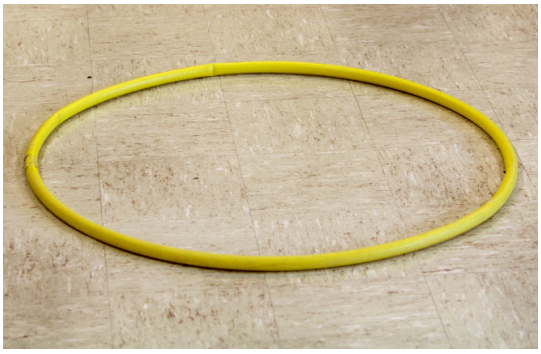
Before beginning this lesson, set up the obstacle course as described below and see the diagram on page 15. Arrange the obstacle course in a large circle or if space does not allow you to do that, a straight line is also fine. Copy the Station Signs and laminate. Staple to the stakes and place them with their corresponding station.

Instructor's Note: Before starting, talk through the course and demonstrate what to do at each station while the children observe. Remind students, this is not a race, but an exercise in helping you to learn more about the different bodies of water and water currents. After the first person begins, the next person will not begin until the person in front of them completes station 2. That will help you all to have plenty of room while you go through the obstacle course.

Station 1: Headwaters

Set Up: Place the inner tube to allow least 15 feet between Stations 1 and 2

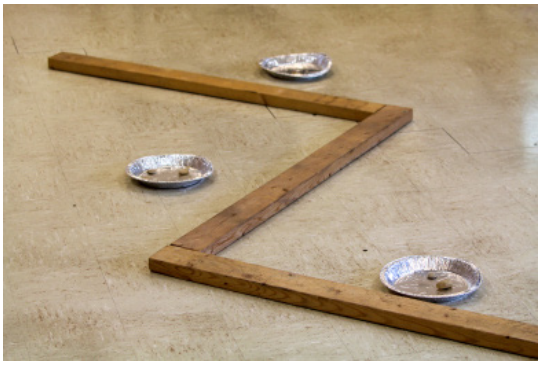
Instructions: **Headwaters** is the source where a stream or river begins. This could be a spring, a marshland, or a spot where two water bodies connect. Some headwaters are springs that come from under the ground. At this station you will pick up the inner tube and put it over your head so that your whole body goes through the tube. Drop the tube to the ground and step out.



Station 2: The Stream

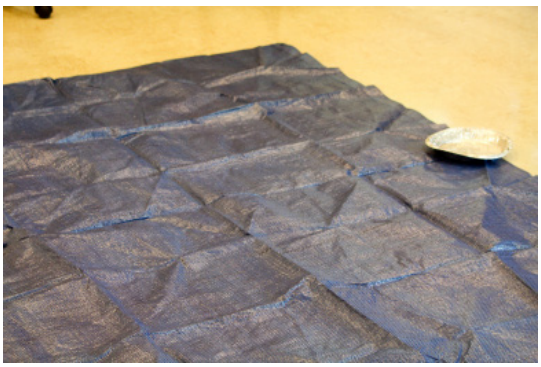
Set Up: Lay three 2x4's flat on the ground in a zig-zag pattern. Place three pans filled with stones along the 2x4's.

Instructions: Carefully walk the timbers and pick up three stones as you walk along. Why do you think we are picking up the three stones as we're walking down our stream? This represents how the current picks up things in the water and moves them down the stream.



Station 3: The Lake

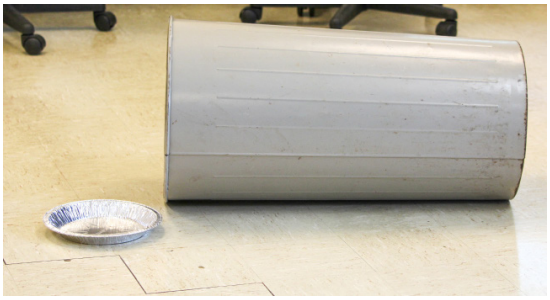
Set Up: Use a rope to make a large circle to represent the outline of a lake. Place one tin pan around the edge of the rope.



Instructions: In Oklahoma, **lakes** are most commonly formed when a stream or river is blocked by a dam that keeps it from running. The water fills the area of land to form what we call a lake. The stream or river will carry rocks, soil, vegetation and other particles into the lake. When you walk into the lake, you are going to run around the edge of the lake two times. Each time you pass a tin pan, you will deposit one rock into the pan. You should have one rock left in your hand after you have made two laps around the lake that you will take with you to Station 4.

Station 4: The Damn

Set Up: Lay down a trash can with the bottom cut out for the "dam." Place one pan at the end of the dam to deposit rock. If the grass is wet, spread out a tarp and place the dam on top of the tarp.



Instructions: The dam is designed to keep water from flowing until a specified time or to slow the flow of the water. At this station, the large trash can represents our dam. You will lay down and "flow" (crawl) through the dam and deposit your one remaining rock in the pan on the other side.

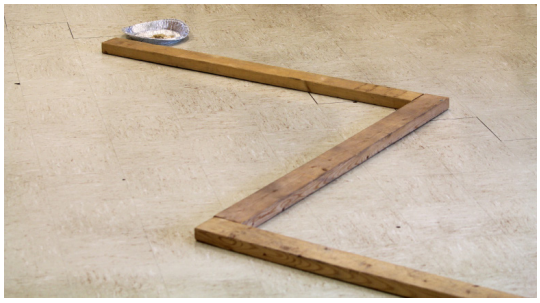
Station 5: Rapids Area

Set Up: Lay down five hula hoops with pans of stones inside each one. Arrange the hula hoops in a zig zag pattern close together.

Instructions: **Rapids** are fast moving water. At the rapids, you will jump into each hoop, picking up one rock at each hoop out of the pan. How many rocks should you have after you complete the rapids? Five rocks. Again, picking up the rocks represents the currents moving items in the water.

Station 6: Another Stream

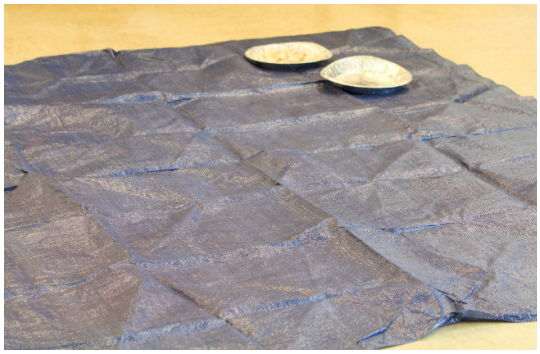
Set Up: Three 2x4's laid flat on the ground in a zig-zag pattern. Place a pan filled with stones at the end of the last 2x4.



Instructions: Carefully walk on the timbers and pick up one stone at the end. How many rocks should you have in your hands now? Six

Station 7: The Bay

Set Up: Use a rope to make another large circle to represent the outline of the bay. Place one pan in the circle to deposit stones, with one pan filled with shells.



Instructions: A **bay** is a body of water that is mostly enclosed by land but connects to the ocean. As you flow out of the stream and through the river you flow into the bay. You are affected by tides. At the bay, you will run in a circle around the bay six times and drop off one rock each time you pass the pan and pick up a seashell in the pan next to the rock pan. When you finish you should not have any more rocks in your hand. How many shells should you have now? Six

Station 8: The Gulf of Mexico

Set Up: Use a rope to create an outline of the Gulf of Mexico. Place a pan in the circle for students to deposit shells.

Instructions: The **Gulf of Mexico** is an ocean basin off the Atlantic Ocean. It is on the southern border of Texas, Louisiana, Mississippi, Alabama, and Florida. As you flow into the Gulf of Mexico, the strong waves and currents wash your seashells onto the beach. You will run in a circle around the Gulf of Mexico six times and deposit one shell each lap into the pan. How many shells should you have after you finish your six laps around the Gulf of Mexico? Zero

Station 9: Evaporation

Set Up: As children exit the Gulf of Mexico, lightly spray them with the hand pump sprayer.

Instructions: What causes **evaporation**? When the sun shines on the Gulf, it turns water into vapor. To end this obstacle course, run through the water vapor and be evaporated. I will be operating our vapor machine and will spray you as you complete the obstacle course!

Once you complete the obstacle course, please have a seat on the grass (bleachers, etc) until everyone has finished their turn.

Let's Clean Up and Review

- What are some things that cause currents?

  Solar heating, wind, gravity, Coriolis Effect, tides, rain, runoff, and ocean bottom topography.
- What is headwater?

  The location of origination of a stream or body of water.
- Name some of the different types of bodies of water:

  Streams, rivers, lakes, bay, ocean
- What did we use to represent a current's effects in the water?

  Stones and seashells.
- What is evaporation?

  When the water turns into vapor and is absorbed into the atmosphere.
- What can we do to keep our waters safe and clean?

  Do not leave trash when we picnic, fish or swim; if we see trash others have left, pick it up and dispose of it properly.

Oklahoma Aqua Times Related Lessons:

Wondrous Water Cycle

Evaporation

Transpiration—Aspiration

Lessons can be found at: https://4h.okstate.edu/projects/science-and-technology/oklahoma-aqua-times/index.html

Lesson adapted from 4-H2O For You: The Water Obstacle Course, Texas A&M AgriLife Extension Service, Guadalupe County

OKLAHOMA WATER RESOURCES CENTER

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PASS Standards

Grade Level	Standard	Science and Engineering Practices	Cross Cutting Concepts
4th	**4.ESS2.1:** Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion.	Planning and Carrying out Investigations	Cause and Effect
4th	**4.ESS2.2:** Analyze and interpret data from maps to describe patterns of Earth's features.	Analyzing and Interpreting Data	Patterns
5th	**5.ESS2.1:** Develop a model to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	Developing and Using Models	System and System Models
5th	**5.ESS2.2:** Describe and graph amounts of saltwater and freshwater in various reservoirs to provide evidence about the distribuion of water on Earth.	Using Mathematics and Computational Thinking	Scale, Proportion, and Quantity
6th	**6.ESS2.1:** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives these processes within and among Earth's systems.	Developing and Using Models	Stability and Change
6th	**6.ESS2.2:** Construct an explation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	Constructing Explanations	Scale, Proportion, and Quantity
6th	**6.ESS2.3:** Analyze and interpret data on the patterns of distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	Analyze and Interpret Data	Patterns
6th	**6.ESS2.6:** Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.	Developing and Using Models	System and System Models
7th	**7.ESS3.1:** Construct a scientific explanation based on evidence for how the uneven distrbutions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	Constructing Explanations	Cause and Effect
7th	**7.ESS3.3:** Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.	Constructing Explanations	Cause and Effect
7th	**7.ESS3.4:** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Engage in Argument from Evidence	Cause and Effect

Station #1 Headwaters: Spring Through Inner Tube

Station #2 Stream: Flow through and pick up 1 stone from each pan

Station #3
Lake:
Make 2 laps around lake and deposit 1 stone each lap!

Station #4 Dam: Flow through dam and deposit 1 stone

Station #5 Rapids: Jump into each rapid and pick up 1 stone from each pan

Station #6 Stream: Flow through stream and pick up 1 stone

Station #7

Bay System:

Make 6 laps around bay and deposit 1 stone each lap; pick up 1 shell each lap

Station #8
Gulf of Mexico: Make 6 laps around the Gulf and deposit 1 shell each lap

Station #9
Evaporation

Water Cycle Obstacle Course Diagram