

Acadia Teacher Fellows

Lessons for Teachers

Grade Level 3

Unit: Interdependent Species and Migrations through the Seasons

Next Generation Science Standards:

Students who develop an understanding can:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS1.B Growth and Development of organisms

Reproduction is essential to the continued existence of every kind of organism. Plants and animals have a unique and diverse life cycles.

Plants and

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

3-LS2.D Social Interactions and group behavior

Being part of a group helps animals obtain food, defend themselves, and cope with changes.

Groups may serve different functions and vary dramatically in size.

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3.A Inheritance of Traits

Many characteristics of organisms are inherited from their parents.

3-LS3.B Variation of Traits

Different organisms vary in how they look and function because they have different inherited information.

ATF Unit Lesson Goals

Migration and Interdependent Species

Unit Objectives:

Students will become familiar with the animal, plant and other types of species in and around their school grounds

Students will observe and collect data about the habitats of species in the area

Students will learn about migration and about migrating animals in/around the area

Students will be able to understand the concept of symbiosis and how organisms interact in their environment

Lesson 1

Spotted Salamander Life Cycle and Migration

Time of year: Spring for observations.

Lesson overview:

Prior Knowledge: What is migration and why do animals migrate?

Lesson 1 Objectives:

Students will learn what a vernal pool is and the importance to other organism's survival
Students will explore school grounds or surrounding area and look for vernal pools or signs of vernal pools.

Students will learn the basic characteristics of the Spotted Salamander.

Students will learn why the spotted salamander migrates to vernal pools during the spring

Lesson Body and Activities:**Activity/Lesson 1: What are Vernal Pools?****What is a Vernal Pool?**

Vernal pools are small temporary bodies of water that form in shallow basins early in the spring. They are rain or snow fed and may or may not dry up at the beginning of the summer season. The pools have no predatory fish and make amazing environments for other organisms to live and breed. **Indicator species** (an organism that serves as a measure of the environmental conditions that exists in a given locale) include **amphibians** (cold-blooded vertebrates that don't have scales. They live part of their life in the water and part on land) including the wood frog, the blue-spotted salamander, and the spotted salamander.

Importance of a vernal pool:

Vernal pool species breed in early spring with the heavy rains that help replenish the water level.

Wetland habitats such as vernal pools act as natural filters that help remove sediments from larger bodies of water, resulting in cleaner rivers, lakes and ponds. Spotted Salamanders visit the vernal pools for only a few days each year between mid-March and the end of April. Amphibians will migrate in mass to a local vernal pool. Here the salamanders will mate at a vigorous pace that the water may seem to "boil". A few days later the females will lay eggs each 25-250. The adults will then return to the forested hideouts. After a few weeks the larvae will emerge from their eggs. They will look like spotted tadpoles with long feathery gills protruding from their heads. They will stay there most of the spring and summer growing their legs and eating on aquatic insects. When the pool dries up they will begin using the lungs instead of gills to breathe. They will then set out to find their new home-usually a few hundred feet from the vernal pool of their beginning.

Activity 1: Making a vernal pool-simulation-Can be done anytime of year.

Length of Lesson: 1-3 hours depending on how it is split up

Objectives: Students will learn what is a vernal pool and how they are formed

Materials:

“Phases of a vernal pool” Activity Sheet-included

Plastic sheeting or a large trash bag

1-2 water bottles for each student (students can bring from home)

Measuring tape

Vernal Pool observation sheet-included

Thermometer

Colored pencils

Preparation: Have students bring water bottles from home. Discuss vernal pool ecosystems with your students (see info above). Give students the “Three Phases of Vernal Pool” activity sheet to color and discuss. Works sheet located at on page 11 and 12 of following site https://www.blm.gov/or/resources/recreation/tablerock/files/vernal_investigators.pdf

Procedure:

In the school yard find a depression at least a few inches deep and a few feet across. Have the students discuss what size the pool should be. Place the plastic sheet over the depression. Explain to students that this is the impermeable layer, or “hard pan” surface, of the vernal pool. Discuss the annual cycle of the vernal pools, beginning with the dry season. Explain to students that in the summer and early fall, when it is hot and there is little precipitation, the vernal pools are completely dried up. During the dry season depressions are filled with dry grasses, flower seeds, and the cysts of macro-invertebrates that inhabit the pools during the wet season. What happens in the winter and spring? The weather changes and rain fills the vernal pools with water. Have each student step up to the edge of the vernal pool and create “rain” by emptying their container of water into the depression. Once the depression has been filled, mark one or more transects (shown by the dotted lines in Figure 1) where students will measure the width of the vernal pool. Have students survey the pool at least once a day from the same spot and record the width and depth of the pool along each transect.

Have students write down a hypothesis stating how long they think it will take for the pool to evaporate, according to the size of the pool and the weather. Survey the pool at least once a day from the same spot and record the day, time, cloud cover, water and air temperature, width and depth of pool (along transects), and any other notes on the data sheet provided.

Vernal Pool Data Sheet

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Activity 2: Searching for Vernal Pools

Length of Activity: Spring/Late Spring or Early Summer

Objectives:

Students will be able to find and understand where vernal pools are located

Materials:

Appropriate clothing for the weather: Boots, Rain jacket, ect.

Species Cards for Vernal Pools- can be located at the Vital Signs website in citations below
Vital Signs Freshwater Survey Data sheet-can be located at Vital Signs website in citations below

Writing Utensil and notebook for sketching what they see

Preparations:

Walk around your school yard or selected area and find the vernal pools before you lead students on a search.

Discuss with students proper "Leave No Trace" rules for exploring in nature. Can do this prior to exploring.

<https://www.rei.com/learn/expert-advice/leave-no-trace.html>

Background info: Should be given prior to activity

Vernal Pool Indicator Species:

Wood Frog:

http://vitalsignsme.org/sites/default/files/content/un_rana_sylvatica_043014.pdf

Spotted Salamander:

http://vitalsignsme.org/sites/default/files/content/un_ambystoma_maculatum_043014.pdf

Fairy Shrimp:

http://vitalsignsme.org/sites/default/files/content/un_eubrachipus_spp_031014.pdf

Procedure:

1. Split students up in groups of 3-4
2. Have students in their groups spread out at your desired location and search for clues of Vernal Pools. (May require a few parent volunteers depending on the size of the area that you are working.

1. Find a body of still standing water. Look around for the vernal pool indicator species.

Record evidence of what you find or do not find on your Freshwater Species Survey datasheet.

1. If you see egg masses, count how many you find and include the number in your field notes.
1. Decide, based on your evidence, if you think you've found a vernal pool. Include your decision in your field notes, too.
1. Have students draw what they see at their vernal hole
1. Meet back as a group after 30-40 minutes and have groups discuss what each group found.

Discussion questions:

1. Describe what your vernal pool looked like?
 2. How big was it?
 3. Did you see any of the organisms that we discussed?
 4. Tell me what you observed
 5. How was your vernal pool similar to the other groups? How was it different?
- 8.** If area is close to school students can repeat this activity with “their vernal pool” and observations over several days.

Activity 3: Spotted Salamanders and Migration

Length of Activity: Should be done in late March or early April-weather dependent
1-3 hours with background info

Objectives:

Students will learn basic information about the spotted salamander
Students will learn why the spotted salamander migrates to vernal pools
Students will learn the basic life cycle of a spotted salamander

Materials:

Book- "Big Night for Salamanders" by Sarah Marwil Lamstein

<http://www.sarahlamstein.com/childrens-books/big-night-for-salamanders/>

Spotted Salamander info sheet:

http://vitalsignsme.org/sites/default/files/content/un_ambystoma_maculatum_043014.pdf

Appropriate clothing for outdoors for this time of year

Pencil and Notebook for field notes and sketches

Preparation:

Before the outdoor activity read the book - "Big Night for Salamanders" by Sarah Marwil Lamstein

This wonderful picture book, illustrated by Carol Benioff, was a Smithsonian Notable Book for Children 2010. It describes how a boy and his parents help salamanders cross a busy road on a rainy night, so they can mate and lay eggs in a vernal pool. While educational, the book is also a good story that is engaging for children. The author's website has a downloadable classroom guide.

<http://www.sarahlamstein.com/childrens-books/big-night-for-salamanders/>

Background Info on Spotted Salamanders-can be give prior or during activity

Info from: <http://www.theheartofnewengland.com/wildlife/spotted-salamanders.html>

The spotted salamander might be thriving near your house (The spotted salamander is in fact, present throughout New England...and can be found in South-central Ontario to Nova Scotia, south to Georgia and in eastern Texas).

The spotted salamander is distinctive-looking: long (4 to 7 inches) dark brown/black body, decorated with two irregular rows of vivid yellow spots, is distinctive. But it's possible you may not notice your guest.

For about 95% of the year, these shy amphibians conceal themselves under logs, leaves, and rocks, or in burrows and tunnels made by other animals. At night they emerge to feast on insects and other invertebrates.

The rest of the time they spend in vernal pools elsewhere in your neighborhood. While spotted salamanders may visit vernal pools for only a

handful of days each year, these special wetlands are crucial to the amphibians' life cycle.

Some moist night between mid-March and the end of April, these amphibians migrate in mass to their local vernal pool. Once there, the congress of salamanders will participate in a nuptial dance so vigorous, that the water around them may appear to boil. A few days later, the females will lay several masses of eggs, each with 25 to 250 eggs. Having done their part, the adults return to their forested upland hideouts—the next generation must fend for themselves.

Within a few weeks the larvae begin to emerge from their eggs. They look something like dull, yellow-green speckled tadpoles, with long feathery gills protruding from their heads. They spend the better part of the spring and summer growing into their legs, feasting on a bounty of aquatic insects in the vernal pools.

By the time the pool dries up, they are ready to use lungs rather than gills. They set out to find a new home, usually within a few hundred feet of the now empty vernal pool. Spotted salamanders are particularly sensitive to development. Destruction of vernal pools will interfere with breeding, while destruction of forests within a half-mile radius of the pools will destroy adult habitat. Roads are particularly dangerous.

Activity: Can be repeated several times throughout this season to see different stages of development.

1. Split students up in groups of 3-4 and give each group a spotted salamander information card.
2. Have students in their groups spread out at your desired location and search for a Vernal Pools. (May require a few parent volunteers depending on the size of the area that you are working.
3. Once at their desired location students should observe for 10-15 minutes.
4. Students should sketch their pool and document any evidence of the spotted salamander 10-15 minutes.
5. Have all groups return to a central location for group sharing.
6. Discussion Questions:
 1. What did your vernal pool look like?
 2. Did you see any evidence of spotted salamanders? Did you see the actual salamander? Did you see eggs? Larvae?
 3. Compare your findings with other groups.

Citations:

“Vernal Pools in Bar Harbor” by Adam Kumm; Project at College of the Atlantic

“Amphibians” National Geographic Kids

<https://kids.nationalgeographic.com/animals/hubs/amphibians/>

“Have You Spotted the Spotted Salamander in Your Backyard” by Erin Crowley

<http://www.theheartofnewengland.com/wildlife/spotted-salamanders.html>

“Vernal Pool Investigators” Table Rocks Curriculum

https://www.blm.gov/or/resources/recreation/tablerock/files/vernal_investigators.pdf

“Mission Vernal Pool” by Vital Signs

<http://vitalsignsme.org/mission-vernal-pool>

“Outdoor Activities for Kids: Big Night! Vernal Pools” Appalachian Mountain Club

<https://www.outdoors.org/articles/amc-outdoors/big-night-teaching-kids-about-vernal>