



# **Restoring Connections**

**Fourth Grade Curriculum**

**2018-2019 Team**

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For giving us the opportunity to work with, teach, and learn from your inspiring students. We want to thank the office staff, teachers, students, and all the parents who have so generously shared their time with us and whose support and involvement assisted in making this project a success.



*Here for Oregon. Here for Good.*

## **The John L. Luuvas fund of the Oregon Community Foundation**

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## **Mount Pisgah Arboretum:**

For supporting the Environmental Leadership Program and empowering the residents of Oregon to act compassionately towards each other and towards the earth. We worked in close collaboration with Mt. Pisgah Arboretum, especially Jenny Laxton and August Jackson, who generously donated their time, resources, and guidance for this project.

## Meet the Team

**Team Mission:** To engage and reconnect Adams Elementary School students from K-4th grade with the natural world through interactive environmental education that fosters a sense of stewardship for the local environment in Eugene, Oregon, specifically at Mt. Pisgah Arboretum.

**Main Contact – Hannah Schmidt:** Hannah was born and raised in Oregon, and after the age of 7 had the privilege of moving from the inner city of Rockwood, Oregon to the forested area of Brightwood, Oregon. Here she was able to explore the old growth forests of the PNW which allowed her to create an appreciation and curiosity for the natural environment. She was first inspired to enter the field of Environmental Studies after conducting a research project related to the effects that carbon emissions had on varying lichen species in Wildwood Park. She continued to explore her interests in environmental studies when she studied abroad for a term in the Galapagos Islands her junior year of college where she explored sustainable agriculture practices and climate change mitigation policy. Hannah is thrilled to be a part of educating the youth in the importance of the natural environment and potentially fostering future stewards for the local environment here in Eugene.

**Chloe Johnson:** Chloe was born and raised in Scottsdale, Arizona. Her family spent lots of time exploring the San Juan Mountains of Colorado, as her father grew up there. The early exposure to the outdoors and her family's great love for nature set her up to become an enthusiastic environmentalist. She decided to venture to green Eugene, Oregon as it was a refreshing change from the dry Arizona climate. Her decision to major in Environmental Studies at the University of Oregon came after having a very passionate environmental science teacher in high school who greatly inspired her. The impact which that one teacher had on her life gave her the inspiration to become an encouraging mentor herself.

**Cameron Wallenfels:** Cameron grew up in Marin County, California before her family moved to Bend, Oregon after she graduated high school. Her childhood was spent being exposed to nature through her parents love of the outdoors. She decided she was interested in studying Environmental Studies while working on a Permaculture farm in Nicaragua during a gap year after high school. Ever since then she has explored her interest in sustainable agriculture and environmental ethics while here at the University of Oregon. Cameron is excited to be a part of teaching the next generation the importance of conservation in our natural world.

**Brittany Calabria:** Brittany was born in San Diego, California and then moved north to Irvine after graduating high school. She grew up in an urban environment so her exposure to the outdoors was limited until moving to Oregon in 2015 to attend college. While initially enrolling as an electrical engineering major she quickly changed her major to Environmental Science after hiking throughout Oregon and discovering her passion for nature. Ever since she has centered her interests on conservation and

restoration, focusing on areas subject to losses in biodiversity. She is an avid dendrophile and intrigued by life under the sea. Brittany is interested in initially pursuing a career as an environmental scientist, and eventually gaining her Ph.D. in Environmental Engineering.

**Eleanor Williams:** Eleanor was born and raised in Lake Oswego, Oregon. Since both of her parents are from Oregon, she spent much of her childhood exploring the state's coast, forests, rivers, and meadows. Her decision to attend college at the University of Oregon's Robert D. Clark Honors College was encouraged by her alumni parents and the strength of the Environmental Studies program offered. Her passion for Environmental Law developed after taking a class with Professor Mary Wood and pursued that passion during her term abroad at Oxford University studying environmental policy. She is currently writing her Honors thesis on the intersection of Environmental Reproductive Justice for Native American women after taking a Native American Environmentalism class with Professor Brian Klopotek. Her passion for environmental justice has inspired a continued pursuit of environmental education. Eleanor is excited to be working with the Restoring Connections team this year and bring environmental education to the center of Eugene's elementary students.

**Savannah Winchell:** Savannah was born and raised in Beaverton, Oregon and has experienced the outdoors through camping, kayaking, hiking, summer camps, biking, and jogging. She developed a passion for conservation through consistent exposure to the outdoors and continued education of environmental problems throughout her life, some of which include removal of local invasive species in Eugene, OR, riparian restoration, and park planning/maintenance. Although she hopes to enter the environmental management field, she firmly believes that starting environmental education at a young age is one of the most important ways to combat future environmental issues.

## Environmental Education Framework

The Restoring Connections ELP curriculum for 2019 is designed to meet the environmental education objectives outlined by UNESCO Tbilisi Declaration of 1977, NAAEE Guidelines for Excellence, and incorporates multiple Next Generation Science Standards (NGSS). The curriculum incorporates Howard Gardner’s Theory of Multiple Intelligences, Jon Young’s Coyote’s Guide to Connecting with Nature, Bell Hooks Engaged Pedagogy, as well as a diversity of teaching and learning techniques to accommodate classrooms of unique learners. The following is a brief description of each of the above components:

<b>United Nations Educational, Scientific, and Cultural Organization (UNESCO) Tbilisi Declaration of 1977</b>	<b>North American Association of Environmental Education (NAAEE) Guidelines for Excellence</b>
<p>EE curriculum should produce:</p> <p><b>Awareness:</b> of environmental issues and topics.</p> <p><b>Knowledge:</b> of the aforementioned issues, topics, and their solutions.</p> <p><b>Attitudes:</b> which foster compassion and responsibility for the environment.</p> <p><b>Skills:</b> that provide the foundation for “how” to resolve environmental issues</p> <p><b>Action:</b> encouraging social, cultural, political and environmental movements towards a more sustainable future</p>	<p>EE curriculum should include:</p> <p><b>Fairness &amp; accuracy:</b> provide accurate information from diverse sources.</p> <p><b>Depth:</b> recognize the complexity of issues, teach concepts.</p> <p><b>Skill-building:</b> build inter- and intrapersonal skills to provide a foundation for action.</p> <p><b>Action-oriented:</b> emphasize civic responsibility.</p> <p><b>Instructional soundness:</b> age-appropriate.</p> <p><b>Usability:</b> be clearly written and include all the necessary information for the instructor.</p>
<b>Next Generation Science Standards (NGSS)</b>	<b>Theory of Multiple Intelligences (Howard Gardner, <i>Frames of Mind</i>, 1983)</b>
<p><b>4-LS1: From Molecules to Organisms: Structures and Processes</b></p> <ul style="list-style-type: none"> <li>● 4-LS1-1</li> <li>● 4-LS1-2</li> </ul> <p><b>4-ESS2: Earth’s Systems</b></p> <ul style="list-style-type: none"> <li>● 4-ESS2-1</li> <li>● 4-ESS2-2</li> </ul> <p><b>4-ESS3: Earth and Human Activity</b></p> <ul style="list-style-type: none"> <li>● 4-ESS3-2</li> </ul>	<p>Students have innate &amp; unique learning styles, which should all be addressed to provide an equal learning atmosphere.</p> <p><b>Linguistic:</b> Word smart.</p> <p><b>Logical:</b> Reasoning &amp; number smart.</p> <p><b>Spatial:</b> Picture smart.</p> <p><b>Kinesthetic:</b> Body smart.</p> <p><b>Musical:</b> Sound &amp; song smart.</p> <p><b>Interpersonal:</b> People smart.</p> <p><b>Intrapersonal:</b> Self smart.</p> <p><b>Naturalist:</b> Nature smart.</p>

<b>Coyote Mentoring</b>	<b>Engaged Pedagogy</b>
<p><b>Sit Spots:</b> A timed moment of silence for students to rest alone in nature and build a more in-depth connection to the world around them and work on heightening their observation skills.</p> <p><b>Journaling:</b> Through the use of words or illustrations, students record their observations, thoughts, and feelings on paper.</p> <p><b>Story of the Day:</b> This activity takes place in small groups, and allows the opportunity for students to exchange their stories and observations of the day.</p> <p><b>Gratitude:</b> A moment for students, teachers, chaperones, and group leaders to reflect on what they are grateful for, and vocally give thanks to everything that made the day possible and enjoyable.</p> <p><b>Three Levels of Questioning:</b> A series of questioning that is intended to be utilized on students to help build confidence and then push them beyond their edge to help challenge them educationally.</p> <p><b>Mapping:</b> Orienting students to the compass direction and helping students perceive the landscape from a bird's eye view. Drawing maps to help locate features of the landscape or tell stories that map your explorations.</p>	<p>An educational philosophy developed by Bell Hooks that involves breaking down the power dynamic between an educator and a student by empowering students to become active participants in their own learning. This form of education allows the students to gain knowledge while simultaneously having education material relate meaningfully to their lives. Engaged pedagogy is an important aspect within Environmental Education because we want students to care about environmental issues and be able to recognize how environmental conditions personally affect their own lives; not just be able to recite the names of local flora and fauna.</p>

## Curriculum Overview

2019 Restoring Connections 4th Grade curriculum teaches students how water and riparian ecosystems are important for native species. The activities have been adapted to incorporate information that students have been learning pertaining to Mt. Pisgah Arboretum habitats they encountered in K-4th grade throughout three different seasons.

For each season (fall, winter, spring), the fourth-grade students will have one 45-minute pre-trip lesson in class and one field trip. The curriculum is organized to focus on these themes:

4th Grade	Fall	Winter	Spring
<b>Theme</b>	Wetland Wildlife	The Movement of Water	Testing the Waters
<b>Pre-Trip Focus</b>	Wetland residents	Water cycle and local waterways	Macroinvertebrate investigation
<b>Pre-Trip Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Explain at least one ecological function of wetland habitat.</li> <li>2. Illustrate how the wetland ecosystem supports native species, specifically the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron.</li> <li>3. Name at least three animal adaptations that help the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron survive in wetland environments.</li> <li>4. Explain how the wetland habitat at the Arboretum is part of larger river systems surrounding the Mt. Pisgah Arboretum.</li> </ol>	<ol style="list-style-type: none"> <li>1. Diagram the 6 different stages of the water cycle.</li> <li>2. Explain what a topographic map is and what it can be used for.</li> <li>3. Describe what a contour line represents on a topographic map.</li> <li>4. List three reasons why water is important to Mt. Pisgah Arboretum.</li> </ol>	<ol style="list-style-type: none"> <li>1. Define a macroinvertebrate</li> <li>2. Describe three physical characteristics of at least one macroinvertebrate (Mayfly, Copepod, Caddisfly, Pouch Snail, Isopod, or the Larval Northwestern Salamander)</li> <li>3. Identify at least one way in which macroinvertebrates use their external senses to support their survival, growth, or reproduction in riparian habitats.</li> </ol>
<b>Field Trip Focus</b>	Scientific observations of riparian habitat and focal species	Hydrology and erosion at Mt. Pisgah Arboretum	Water quality testing and sustainable water usage
4th Grade	Fall	Winter	Spring

<b>Field-Trip Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Use various sensory awareness techniques to identify species in the riparian habitat.</li> <li>2. Describe 5 characteristics of a pond habitat.</li> <li>3. Identify 3 ways that a pond differs from a river or stream.</li> <li>4. Identify 3 different plants and/or animals that a wetland habitat supports.</li> </ol>	<ol style="list-style-type: none"> <li>1. Describe 3 physical characteristics of a healthy river or creek.</li> <li>2. Describe how water can erode and shape landscapes</li> <li>3. Interpret the elevation of a landscape from a topographic map</li> <li>4. Describe the 4 necessary elements of a map.</li> </ol>	<ol style="list-style-type: none"> <li>1. Describe 3 adaptation techniques that help wetland residents survive in the Riparian system.</li> <li>2. Name three different techniques that can be used to test water quality.</li> <li>3. Explain how macroinvertebrates receive information through different external or internal features.</li> <li>4. Explain the relation between macroinvertebrate population levels and water health.</li> <li>5. List three ecological functions of a wetland.</li> </ol>
<b>Linked <a href="#">NGSS</a> Standards</b>	4-LS1 From Molecules to Organisms: Structures and Processes <ul style="list-style-type: none"> <li>● 4-LS1-1</li> </ul>	4-ESS2 Earth's Systems <ul style="list-style-type: none"> <li>● 4-ESS2-1</li> <li>● 4-ESS2-2</li> </ul>	4-LS1 From Molecules to Organisms: Structures and Processes <ul style="list-style-type: none"> <li>● 4-LS1-1</li> <li>● 4-LS1-2</li> </ul>



## 4th Grade Focal Species



### **Oregon Ash (*Fraxinus latifolia*)**

**Habitat:** Moist to wet soils near streams, lakes and in flood plains

**Region:** From the southern coast of British Columbia, west of the Cascades in Washington and Oregon, to the coast ranges and Sierra Nevadas of California

**Food:** Water, sunlight, nutrients from the soil

**Predators:** The winged seeds of Oregon Ash are eaten by birds and small mammals. The leaves are food for butterfly larvae and passing browsers such as deer

**Fun Fact:** Wood was used by Klamath Indians for canoe paddles and digging sticks

<http://nativeplantspnw.com/oregon-ash-fraxinus-latifolia/>



### **Osoberry (*Oemleria cerasiformis*)**

**Habitat:** Dry to moist open woods and streambanks; usually occurs in wetlands

**Region:** Vancouver, British Columbia to Santa Barbara County, California

**Food:** Water, sunlight, nutrients from the soil

**Predators:** Birds such as cedar waxwings and mammals eat the berries

**Fun Fact:** Leaves smell like cucumber when crushed; berries sometimes also have a taste of cucumber

<https://www.plantoregon.com/product.asp?specific=2250>



**Pacific Ninebark** (*Physocarpus capitatus*)

**Habitat:** Wetlands, along streams, coastal marshes, in wet meadows

**Region:** From SE Alaska to Santa Barbara, California coast ranges

**Food:** Water, sunlight, nutrients from the soil

**Predators:** Mountain goats

**Fun Fact:** This plant is in the Rose family

<http://nativeplantspnw.com/pacific-ninebark-physocarpus-capitatus/>



**Cow Parsnip** (*Heracleum maximum*)

**Habitat:** Bottomland woodlands, terraces of floodplain woodlands, borders of woodlands, woodland openings, meadows in wooded areas, riverside prairies, thickets, streambanks, and partially shaded roadsides

**Region:** Most of the continental United States except the Gulf Coast and a few neighboring states; especially prevalent on the West Coast from Alaska to California

**Food:** Water, sunlight, nutrients from the soil

**Predators:** Cows, sheep, goats, bears

**Fun Fact:** Rubbing the outer skin of this plant onto human skin can cause a rash when exposed to direct sunlight

<https://enacademic.com/dic.nsf/enwiki/297471>

/



**Nuttall's Larkspur** (*Delphinium nuttallianum*)

**Habitat:** Coastal, meadow

**Region:** British Columbia, Alberta south to California, Arizona and New Mexico, and as far east as South Dakota and Nebraska

**Food:** Water, sunlight, nutrients from the soil

**Predators:** Slugs, snails, cyclamen mites

**Fun Fact:** All members of this family are toxic to humans and livestock, and young plants tend to be the most poisonous

<http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Delphinium%20nuttallianum>



**Great Blue Heron** (*Ardea herodias*)

**Habitat:** Coastlines, marshes, ponds, or streams

**Region:** North America

**Food:** Fish, mice, insects, and other small creatures

**Predators:** Bald eagles, red-tailed hawks, great horned owls, raccoons

**Fun Fact:** Have been known to choke to death by attempting to swallow fish too large for their beaks

<https://www.publicdomainpictures.net/en/view-image.php?image=226939&picture=great-blue-heron>





<https://commons.wikimedia.org/wiki/File:2009-Western-pond-turtle.jpg>

### **Western Pond Turtle (*Actinemys marmorata* )**

**Habitat:** Freshwater ponds, streams, lakes, and wetlands

**Region:** Pacific Northwest

**Food:** Insects, tadpoles, frog eggs, snails, leeches, aquatic beetles, dragonfly larvae, and fish

**Predators:** Bullfrog, warm freshwater fish, raccoons, coyotes

**Fun Fact:** Western Pond Turtles bask in the sun to rid themselves of harmful parasites.



<https://www.nationalparkstraveler.org/2008/05/Creature-feature-pacific-treefrog>

### **Pacific Tree Frog (*Pseudacris regilla*)**

**Habitat:** Ground living near streams, springs, ponds, and swamps

**Region:** Pacific and western regions of North America

**Food:** Plant material, gnats, flies, and mosquitoes

**Predators:** Bullfrog, bluegill sunfish, garter snakes

**Fun Fact:** It is believed by Native Americans that an individual tree frog co-exists for every person



## **Bullfrog**

*(Lithobates catesbeianus)*

**Habitat:** Freshwater ponds, lakes, and marshes

**Region:** North America to Mexico and Cuba

**Food:** Insects, mice, fish, birds, and snakes

**Predators:** Crayfish, fish, other bullfrogs, aquatic turtles, snakes, birds, and larger mammals

**Fun Fact:** The Bullfrogs' ability to outcompete native species and eat almost anything makes them an invasive species that is extremely difficult to eradicate.

<https://fw.oregonstate.edu/150-species/american-bullfrog>



## **Flame Skimmer Dragonfly**

*(Libellula saturata)*

**Habitat:** Lakes, swamps, wetlands

**Region:** Northern and Southern Hemispheres

**Food:** Mosquitos, flies, bees, and other small invertebrates

**Predators:** Birds, fish, reptiles

**Fun Fact:** The larval stage of large dragonflies can last up to five years

[https://www.inaturalist.org/guide\\_taxa/179224](https://www.inaturalist.org/guide_taxa/179224)

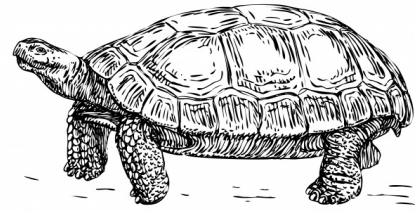
# Fall: Pre-Trip Lesson

Developed by: ELP Restoring Connections Team 2019

**Time:** 45 minutes

## Overview

This season focuses on the fauna of wetland and riparian areas of Mt. Pisgah Arboretum, which is home to a wide variety of animal species endemic to the Eugene area. The pre-trip lesson prepares the students for their upcoming field trip by familiarizing them with the form and function of a variety of animal species living in the wetland habitat at Mt. Pisgah Arboretum. This lesson helps students understand wetland habitats and how they support the different species that inhabit them. Students take a close look at three different wetland species: the Great Blue Heron, Pacific Tree Frog, and Western Pond Turtle. Through artistic expression, inquisitive exploration, and critical thinking students will become familiar with the characteristics of these three species along with certain external and internal adaptations that the animals have acquired for growth and survival benefits. By incorporating active gameplay, language arts, and the sciences, this pre-trip lesson prepares students for an engaging and informative field trip by considering adaptations that help organisms live in wetland environments.



## Rationale

This lesson provides students with a general overview of the wetland species and their adaptations that they will be focusing on during the field trip. The pre-trip establishes a sense of interconnectedness between landscapes and the organisms that live in these ecosystems as well as preparing the students for an outdoor learning experience.

## Learning Outcomes

By the end of this pre-trip classroom lesson, fourth grade students will be able to:

- Explain at least one ecological function of wetland habitat.
- Define how the wetland ecosystem supports native species, specifically the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron.
- Name at least three animal adaptations that help the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron survive in wetland environments.
- Explain how the wetland habitat at Mt. Pisgah Arboretum is part of larger river systems surrounding the park.

**Academic Subjects:** Science & Language Arts

### **Links to Standards**

#### **Next Generation Science Standards (NGSS): Pre-Trip and Field Trip**

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

#### **NAAEE STANDARDS**

- **2.1 A:** Earth's physical systems -- Learners describe characteristics of Earth's physical systems including air, water, and land. They explain how these systems interact with one another and identify changes in the physical environment over time. They provide examples of how physical systems affect living organisms, including humans.
- **2.3 A:** Human-environment interactions -- Learners identify ways that people depend on, change, and are affected by the environment.

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Physical, living and human systems
- ✓ The interconnectedness of people and the environment

#### **Intelligence Developed**

- ✓ Nature Smart (Naturalist)
- ✓ People Smart (Interpersonal)
- ✓ Self Smart (Intra Personal)
- ✓ Body Smart (Bodily/Kinesthetic)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)

#### **Evaluation of Learning Outcomes**

At the end of the pre-trip lesson, we collect their wetland residents worksheets to evaluate the effectiveness of our teaching methods. The sheets include a space for the students to describe/draw their designated focal species, its habitat, and two adaptations that enable the species to survive in a riparian environment. These sheets will reveal whether the students were able to comprehend instructions and further complete the activity. Also, answers shared during the Adaptation Artistry activity can be recorded for further evaluation of whether the students can assess and explain the importance of animal adaptations to survive in its environment.

## Materials Needed:

### Wetland Residents

- Wetland Residents Worksheet (1 per student, Appendix A)
- Coloring & drawing supplies (i.e., colored pencils)

### Adaptation Artistry

- Drawing materials (colored pencils, crayons, etc.)
- Blank side of Wetland Residents Worksheet

## Background Material

- *Habitat*: An area that provides an animal or plant with adequate food, water, shelter, and living space in a suitable environment.
- *Wetland*: An ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate.
- *Ecological functions of a wetland*: Wetlands provide multiple ecosystem functions including biodiversity protection, water storage for flood and erosion control, groundwater replenishment, sediment retention causing high biological productivity, retention of nutrients, and storehouses (sinks) of carbon.
- Wetland ecosystem supports native species, specifically the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron by providing an environment with Shallow, still water for the Great Blue Heron, the Pacific Tree Frog, and the Western Pond Turtle to nest in, ideal environment for macroinvertebrates and small fish (food source for many wetland creatures), provides good quality water for all local species
- Animal adaptations that help the Pacific Tree Frog, Western Pond Turtle, and the Great Blue Heron survive in wetland environments: sticky pad toes for sneaking up on predators, hard exterior shell to provide protection from predators, and elongated neck for attacking prey.
- *Riparian*: Relating to wetlands adjacent to rivers and streams; areas on the sides of rivers and streams but not the river itself. (This includes wetlands they will see on their field trip)
- *Adaptations*: (biology) a change or the process of change by which an organism or species becomes better suited to its environment.



## Additional Readings/Resources

- *Great blue heron*. (2019, May 31). Retrieved May 28, 2019, from Wikipedia website: [https://en.wikipedia.org/wiki/Great\\_blue\\_heron#Behavior](https://en.wikipedia.org/wiki/Great_blue_heron#Behavior)
- *How Do Turtles Adapt to Their Environment*. (n.d.). Retrieved May 28, 2019, from IAC Publishing, LLC website: <https://www.reference.com/science/turtles-adapt-environment-b2eaa5dc7a46f1fc>
- *Most Important Functions and Services of Wetlands*. (n.d.). Retrieved May 28, 2019, from [http://www.personal.ceu.hu/students/03/nature\\_conservation/wwddetail/Funct\\_serv.html](http://www.personal.ceu.hu/students/03/nature_conservation/wwddetail/Funct_serv.html)
- *Pacific Tree Frog* . (n.d.). Retrieved June 21, 2019, from NatureMapping Facts website: [http://naturemappingfoundation.org/natmap/facts/pacific\\_treefrog\\_712.html](http://naturemappingfoundation.org/natmap/facts/pacific_treefrog_712.html)
- *Project BEAK: Adaptations* . (2019). Retrieved May 28, 2019, from Project BEAK website: [http://www.projectbeak.org/adaptations/beaks\\_striking.htm](http://www.projectbeak.org/adaptations/beaks_striking.htm)
- *The Great Blue Heron Resource*. (n.d.). Retrieved May 28, 2019, from Weebly website: <http://greatblueheronresource.weebly.com/reproduction.html>
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- USDA. (n.d.). What is a Wetland? Retrieved June 09, 2019, from [https://www.ers.usda.gov/webdocs/publications/40845/32653\\_aer765c\\_002.pdf?v=41304](https://www.ers.usda.gov/webdocs/publications/40845/32653_aer765c_002.pdf?v=41304)

# Meet the Wetland Residents: 4th Grade Fall

## Pre-Trip Lesson

### **Preparation before the lesson:**

- Print out and laminate focal species sheets (Great Blue Heron, Pacific Tree Frog, Western Pond Turtle) so that there is a reference sheet for each of the three groups (*found in Appendix B*).
- Print 30 copies of Wetland Residents Worksheets, double sided (*found in Appendix A*).

### **Introduction (5 minutes)**

- Introduce yourself to the class and what the ELP program is and our goals (creating lasting connections to the environment through fun, interactive field trips to Mt. Pisgah Arboretum)
- Each member introduce themselves with their favorite water animal
- Ask for some quiet hands of something that they have learned on previous field trips to Mt. Pisgah Arboretum.
- All life at Mt. Pisgah Arboretum needs water to be able to survive.
  - **Q: What are some ways that we as humans interact with water?**
    - A: Drink, bathe, brush our teeth, recreation (swimming)
- Right! We use water for so many things in our lives, we can't live without it! So in 4th grade we are going to focus on the importance of water and the impacts it has on habitats at Mt. Pisgah Arboretum.

### **Introduction of Focal Species (5 minutes)**

#### **Q: Who can define habitat for me?**

A: An area that provides an animal or plant with adequate food, water, shelter, and living space in a suitable environment.

#### **Q: Can anyone define what a wetland is?**

A: A land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem.

#### **Q: Can anyone define what a riparian zone is?**

A: If no one knows the answer, ensure that's okay! Because that is the habitat that we all are going to learn about this year. Relating to wetlands adjacent to rivers and streams; areas on the sides of rivers and streams but not the river itself. (This includes wetlands they will see on their field trip).

## **Get to Know Some Wetland Residents (25 minutes)**

*Name tag activity template (found in Appendix A). Focal Species Information sheets (found in Appendix B).*

### **Instructions**

- Divide students into three groups (use focal species groups they will be in for the field trip).
- Introduce the activity by explaining that each student will be handed one of three focal species informational cards and they will get the chance to decipher the information in their own way.
- Inform the students in a minute they will be handed a worksheet\* so they can draw or describe their focal species in the first box, its habitat in the next box, and lastly two adaptations that species attains to survive in their habitat.
  - \*These worksheets will be collected and turned into name tags that the students will wear during lesson two and the field trip.
- Hand out species cards (one per student). Try to minimize repeats of species within the groups.
- The students will first quietly read about their species habitats, which is provided on the informational sheets.
- Next, students will now draw the specific habitat described on their species cards. In order to make it a suitable habitat for their animal, they must include the main features outlined in the description.
- After everyone has had a chance to read about and draw their habitat, each student will share the information about their animal and their drawings within the small groups. This way, everyone can get familiar with all three species. Encourage the students to think about similarities and connections between these animals.

### **Adaptation Artistry (10 minutes)**

*Students will (1) identify and describe the advantages of wetland adaptations, and (2) evaluate the importance of adaptations to wetland species.*

(Adapted from C., & P. (2006). *Project Wild K-12 Curriculum and Activity Guide* (2nd ed.). Council for Environmental Education.)

- Ask students to share what adaptations their species have to live in their wetland environments. Write the list on the whiteboard.
- Explain to students they will each have a chance to design their own original wetland species with adaptations specific to the habitat. Each student should decide:
  - Where the animal will live
  - What it will eat
  - How it moves
  - Its gender or sex and
  - How it raises its young
- Using the adaptations listed up on the board and any other adaptations the group may brainstorm, have the students create their own original species by drawing them with labeled descriptions of adaptations. These drawings and notes can be done on the back of the Wetland Resident worksheets (*found in Appendix A*).
- Completed projects may be presented to the group or displayed in the room. Ask the students to imagine their species in a habitat different from the one identified in their report. What specific difficulties might the animal encounter in this new environment? Why?

### Assessment

- Ask students to name one ecological function of a wetland

### Transition/Wrap up (5 minutes)

- **Q: Who is excited to go out to MPA for our field trip?**
- **Q: Who can tell me how we should dress so we can be prepared for our field trip to Mt. Pisgah Arboretum?**
  - A: layers, closed-toe shoes, rain gear (unless it's sunny, then also mention they should put on sunblock at home if they use it)
- **Q: What else do we need to do to prepare our bodies and minds for the field trip?**
  - A: bring a lunch, water, eat a big breakfast, dress appropriately
- **Q: “Who is responsible for you having a good time?”**
  - A: “Me” – instill that each student is responsible for themselves and for contributing to a fun day for their group. Everyone is doing their part by coming ready to participate! That is why we come prepared!
- Thank them for an amazing time, and share your excitement for their field trip!

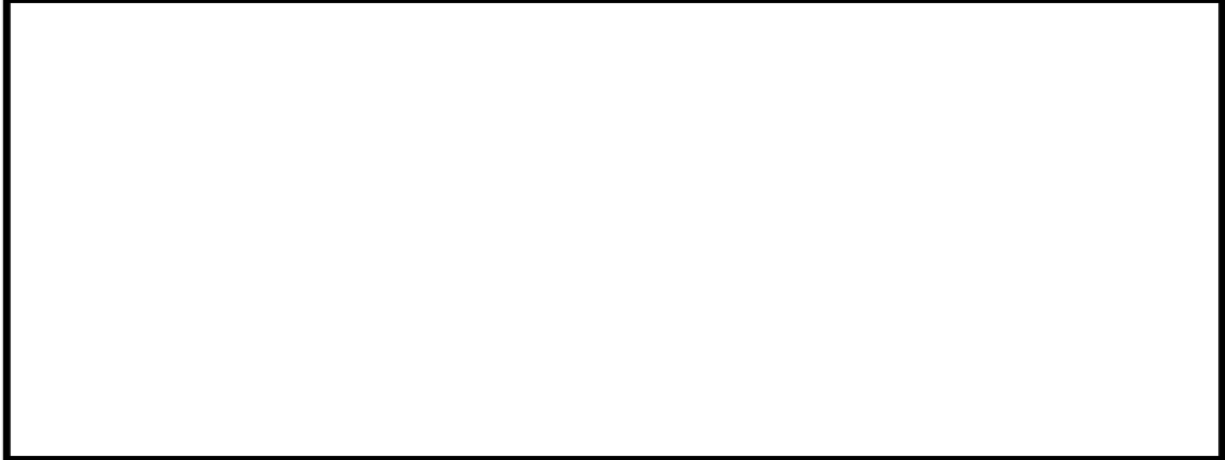
## **Appendices For Fall Pre-Trip Lesson**

*(Refer to or print the following pages as needed)*

**Appendix A:** Name Tag Activity Template

**Hello My Name Is** \_\_\_\_\_

This is what I look like:



This is where I live:



**Adaptations:**

- 1.)
- 2.)

## **Now Create Your Own Wetland Species!**

**Include the following features: What/ how does it eat? How does it move? Is it male or female? How does it raise its young?**

A large, empty rectangular box with a thick black border, intended for students to draw or write their own wetland species and its characteristics.

**Appendix B:** Focal species informational sheets

Pacific Tree Frog:  
*Pseudacris regilla*



<https://upload.wikimedia.org/wikipedia/commons/thumb/5/5b/Pacifictreefrog2kjfmartin.jpg/400px-Pacifictreefrog2kjfmartin.jpg>

- Description: They have a dark “mask” covering their eyes. They range in color from green, tan, red, brown, grey, and black. They can also change their color based on air temperature and humidity, but they cannot control it, it just happens naturally over the course of minutes.
- Range: These amphibians can be found along the Pacific Coast from northern California to British Columbia, their homes include small bodies of water.
- Habitat: Any place where there are suitable breeding waters, for example small ponds or lakes and rivers.
- Predators: Garter snakes, herons, and fish.
- Food/Prey: They eat a variety of arthropods (including spiders and insects).

Adaptation	Advantage
Sticky pads	The Pacific Tree Frog has sticky pads on their toes which allow them to climb up on trees and plants to be able to sneak up on their prey.
Tongue	Their long sticky tongue allows for them to successfully catch their prey from a distance.
Legs	The large hind legs of the Pacific Tree Frog allow them to be able to quickly move from one place to another, jump far, which aids them in escaping from predators.



Western Pond Turtle:  
*Clemmys marmorata*



[https://www.cpsg.org/sites/cbsg.org/files/CaseStudies/Oregon Department of Fish %26amp; Wildlife - 072010 western pond turtle wray \\_odfw 1.jpg](https://www.cpsg.org/sites/cbsg.org/files/CaseStudies/Oregon%20Department%20of%20Fish%20Wildlife%20-%20072010%20western%20pond%20turtle%20wray%20odfw%201.jpg)

- Description: Their coloration ranges from brown to black on their upper shell (carapace), and black to yellow on their lower shell (plastron). Their head and legs are dark and sometimes include yellow markings on them, but not stripes.
- Range: They are found from the Puget Sound lowlands in Washington through western Oregon and California, and south of Baja California.
- Habitat: These turtles live in streams, ponds, and lakes along the west coast. They spend most of their time in the water but come on land for nesting.
- Predators: Birds, fish, and bullfrogs.
- Food/Prey: These turtles are omnivorous, eating a variety of insects, tadpoles, frog eggs, snails, leeches, dragonfly larvae, aquatic beetles, and fish.
- Fun Facts: They are very shy and will slide into the water at the first sign of danger. They will also retract their heads and arms into their shell for protection. These turtles also enjoy resting on logs, fallen trees, and other objects near water, with sun exposure helping rid themselves of parasites.

Adaptation	Advantage
Shell	Turtles that live in riparian habitats have flattened shells to help them glide through the water, while turtles in terrestrial habitats have domed shells to help protect them from the jaws of predators.
Feet	Turtles that live in aquatic environments have web-like feet to help them swim while turtles in terrestrial environments have elephant-like feet.
Oxygen absorbent skin	During drought and dry conditions, these turtles conserve energy by reducing their activity and their need for oxygen. The turtles bury themselves in wetland soils to soak in small traces of oxygen found in the mud. This helps them to survive in a low oxygen environment.

Great Blue Heron:  
*Ardea herodias*



<https://d1ia71hq4oe7pn.cloudfront.net/photo/60314201-480px.jpg>

- Description: These birds can be up to 4.5 feet tall and their wingspan can reach 6.6 feet enabling them to fly up to 30 mph! Their body is a gray color, with chestnut and black accents, and they have very long legs and necks.
- Range: This is the most common and largest Heron in North America.
- Habitat: They live in both freshwater and saltwater habitats, on coastlines, in marshes, ponds, or streams.
- Predators: Red-Tailed Hawks, Bald Eagles, Great Horned Owl, and Raccoons.
- Food/Prey: They are expert fish hunters, they walk very slowly or stand still for long periods of time waiting for their prey to come in reach of their blade sharp bill. They swallow the fish whole, and eat mice, insects, amphibians, reptiles, small mammals, and even other birds.
- Fun Facts: They nest in colonies called heronries, with preference for dead trees. They sometimes nest close to each other with some colonies consisting of over 500 nests!

Adaptation	Advantage
Neck	The Great Blue Heron is a sit and wait predator and its long neck allows it to lunge at prey that swims by
Beak	The sharp beak of the Great Blue Heron is used to either spear its prey or grab its prey between the bills, but either way the prey gets swallowed whole.
Legs	Since Great Blue Herons like to wade through shallow water, they use their long legs to glide slowly and effortlessly through the wetlands.
Eggs	Since Great Blue Herons like to hang out in shallow water like wetlands, they are able to build nests using grass that are low to the ground to lay their eggs in. They incubate them for about 26-30 days until they hatch.

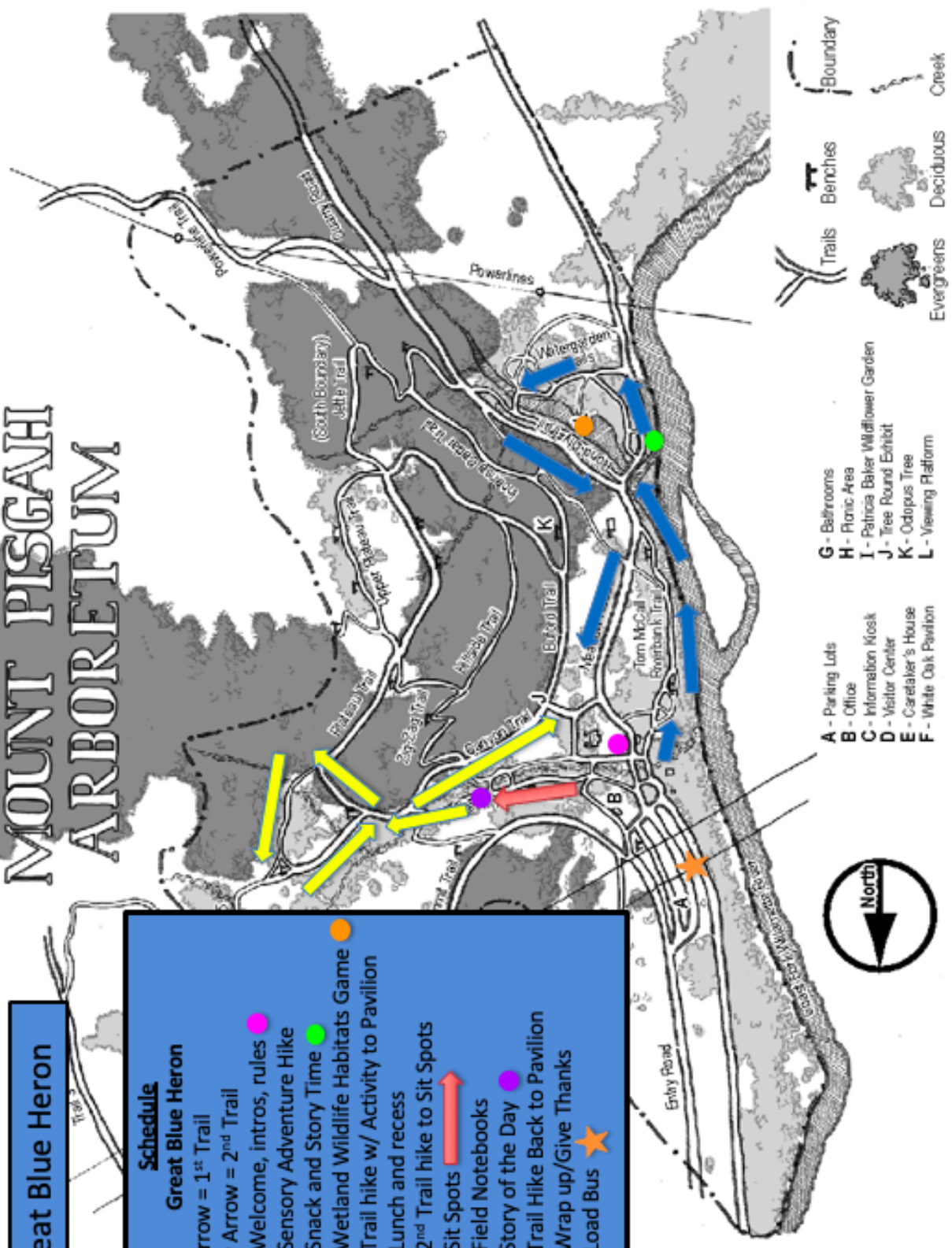
# MOUNT PISGAH ARBORETUM

## Great Blue Heron

**Schedule**

**Great Blue Heron**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – Sensory Adventure Hike
- 10:05 – Snack and Story Time
- 10:20 – Wetland Wildlife Habitats Game
- 10:50 – Trail hike w/ Activity to Pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- 1:45 – Wrap up/Give Thanks
- 2:00 – Load Bus



## 4th Grade - Wetland Wildlife - Fall Field Trip

### Agenda at a Glance: **Great Blue Heron**

- 9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)
- 9:40** Sensory Adventure Hike (25 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 10:05** Snack and story time (15 minutes)
- 10:20** Wetland Wildlife Habitats (30 minutes)
- 10:50** Trail hike back to Pavilion (40 minutes)  
*Binocular scavenger hunt: emphasizing focal species*
- 11:30** Lunch and recess (40 minutes)  
*After lunch game - Bullfrog in the Pond*
- 12:10** Hike out to Sit Spots (20 minutes)
- 12:30** Sit Spot (15 minutes)
- 12:45** Science Time: Field Notebooks (15 minutes)  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** “Story of the Day” sharing time (15 minutes)
- 1:15** Trail hike w/activity back to the pavilion (30 minutes)  
*Use the Art of Questioning*
- 1:45** Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)
- 2:00** Load bus



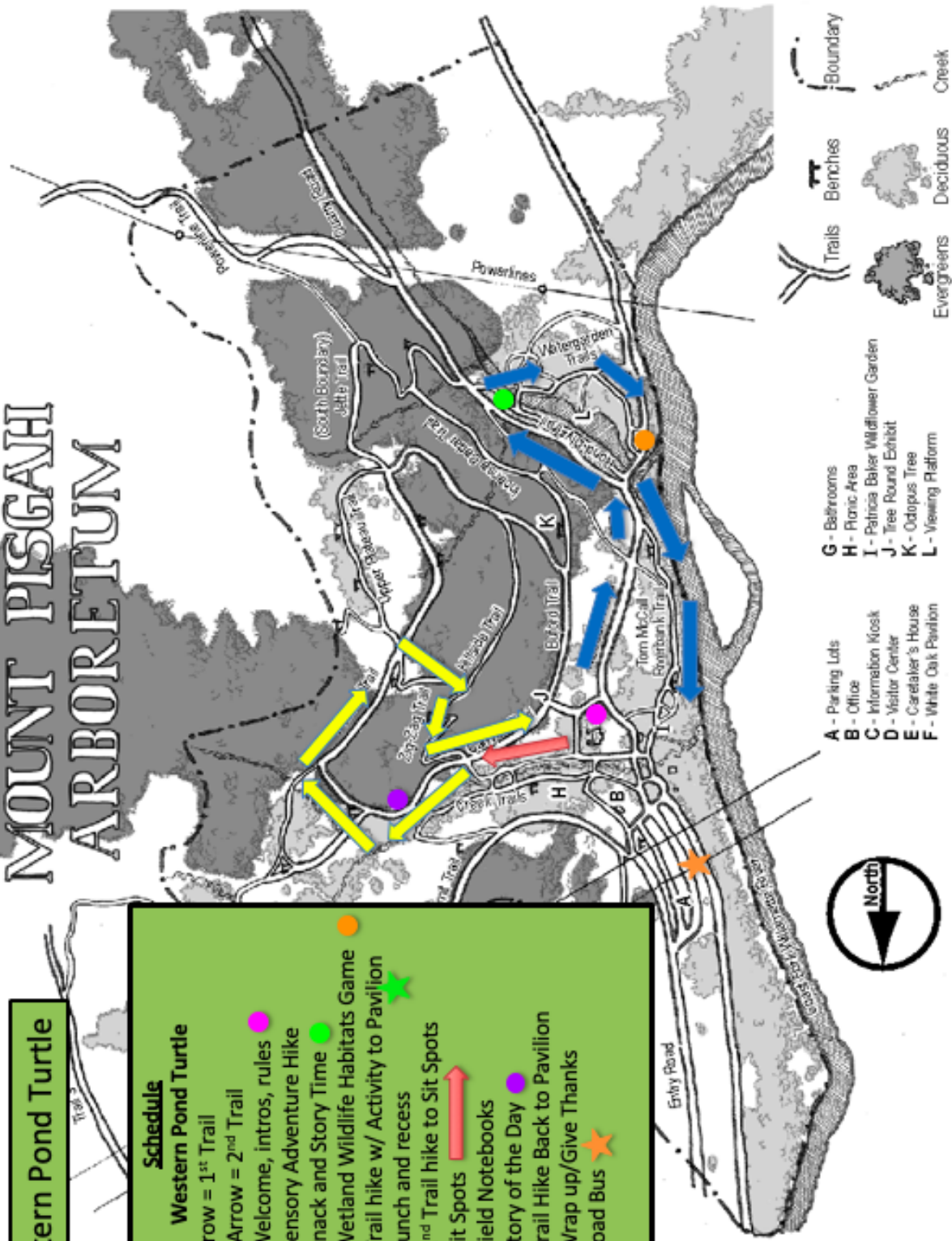
# MOUNT PISGAH ARBORETUM

## Western Pond Turtle

**Schedule**

**Western Pond Turtle**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- 9:30 – Welcome, intros, rules
- 9:40 – Sensory Adventure Hike
- 10:05 – Snack and Story Time
- 10:20 – Wetland Wildlife Habitats Game
- 10:50 – Trail hike w/ Activity to Pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- 1:45 – Wrap up/Give Thanks
- 2:00 – Load Bus



## 4th Grade - Wetland Wildlife - Fall Field Trip

### Agenda at a Glance: **Western Pond Turtle**

- 9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)
- 9:40** Sensory Adventure Hike (25 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 10:05** Snack and story time (15 minutes)
- 10:20** Wetland Wildlife Habitats (30 minutes)
- 10:50** Trail hike back to Pavilion (40 minutes)  
*Binocular scavenger hunt: emphasizing focal species*
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- 12:45** Science Time: Field Notebooks (15 minutes)  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** “Story of the Day” sharing time (15 minutes)
- 1:15** Trail hike w/activity back to the pavilion (30 minutes)  
*Use the Art of Questioning*
- 1:45** Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)
- 2:00** Load bus



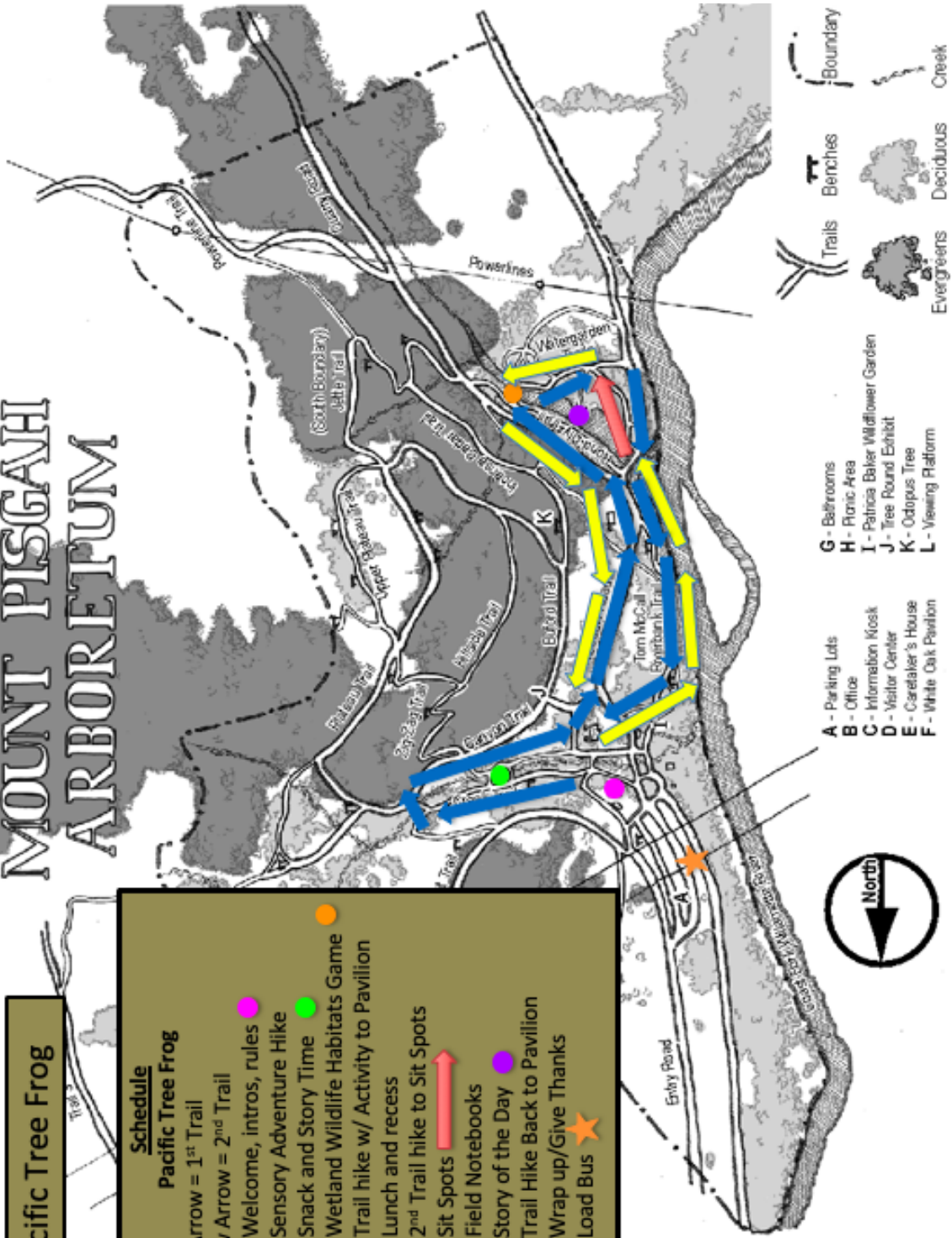
# MOUNT PISGAH ARBORETUM

## Pacific Tree Frog

**Schedule**

**Pacific Tree Frog**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – Sensory Adventure Hike
- 10:05 – Snack and Story Time
- 10:20 – Wetland Wildlife Habitats Game
- 10:50 – Trail hike w/ Activity to Pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- 1:45 – Wrap up/Give Thanks
- 2:00 – Load Bus



## **4th Grade - Wetland Wildlife - Fall Field Trip**

### **Agenda at a Glance: Pacific Tree Frog**

- 9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)
- 9:40** **Sensory Adventure Hike (25 minutes)**  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 10:05** **Snack and story time (15 minutes)**
- 10:20** **Wetland Wildlife Habitats (30 minutes)**
- 10:50** **Trail hike back to Pavilion (40 minutes)**  
*Binocular scavenger hunt: emphasizing focal species*
- 11:30** **Lunch and recess (40 minutes)**  
*After lunch game - Bullfrog in the Pond*
- 12:10** **Hike out to Sit Spots (20 minutes)**
- 12:30** **Sit Spot (15 minutes)**
- 12:45** **Science Time: Field Notebooks (15 minutes)**  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** **“Story of the Day” sharing time (15 minutes)**
- 1:15** **Trail hike w/activity back to the pavilion (30 minutes)**  
*Use the Art of Questioning*
- 1:45** **Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)**
- 2:00** **Load bus**

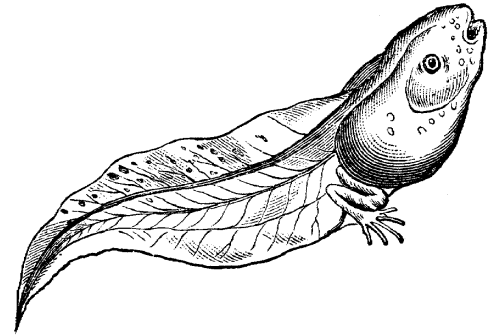
# Fall: Field Trip

**Developed by:** ELP Restoring Connections Team 2019

**Time:** 5 hours

## Overview

This season focuses on the fauna of wetland and riparian areas of Mt. Pisgah Arboretum. In the field trip, students examine these organisms up close and personal. The field trip does not rely on the actual observation of fauna species, but rather encourages the students to observe the habitats around them and search for signs of life within the area that could correlate to the presence of animal life in the area. Students will explore the flora and fauna at Mt. Pisgah Arboretum through a scientific lens, helping spark curiosity in the students while simultaneously adhering to education requirements. The curriculum is designed to show students the amazing qualities of creatures that many students have never seen before. In this curriculum, students practice many of the skills used by wildlife biologists and ecologists to make primary observations and communicate their findings toward constructing a narrative of the landscape. This lesson explores species adaptations to teach students about local biological diversity and the unique, ecologically crucial habitat they live in.



## Rationale

The following field trip lesson focuses on students gaining direct interaction with riparian habitats in the field in order to gain a fuller understanding of the use and need of plant and animal adaptations necessary for this habitat. Riparian areas are home to several diverse animal species such as their focal species: the Western pond turtle, the great blue heron, and the pacific tree frog.

## Learning Outcomes

By the end of this field trip, 4th grade students will be able to:

- Students will gain sensory awareness techniques such as those to look, listen and feel to focus their scientific observations to identify their focal species in the riparian habitat.
- Describe 5 characteristics of a wetland habitat.
- Identify 3 ways that a pond differs from a river or stream.
- Identify 3 different plants and/or animals that a wetland habitat supports.

**Academic Subjects:** Science

### **Links to Standards**

#### **Next Generation Science Standards (NGSS):**

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

#### **North American Association for Environmental Education**

- **2.1 A:** Earth's physical systems -- Learners describe characteristics of Earth's physical systems including air, water, and land. They explain how these systems interact with one another and identify changes in the physical environment over time. They provide examples of how physical systems affect living organisms, including humans.
- **2.2:** Focus on concepts -- This lesson is holistic and unifying by presenting the information in context.
- **3.1:** Critical and creative thinking-- Learners are challenged to exercise their creative and critical thinking skills through creating hypothesis, analyzing information and forming possible solutions.
- **5.4:** Expanded Learning Environment-- Students learn in a diverse outdoor classroom which expands their breadth of exposure to native ecological systems.
- 

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Physical, living and human systems
- ✓ The interconnectedness of people and the environment

#### **Intelligence Developed**

- ✓ Nature Smart (Naturalist)
- ✓ People Smart (Interpersonal)
- ✓ Self Smart (Intra Personal)
- ✓ Body Smart (Bodily/Kinesthetic)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)

## Evaluation of Learning Outcomes

To evaluate the effectiveness of our curriculum activities, we ask students to delve further than just identifying the pictures on the nature bingo sheets. After their pre-trip lesson, the students have some information on what adaptations enable specific species to survive in riparian areas. Through inquiry, students should be able to identify their three wetland focal species, identify at least three riparian plant species, and name at least five characteristics of a wetland habitat. This will assist students in reaching a connection between how these plants and animals use their adaptations to help them survive in a wetland habitat. Once the connection is made, they can distinguish the difference between wetland habitats and other habitats.

## Materials by Activity

- Trail Activities
  - Backpacks should include:
    - Small notebook
    - Hand sanitizer
    - Two water bottles
    - List of groups/students/chaperones and teacher phone number
    - Map/agenda for the day
    - Small first aid kit (Band-Aids and gloves)
    - Field notebooks for each student, should be in a ziploc bag (students name labeled on each journal)
    - Ziploc bag of pencils (for field notebooks)
    - Tarp “sit spots” for children to sit on while they do their field observations and field journals (at least 12 per backpack)
    - Snacks (carrots and goldfish)
    - Each bag has a laminated picture of the group’s animal
    - If needed – rain ponchos (pickup and return to MPA visitor center each visit. Be sure if used, they are hung to dry at the end of the day)
  - Snack & Story Time
    - Printed copy of the Great Blue Heron Story
  - Nature Bingo
    - Laminated bingo card sheets (4 per backpack)
    - Informational species sheets (1 per backpack)

## Background Material

- What are wetlands?

- The EPA's definition of *Wetlands*: "areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season."
- Wetlands often fluctuate with the changing seasons, at times they are wetter and flooded (when it rains more) and others it is completely dried up (What is a Wetland 2018).
- Why are they important?
  - Water storage: wetlands act like a sponge, they can store large amounts of water and slow a river down to allow the water to rest and reduces erosion potential.
  - Water filtration: the water that is now slow enough to feed plants is in turn filtered by their roots, plants and microorganisms suck up fertilizers and manure (from agriculture) and certain pollutants in the water will bind with soil particles, the water leaves much cleaner than when it entered.
  - Biological Productivity: wetlands provide diverse habitats for many different types of critters to survive and thrive in. The mixture of
- What species do Wetlands support?
  - (reference focal species), plants due to water accumulation, fish come because of how the water slows, birds come to feed on fish and macroinvertebrates.
- Did you know?
  - 43% of federally threatened/endangered organisms depend on wetlands for their survival!

### Additional Readings/Resources

- Cornell University. (2017). Great Blue Heron Life History. Retrieved May 22, 2019, from [https://www.allaboutbirds.org/guide/Great\\_Blue\\_Heron/lifehistory#food](https://www.allaboutbirds.org/guide/Great_Blue_Heron/lifehistory#food)
- DeLay, C. (n.d.). Bearded Lichen (*Usnea longissima* Ach.). Retrieved May 27, 2019, from [https://www.fs.fed.us/wildflowers/plant-of-the-week/usnea\\_longissima.shtml](https://www.fs.fed.us/wildflowers/plant-of-the-week/usnea_longissima.shtml)
- Gillaspay, R. (n.d.). Wetland Animal Adaptations Lesson for Kids. Retrieved May 30, 2019, from <https://study.com/academy/lesson/wetland-animal-adaptations-lesson-for-kids.html>
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- NatureMappingProgram. (n.d.). Western Pond Turtle. Retrieved May 30, 2019, from [http://naturemappingfoundation.org/natmap/facts/western\\_pond\\_turtle\\_712.html](http://naturemappingfoundation.org/natmap/facts/western_pond_turtle_712.html)
- Seed Heteromorphism: An Important Adaptation of Halophytes for Habitat Heterogeneity. (2018, October 17). Retrieved May 23, 2019, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6199896/>
- Vest, N., Leggett, C., & Williams, J. (n.d.). Adaptation of Wetland Plants. Retrieved May 26, 2019, from [http://web.utk.edu/~ctmelear/ossabaw/LeggettVestWilliams/N\\_Vest2.html](http://web.utk.edu/~ctmelear/ossabaw/LeggettVestWilliams/N_Vest2.html)
- Young, J. (2001). *Exploring natural mystery: Kamana one*. San Gregorio, CA: Owl Link Media.

## **Wetland Wildlife: 4th Grade Fall**

### **Field Trip Activity Break Down**

**Before students arrive** (Get there by 8:20 to prepare the field trip)

- Each instructor should gather 5–8 plant leaves or fragments, cones, fruits, bark pieces, berries, or seeds from various riparian areas around Mt. Pisgah Arboretum, keeping them in the backpack hidden from the view of the students. Make sure that each of the items has a unique texture, smell, or identifying feature.

**9:30 – Welcome** (10 minutes)

- As children exit the bus, separate into groups (Great Blue Heron, Western Pond Turtle, and Western Tree Frog) as quickly as possible, with all guides ready to go and holding pictures of their group species.
- Take lunch bins to the pavilion.
- Groups should spread out and circle up inside MPA.
- Start the day with cultivating gratitude: say what we are grateful for, how thankful we are to be here today, exploring this magical forest with them. Take note if anyone is cold – share extra hats, gloves, coats as needed.
- Next, go around the circle, starting with your name and the coolest thing you learned from previous trips, and have each student do the same.
- Take notes as this is an assessment opportunity.
- Set ground rules so children are clear on expectations, but do it in a fun way that establishes a sense of exploring, adventure, freedom, and joy (rather than a list of rules!) For example, it does not matter if they are in a straight line always, but that they are on the trail. So explain it in terms of respect for the plants rather than some seemingly arbitrary rule. Adams Elementary teaches their students to be safe, respectful, and responsible. Ask them how we should apply these familiar terms to today's field trip.
- Remind students about their deer ears, owl eyes, raccoon hands, dog noses, and fox walking.
- Check and see if anyone needs to use the bathroom before heading out on trail.

**9:40 – Sensory Adventure Hike** (25 minutes)

[Groups A & B head up Creek, Group C head to Wildflower Garden (30 minutes)]

## Introduction

*Remind the students to use all five senses to become more aware of their environment. By focusing on the senses, we are more likely to notice wild animals and they are more likely to let us see them!*

- Gather students and ask them what our five senses are.
- Explain how we will be using our sense of hearing, sight, touch, and sense of smell on the hike.
- Remind them throughout the hike we will be pretending to be different animals to highlight their different senses.

At the beginning of the hike, ask someone to describe what it is like to be a deer. Then add in:  
“We know you’ve been perfecting your animal senses. This year-- as 4th graders-- we are going to push the practice further. So...who can tell me about adaptations deer have? (A: Big ears) How does this adaptation help deer? So...everyone pretend you are a deer. Your big ears are important for keeping you alert to everything going on around you. Focus on listening for a few minutes to all the sounds that you hear. You can cup your hands around your ears to help you hear even better. What sounds do you hear? Can you hear the wind in the trees? The sound of the water? The highways in the distance? Any animal sounds? Are there constant sounds? Sudden sounds? What is the softest sound you hear? What do you hear right in front of you? Behind you? To the side of you? What do you hear that’s far away?”

After a few minutes of pretending to be deer, stop the students and explain what it would be like to be an owl:

“Now pretend you are an owl. What adaptations do owls have? (A: They have big eyes and their necks can turn 270 degrees) How do these adaptations help them catch their prey? You have very large eyes that help you detect prey and keep yourself safe as well. Look straight ahead at one spot in front of you, but use your peripheral vision so you can see the sky, the ground, and out to both sides of yourself all at the same time. Do you notice any movement? Do you notice any repeated or constant movements? Any sudden movements? What colors catch your eye? Is there sunlight shining on anything? Do you notice any shadowy areas?”

During the last part of the hike, ask the students to pretend they are dogs and highlight that they have a keen sense of smell:

“Pretend you are a dog. What adaptations do dogs have? Dogs use their large noses for sniffing out the trails of other animals. Take quick sniffs of the air around you. Then take a long slow breath in through your nose. Flare your nostrils like a dog does to detect smells that are faint. Which way of sniffing helps you smell the most things? What are the strongest smells you can identify? Can you smell more than one thing? Can you smell evergreen needles? Can you smell moist earth? Can you smell any flowers? Now pick up something near you -- a leaf, some moss or lichen, evergreen needles, or a handful of dirt-- and hold it close to your nose. Notice what it smells like. How far away can you hold it and still smell it?”



## Instructions

- After walking for about 10 minutes, once the students have gotten the chance to use all of their animal senses, instruct them to form a circle around you.
- Inform the students that they will get the chance to embrace their owl, deer, and racoon senses in the next activity.
- Have all the students close their eyes and put two hands in front of them. Let them know that for 2 minutes they will get the chance to truly listen to nature and that every time they hear a sound they should put a finger up, and keep it up. Once a majority of the students have most of their fingers up let them know they can open their eyes. Call on a couple of students and have them share one thing they heard, and have them describe it as in-depth as possible.
  - Ask them where the sound was coming from -- up high? From the brush? On the ground? In a tree?
- After a couple of people have shared, introduce the next activity by explaining that now that they got the chance to use their sense of hearing, it's time to tackle those other senses: smell and touch.
- Tell the students that you have some items in your backpack that you collected from MPA, reiterating that you collected these items from the ground and did not pick any plants or leaves to get them.
- Explain that everyone will close their eyes as you hand one person an item and they will take a couple seconds to feel and smell the item before passing it on to the next student. Continue to hand new items to the same student so that the rotation of items is able to reach every person.
- Tell the students to name each item, for example "item one", because after everyone has gotten the chance to feel the items they will get the chance to use a quiet hand and guess what the name of the object might be.
- After everyone has gotten a chance to feel the items, place all of them behind your back or out of view of the students.
- One by one, ask the students to describe some aspects of the items, in sequential order, using the art of questioning to try to draw out some descriptive aspects of the items before finally revealing the objects and letting the students see and handle them.
- After revealing the item, continue to inspire curiosity in the students by asking questions that pertain to the habitat and/or function of each individual item. Questions include:
  - Why is this item found here at MPA?
  - What kind of leaf grows on this tree?
  - Do you think you are more likely to find this plant closer or further from the river?
  - Do you think this item is here year round, or is it seasonal?
  - How would poor water, food, or sun availability affect the abundance of this item?
  - Is it edible? Maybe if it is not for humans, who is it edible for?

- After finishing the game, now instruct the students that on the next half of the walk to try to use their senses they just practiced, and ask them to try and notice one sound, smell, or sight that they have yet to notice on the trail so far.

**10:05 – Snack and Story Time (15 minutes)**

*After passing out snacks, read the Great Blue Heron Story to the students (found in Appendix C).*

(Reference: Pelo, A., & Pyle, R. M. (2018). *The goodness of rain: Developing an ecological identity in young children*. Lincoln, NE: Exchange Press.)

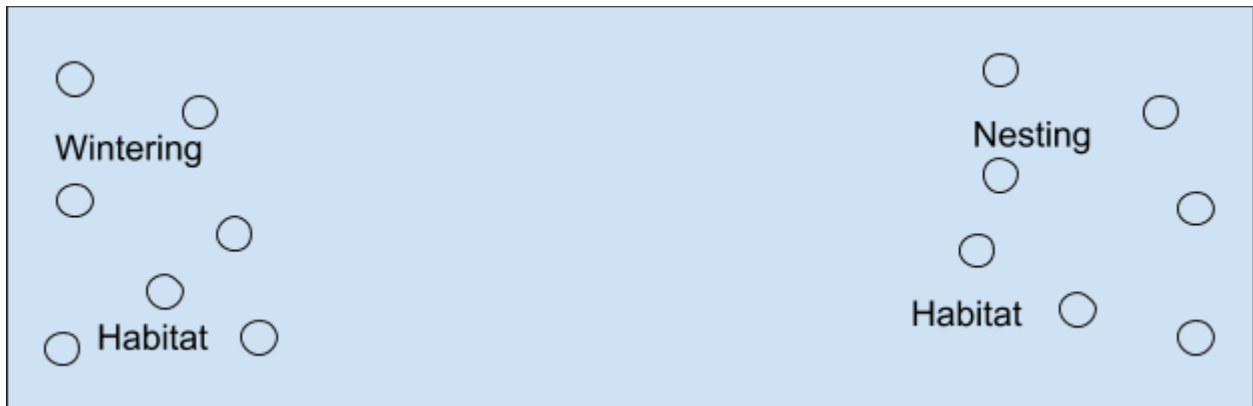
**10:20 – Wetland Wildlife Habitats (30 minutes)**

(Adapted from Anglin, J. (2019). Migration Alert: Indiana and Illinois Hunters Prepare for Fast-Moving Spring Light Goose Migration. Retrieved from <https://www.ducks.org/hunting/waterfowl-migration>)

**Introduction**

- Ask the students to raise their hand if they remember learning about the Great Blue Heron in their class a couple of days prior.
- Call on a couple of students to share one fact about the Great Blue Heron or adaptations that it has so it can survive in its habitat.
- Make sure you have two sit spot tarps for every three students

**Playing Area and Game Execution (30 minutes)**



- Start by breaking the team into two groups, to read the instructions and play separately.
- Place the habitat markers in two patches (as shown above)
- Tell the students that they are now Great Blue Herons that need to get from one habitat to the other at your signal.

- Note: Great Blue Herons do not migrate but are present year round so emphasize they are still in the same area just moving to a different location.
- Tell them that the markers represent "wetlands." These wetlands provide suitable habitats for water birds. At the end of each journey, the students must have one foot on a marker in order to be allowed to continue. If they cannot get their foot on a marker, that means they have not found any suitable habitat, so they "die" and then watch from the sidelines until the next round.
  - Note: During movement between habitats, the students should "flap their wings", moving their arms like birds in flight.
- Also, for the purposes of this activity, state that only three water birds can occupy a "habitat haven" (marker) at any one time.
- Begin the activity with all of the students at the wintering habitat. Announce the start of the first flight. Have the students "fly" in slow motion until they become familiar with the process. Then they can speed up. On the first try, all the birds will successfully "fly" to the nesting habitat.
- There has been no loss of available habitats! Congrats! A successful nesting season has begun.
- In between rounds, explain to the students that many factors will limit the survival of populations of waterbirds attempting to fly between habitats(examples):
  - Changes in the wintering and nesting habitats.
  - Times of abundant food, water, shelter and space suitably arranged to meet the habitat requirements of the birds.
  - When the habitat is stressed, many factors limiting the potential for survival.
  - Sometimes the total area of available habitat is reduced.
- Before the students "fly" toward the wintering habitat, turn over one marker from the wintering region. Explain that a large wetland area has been drained to build a condominium. Give your signal for the birds to "fly" to the wintering habitat. Have the three students that will be displaced stand on the sideline. Tell the students that these three died as a result of a loss of habitat.
  - Note: Remind sidelined students that they will be back in the game the next time. They can come back as surviving hatchlings when favorable conditions prevail and there is habitat available in the nesting ground.
- Before the next flight to the nesting region, turn over four markers in the nesting habitat. This represents a catastrophic loss. Tell the students that this is the result of an oil spill in the local river, severely damaging shoreline habitat. Instruct the students to take flight.
- Repeat the process for eight or ten cycles to illustrate how alterations in habitat conditions have resulting effects on the birds that occupy those regions. Give examples of positive and negative factors that might influence the birds' survival.
  - Examples of positive factors:
    - Preservation of areas, reducing ability of human intervention.
    - Improvements in laws that prevent timber industries from cutting down large quantities of trees.

- Reductions in the use of fossil fuels which contribute to the addition of greenhouse gases and alter atmospheric conditions.
    - Place roadways and industrial plants further from inhabited wetland areas.
  - Examples of negative factors:
    - Reduction in complexity of habitats, including: deforestation, reduction in structural complexity of forests, climate change, etc.
    - Pollution of physical landscape and/or water sources.
    - Reduction in available prey either due to increased competition from introduced species, or increased hunting or fishing.
  - Play as many rounds as time allows.

### **10:50 – Wetlands and Riparian Areas Bingo (40 minutes)**

*Laminated Bingo Card Sheets (Found in Appendix D). Informational Species Table (Found in Appendix E). To be done on the trail walking back to the Pavilion for Lunch*  
 (Reference: Restoring Connections 2015 Kindergarten Curriculum)

#### **Instructions**

- Start the activity by asking the students: “Has anyone played bingo before? Well, today we get to play a special version of nature bingo!”
- Tell the students that in a minute they will be placed in pairs, and each pair will be given one laminated bingo sheet and a dry erase pen. Each card will have the same plants, animals, features, and activities but in a different order per card.
- Once a pair finds an item on the bingo sheet, they should raise their hand so that the whole group can gather around and attempt to identify the item and further discuss it. If the item matches the one on the bingo sheet, tell the pair to cross off that square by drawing an “X” over it.
- The goal is for each pair to locate the images on their card in the shape of a vertical, horizontal, or diagonal line.
  - Note: Remind the students that all of the items on the bingo sheets can be seen from the trail, and that while animals are present at MPA year-round they may be more challenging to find. Encourage the students to work together with other groups to try to find animals, specifically ones that are their focal species: the great blue heron, the pacific tree frog, and the western pond turtle.
- Each image is a talking point for the instructor, including the use of the art of questioning. Make sure you ask questions about why these plants and animals are able to live in wetland habitats, and what a wetland habitat provides for them. In each backpack will be sheets with the same images along with informational facts that can lead students toward making connections between the pictured items and why they are found in riparian areas. Beforehand, instructors should be familiar with these species and be able to identify and describe them while out on the trail, enabling students to check off items on their bingo cards.

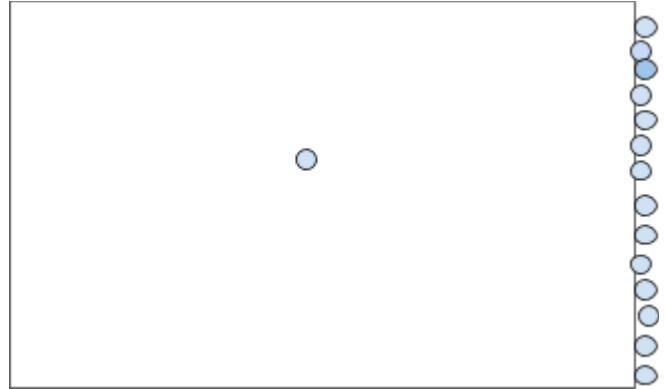
### 11:30 – Lunch and Recess (30 minutes)

#### 11:45 – Game: Bullfrogs at the Pond (15 minutes)

Invite those who have finished lunch to play the game; other students can continue eating but let them know they have about 10 minutes left.

#### How to play:

- Create the Playing Field. For this game, you will need to mark a large rectangle as a playing field, using bandanas or backpacks to mark the four corners and some of the sides. Make it 15-20 large paces long, and 5-10 paces wide (a wider field will make it easier to not get tagged, but will make the game take longer to complete).
- Set-up.
  - *Tell the students:* “We’re going to play a game! Line up shoulder to shoulder at one side of this long rectangle and I will tell you the rules.”
- *Have everyone stand in a line facing you in the middle. Tell them:* “Imagine this big rectangle made with (bandannas or whatever you use for boundary markers) is a pond and you are now standing safe on the shore. In this pond will be a big Bullfrog that wants to eat anything it can catch! You will all get to be an animal that lives at the pond and will try to cross the pond without getting tagged by the Bullfrog!
- You will choose a pond animal to be in this game. [If you have more time, you might ask them to first tell you what creatures live at the pond you just visited. You can draw a list of three animals from that list.]
  - You can choose to be a Pacific Tree Frog, a Dragonfly, or a Western Pond Turtle!
  - Raise your hand if you’re going to be a Frog! Great, now put your hands down.
  - Raise your hand if you’re going to be a Dragonfly! Awesome, now put your hands down.
  - Finally, raise your hand if you’re going to be a Turtle! Fantastic!”
- *Ask:* “Would anyone like to be the Bullfrog who will chase the other animals as they cross?”  
*Invite that student out to the middle to join you as you explain the rest of the rules.*
- *Tell them:* “The player who is the Bullfrog will start the game by calling out one of the three animals. They might call Frog, Dragonfly, or Turtle.



- When you hear your animal name, you will run through the “pond” to the other shore without getting tagged by the Bullfrog. If you get tagged, you are transformed into a young bullfrog tadpole, who is so weak you must stay where you are. New tadpoles must stand where they were tagged but they can still reach out to tag those animals who pass near and turn them into Bullfrog tadpoles too!
- Any time you get tagged you become another tadpole who can’t run but can reach out to try to tag other animals who pass.
- ONE LAST RULE! If the Bullfrog person calls out, **Bullfrogs in the Pond!** then all the animals have to run across to the opposite shore without getting tagged by the Bullfrog or any standing tadpoles.”
- *The game goes on like this, with animals running back and forth from shore to shore as they are called out until all the animals have transformed into Bullfrog tadpoles.*
- *If it’s close to 12:30 and the game has not ended, then just use your attention-getting technique to get everyone’s attention and let them know that the time has ended and to clap for the remaining animals who escaped getting eaten by the Bullfrogs.*
- *If there is time to play another round: The last animal to be tagged gets offered the chance to be the Bullfrog for the next game.*

### **12:10 – Hike out to Sit Spots (20 minutes)**

- Encourage students to look for signs of wildlife as they walk, using:
- Deer Ears, Owl Eyes, Dog Noses, Raccoon Hands
- → Remind them of these skills again if necessary.

### **12:30 – Sit spots (15 minutes)**

- Remember: it is critical to space the children out so that they don’t distract one another. Encourage them to look for signs of fall
- Ask: Who wants to see some animals? Whether insects to birds to maybe even a mammal, the most elusive of all!

### **Introduction**

- *For this sit spot activity:* “This is your chance to potentially see some of the critters that have been hiding from our noisy group today. Remember to use your skills from walking here to be \*extra\* alert to any sounds, sights, smells, etc. as they may give you a hint that wildlife is nearby! During this last sit spot session use all of your senses to remember what you experienced here today.

- Start with a story of one of your past sit spot experiences. This story does not need to have been at Mt. Pisgah Arboretum, but it should incorporate all the rules of sit spots: staying quiet, keeping still, using all your senses, and exploring all depths of the surrounding environment.
- After completing the story, instruct the students that you will be placing them, one at a time, at their own special sit spot. After 15 minutes at their sit spots, you will hand them their notebooks and pencils so that they can record what they experienced. In the end, you will “crow call” and the volunteer at the end of the line will sweep the students to you at the other end.
- To awaken their senses, each student can choose to sit (or lie on their backs) with their eyes closed.

### **12:45 – Field Notebooks (15 minutes)**

#### **Instructions**

- Walk down the path the students are doing sit spots on and one-by-one hand the students their field notebook, opened to the two pages they will be using.
- Advise each student to first write in their field notebooks their location, the time of day, the date, and what the weather is like. Then, tell them to draw anything they saw, smelled, heard, touched, or just experienced during their sit spots.

### **1:00 – Story of the Day (15 minutes)**

- Circle up the students for a sharing of their most spectacular or surprising discovery during their sit spot. Use the art of questioning to dive deeper into their observations. Be sure questions push them to use all their senses.

### **1:15 – Trail Hike back to Pavilion (30 minutes)**

(Adapted from Young, J., Haas, E., and McGow, E. (2010). *Coyote’s Guide to Connecting with Nature*. 2nd ed. Shelton, WA: Owl Link Media Corporation.)

- Continue sharing stories, encouraging students that haven’t participated as much to share something they were grateful for today or something interesting and new they saw
- Encourage the students to take a minute or two to stay silent and listen again, seeing if they can use their senses to acknowledge different things after hearing feedback about what their peers experienced.

#### **Questioning**

Questions usually can be lumped into three categories:

**Level 1 Questions** are questions that the student can easily answer. These are useful in helping the student recall more vividly their experience while also helping you show interest and engagement in what they are telling you. Again, don’t quiz the student, just be curious and let the questions flow. Be sure to acknowledge the answers, too. Remember, your main job is to listen to them.

**Level 2 Questions** are usually about things that the student might not have thought about on his or her own but still can answer with a little thought. You are looking here for gaps in the student's awareness of what he or she experienced. She may have noticed the color of that bird's beak but didn't realize it was an interesting and important detail. Don't go overboard on these questions or it can start to feel like you are administering an exam. Let your own curiosity guide you.

**Level 3 Questions** are reserved for when you see an opportunity to break through a wall of awareness and understanding. A level 3 question is something that hints at a whole realm of understanding that the student hadn't ever considered before. Used well, these questions can set the student on a journey of independent discovery. But used poorly, these questions can be off-putting and uninteresting. Take your time and be thoughtful in the way you use these questions. They might be phrased more like "I wonder if...?" or "Why do you suppose...?"

- Continue sharing stories, encouraging students that haven't participated as much to share something they were grateful for today or something interesting and new they saw.

### **1:45 – Wrap up at Pavilion (15 minutes)**

Have all groups join together for a group circle to cultivate gratitude and give thanks.

Moment of gratitude:

- Tell them to ground their feet like roots.
- Have everyone take a deep breath together, raising their arms above their heads like the trees extend their branches, and then tell everyone to let it out.

Discussion:

- Have the students think about one thing they were grateful for, such as the trail, shade, birds, etc.
- Next, call on each of the focal species asking for one person to share, with a quiet hand, one thing they saw, heard, smelled, or experienced today!
- After everyone has gotten the chance to share, take a second to thank the chaperones, guides, and students for being there.

### **2:00 – Load Bus**



## **Appendices For Fall Field Trip**

*(Refer to or print the following pages as needed)*

### **Appendix A: Great Blue Heron Story**

Excerpt from *The Goodness of Rain* by Ann Pelo

*The Goodness of Rain* follows Ann Pelo on a journey with a toddler named Dylan. In her words she accounts for the insightful moments of wonder that both she and Dylan experienced through their many adventures within the natural environment together. Pelo accounts for her own moments of growth as well as those of Dylan in beautifully expressed prose.

#### Eat Like Heron

“Dylan and I have just come to shore from our first paddle on Lake Washington in a kayak. We’ve hauled the boat onto a dock at a paddle club, stripped off our life jackets, and put on our shoes. I’m reluctant to leave the lake, though it’s nearly time for lunch and for Dylan’s nap; we’ve had a great morning on the water, and I was to savor it a little longer. So I suggest to Dylan that we walk along the urban shoreline to look at the boats and the marine shops that line the lake, and Dylan says, “Yes, yes, a walk!” And so we leave the paddle club and amble along the waterfront.

We follow a rough shoreline footpath past a marina with boats moored along a gated dock and toward a row of weathered houseboats. Tucked between the two docks is a ragged wetland, cordoned off from the footpath by black site fencing that encloses a few plumbing bunches of landscaped grasses and one frail sapling staked with rubber tubing to a metal post. The air has the heady smell of gas and moist fertile earth. Here, in this grubby, closed-in wetland, a heron stands in the shallows.

When I see it, I stop walking and kneel close to Dylan. “Great Blue Heron,” I whisper to her. This is her first encounter with these birds that stand as tall as her, all sharp angles and jagged feathers. “Great Blue Heron,” she whispers back, tangling the syllables but capturing the reverence she hears in my voice. I sit on the footpath, Dylan lowers herself onto my lap, and we watch the heron.

Long, quiet minutes pass. The heron, motionless: body poised, head angled toward the water, eyes intent, unblinking. Dylan and I, silent echoes of the heron’s stillness. We watch the heron and (153) the heron watches for fish, all of us with a singleness of attention and commitment that binds us to the moment and each other.

Then stillness breaks open. The heron plunges its bill into the water. Dylan and I startle. Before we’ve fully registered the fast lunge, the heron stands tall again, a fish dangling from its long sword of a bill. “Fish,” exhales Dylan.

The heron gives several quick jerks of its head to reposition the fish, and then opens its bill and tilts the fish in. It pulls its long, thin neck tight against its body, flattening the graceful curve as it works the fish down its throat. After a visible gulping swallow, the heron straightens, returning to its unmoving watchfulness.

Dylan looks at me, eyes wide. I hesitate before speaking, wary of clouding this moment. Wanting to give Dylan language for what she has witnessed. Wanting her witnessing to remain bigger than words. I keep it simple: “The heron caught a fish to eat. The fish is the heron’s food.”




Dylan listens, gazing at the heron standing quiet in the shallows. Then she tries out the idea I’ve offered: “Heron eat a fish?” I nod, and in a moment Dylan stirs in my lap, ready to move on. We leave the heron and follow the footpath home for lunch.

For lunch: chunks of cantaloupe, roasted beets, steamed carrots cut into bite sized rounds. Dylan climbs into her highchair and stills herself. There is an electric quiet to her body, a fierce attentiveness that compels my attention. Dylan begins to move her eyes slowly side to side, grazing them over the food on the (154) highchair’s tray. Then: a lunge forward, and quickly upright again, cantaloupe held in teeth. Dylan gives the cantaloupe three quick jerks, then tilts her head back and swallows. And returns to her wild watchful posture. Eyes riveted on the food that awaits her capture, she whispers, “I eat like heron” (155).”




Appendix B: Nature Bingo Sheet






## Appendix C: Informational Species Table

	Organism	Why it's found in wetlands
 <p><a href="https://www.allaboutbirds.org/guide/Great_Blue_Heron/id">https://www.allaboutbirds.org/guide/Great Blue Heron/id</a></p>	<p>Great blue heron <i>Ardea herodias</i></p>	<p>They eat small fish and macroinvertebrates (they will eat anything that they can catch, lizards, gophers, insects etc.) which reside in the slow moving shallow waters of a wetland.</p>
 <p><a href="http://www.californiaherps.com/frogs/pages/p.regilla.html">http://www.californiaherps.com/frogs/pages/p.regilla.html</a></p>	<p>Pacific Tree Frog <i>Pseudacris regilla</i></p>	<p>The Pacific Tree Frog hatches its young in the water. As the tadpoles develop they feed on the algae, bacteria, protozoa, and organic or inorganic debris that they find in the wetland.</p>
 <p><a href="https://en.wikipedia.org/wiki/Western_pond_turtle">https://en.wikipedia.org/wiki/Western_pond_turtle</a></p>	<p>Western Pond Turtle <i>Actinemys marmorata</i></p>	<p>The Western pond turtle lives in the water most of its life but needs to find land in order to nest and lay eggs.</p>



 <p><a href="https://wildfoodgirl.com/2011/cow-parsnip-for-breakfast-dinner-dessert/">https://wildfoodgirl.com/2011/cow-parsnip-for-breakfast-dinner-dessert/</a></p>	<p>Cow Parsnip <i>Heracleum maximum</i></p>	<p>The conditions in which Cow Parsnip does the best is in shady and moist areas, such as that of a wetland. They also have hollow stems that enable easy transport of oxygen and water throughout the plant.</p>
 <p><a href="https://www.fireweedschool.com/registration/tzmqthwu5hsn5n04aefc0jact340ou-s2ppr-n9jlk-da5x9">https://www.fireweedschool.com/registration/tzmqthwu5hsn5n04aefc0jact340ou-s2ppr-n9jlk-da5x9</a></p>	<p>Old Man's Beard <i>Usnea longissima</i></p>	<p>Old man's beard is a lichen that grows near water in forests. This lichen is particularly sensitive to pollution so it is mostly found in areas far from developed cities. It can be found here in the riparian habitat because lichens need lots of water to grow best.</p>
 <p><a href="http://www.pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=4">http://www.pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=4</a></p>	<p>Pacific ninebark <i>Physocarpus capitatus</i></p>	<p>The habitat of the Pacific Ninebark is within Wetland areas such as streams, marshes, meadows and the edge of a moist wooded area.</p>

 <p><a href="https://www.mountpisgaharboretum.com/habitats-and-ecology/plant-list-at-mount-pisgah-arboretum/oemleria-cerasiformis/">https://www.mountpisgaharboretum.com/habitats-and-ecology/plant-list-at-mount-pisgah-arboretum/oemleria-cerasiformis/</a></p>	<p>Osoberry <i>Oemleria cerasiformis</i></p>	<p>Osoberry thrives in moist conditions, they can be in both shaded and sunny areas.</p>
 <p><a href="https://calscape.org/Fraxinus-latifolia-(Oregon-Ash)?srchcr=sc572396ce5bded">https://calscape.org/Fraxinus-latifolia-(Oregon-Ash)?srchcr=sc572396ce5bded</a></p>	<p>Oregon ash <i>Fraxinus latifolia</i></p>	<p>These trees in particular need a significant amount of water, if you spot the Oregon ash that means that you are in a wetland area.</p>
 <p><a href="https://mtc.farm/product/douglas-fir-2-gal/">https://mtc.farm/product/douglas-fir-2-gal/</a></p>	<p>Douglas-fir <i>Pseudotsuga menziesii</i></p>	<p>Have shallow root systems and swollen trunks which enable them to survive periods of low oxygen levels. Abundant water in the soil can create anaerobic conditions because it fills up all the pore spaces and leaves no room for oxygen.</p>



<http://www.countrysideinfo.co.uk/forest2/FOLDER01/HTML/INDEX.HTM>

Black-tailed deer print  
*Odocoileus hemionus*

During the day, they rest in plants surrounding water sources. The wetland area provides shelter, food, and a steady source of water.



<http://www.lhseeds.com/symphoricarpos-albus-common-snowberry>

Snowberry  
*Symphoricarpos albus*

Hard coat surrounding their seeds protects the seedlings from being damaged due to salty stress. This increases reproductive success, and enables this plant to grow in salty environments such as wetlands.



<https://home.howstuffworks.com/creeping-buttercup.htm>

Mallard  
*Anas platyrhynchos*

These ducks use their webbed feet as paddles, assisting them in moving through the water quickly. Their diet also consists of fish and other small prey that live in these riparian areas.

# Winter: Pre-Trip Lesson

Developed by: ELP Restoring Connections Team 2019

Time: 45 minutes

## Overview

This season focuses on the water cycle and the various ways in which water interacts with the landscape at Mt. Pisgah Arboretum. In the pre-trip lesson, students learn how to identify six different stages of the water cycle: evaporation, condensation, precipitation, transpiration, percolation, and streamflow/runoff. Students will also explore how water interacts with the land at Mt. Pisgah Arboretum and be introduced to the concept of a topographic map and the ways in which these maps can be helpful when identifying the movement of water throughout Mt. Pisgah Arboretum. This will support their understanding of natural systems and interconnections between vegetation and the movement of water.



## Rationale

These activities aim to allow for a deeper understanding and comprehension of the water cycle, local waterways, and natural geography. This will allow the students to make observations and connections with larger concepts while out in the field. Our curriculum is built upon an understanding of natural water systems and their relationships between organisms in riparian areas which will help build a sense of stewardship and gratitude.

## Learning Outcomes

By the end of this pre-trip classroom lesson, 4th grade students will be able to:

1. Diagram the 6 different stages of the water cycle.
2. Explain what a topographic map is and what it can be used for.
3. Describe what a contour line represents on a topographic map.
4. List three reasons why water is important to Mt. Pisgah Arboretum.



**Academic Subjects:** Science

### **Links to Standards**

#### **Next Generation Science Standards (NGSS):**

- **4-ESS2-2.** Analyze and interpret data from maps to describe patterns of Earth's features.  
[Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Physical, living and human systems
- ✓ Interconnectedness of people and the environment

#### **Intelligences Developed**

- ✓ Nature Smart (Naturalist)
- ✓ Self Smart (Intra Personal)
- ✓ Body Smart (Bodily/Kinesthetic)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)
- ✓ Music Smart (Musical)

#### **Evaluation of Learning Outcomes**

At the beginning of the pre-trip lesson, a water cycle song is played and a dance is taught to the students. Their participation in subsequent performances of the dance reveal their ability to visually retain information and physically demonstrate actions connected to song verses describing stages of the water cycle. At the end of the pre-trip lesson, we collect their comic strip templates to evaluate the effectiveness of our teaching methods. The template provides spaces for the students to draw/describe the different forms that water can be in, enabling us to see whether the students were able to comprehend the basic forms of water. In the topographic map activity, the instructor will use inquiry with the students to ensure that they understand what a topographic map is and what it can be used for. Answers shared during both the topographic map and Potato Mountain activity can be recorded for further evaluation of whether the students can read a topographic map and make connections between the visual and physical representations.

## Materials Needed

### Supplies Adams Teachers and Restoring Connections Members Have Access To:

- 9 yellow rain jackets with hoods (1 small, 3 medium, 2 large, 3 XL)
- 13 pairs of rubber boots (2 size 1, 2 size 3, 3 size 4, 1 size 5, 2 size 6, 1 size 7, 2 size 8.)
- 5 Aquascopes!
- 6 aquatic field guides (blue spiral notebooks)
- 2 aquatic insect guides (laminated pink sheets)
- 8 blue ice trays, 4 white ice trays
- 15 big white trays
- 7 dipping nets
- stack of salmon watch glasses

Water Song and Dance [bring a laptop to the classroom or make sure the teacher has a way to play the video]

- Music Video <https://www.youtube.com/watch?v=T05djtkEFI>  
Begin at 0:18 end at 1:00

- Dance Video <https://youtu.be/UrvoxBujPMJw>

Water Cycle Comic Strip (*found in Appendix C*)

- Printed out comic strip template
- Coloring & drawing supplies (i.e. colored pencils)

Topographic Map

- Potato Mountain Worksheet (*found in appendix E*)
  - Potato
  - Carve tool (i.e. knife)
  - Cutting board
  - White printer paper
  - Black marker (i.e. sharpie)
- Laminated topographic maps of Mt. Pisgah Arboretum (*found in appendix D*)
  - Dry erase markers

## Background Material

- *Precipitation*: when water, in any state (liquid, gaseous, solid), falls from the sky.
- *Evaporation*: when water particles form clouds after changing from a liquid to a gaseous state, due to an increase in temperature and/or pressure.
- *Condensation*: the accumulation of water on a surface or in a body of water.
- *Transpiration*: the passage of watery vapor from a living body (as of a plant) through a membrane or pores.
- *Stream Runoff*: the portion of precipitation on land that ultimately reaches streams often with dissolved or suspended material.

- *Groundwater percolation*: where water moves downward from surface water to groundwater.
- *Topographic Map*: a detailed two-dimensional map that represents elevation or relief, using contour lines, of natural and human-made features on the surface of the Earth.
- Facilitators should make sure to review water cycle song and dance so they are prepared to lead in class.

**Additional Readings/Resources:**

- BIO. (2007). Adaptations. Retrieved May 29, 2019, from [http://bioweb.uwlax.edu/bio203/f2013/bradley\\_aman/index.htm](http://bioweb.uwlax.edu/bio203/f2013/bradley_aman/index.htm)
- Freelan & Bach. (2018). What All Good Maps Should Have. WWU's ENVS-321 Computer Cartography.
- Pelo, A., & Pyle, R. M. (2018). *The goodness of rain: Developing an ecological identity in young children*. Lincoln, NE: Exchange Press.
- Wikipedia. (2019, May 17). Pacific Tree Frog. Retrieved June 09, 2019, from <https://upload.wikimedia.org/wikipedia/commons/thumb/5/5b/Pacifictreefrog2kjfmartin.jpg/400px-Pacifictreefrog2kjfmartin.jpg>

The following links provide additional information about the water cycle and how it moves across landscapes:

- <https://www.merriam-webster.com/dictionary/transpiration>
- <https://www.merriam-webster.com/dictionary/runoff>
- [https://en.wikipedia.org/wiki/Groundwater\\_recharge](https://en.wikipedia.org/wiki/Groundwater_recharge)
- <https://www.youtube.com/watch?v=SymUFSwEm3c> <https://www.youtube.com/watch?v=SymUFSwEm3c> (go to 1:30)

# The Water Cycle: 4th Grade Winter

## Pre-Trip Lesson

### Preparation before the lesson

Adapted from Potato Mountain Worksheet (*found in Appendix E*)

1. Microwave a potato to make it more malleable to carve.
2. Carve a “valley” into the top portion of the potato by slicing a chunk out of the potato horizontally.
3. Slice the potato horizontally into 8 separate layers. Use the top 6 layers of the sliced potato to represent two hills of different heights with one valley in the middle.
4. Pierce the layers on both “hills” with toothpicks to keep them intact for the lesson.

### Introductions (5 minutes)

**First:** Find out from teachers what attention-grabbing activities are used in the event you need to use one during activity/transitions.

- “Welcome all! We are here to introduce the field trip you all will be taking to the Mt. Pisgah Arboretum! As you all probably know there are a lot of plants and animals that live in the area that rely on the natural environment. We are going to be going over today some of the important things that you will need to be familiar with before we get to go on a trip together!”
- Each facilitator should introduce themselves and state one of their favorite water animals, “My name is \_\_\_\_\_ and \_\_\_\_\_ is one of my favorite animals.”
- **Q: Can anyone recognize something all of these animals have in common?**
  - A: They all live in water!
- Today we will be exploring different aspects about water
- Water is unique and constantly transforming! We are going to teach you a super fun song that outlines the journey of transformation that water goes through.

### Water Song and Dance (5 minutes)

*Water cycle song and dance (found in Appendix A). Water stages diagram (found in Appendix B).*

- “We are going to learn a little song and dance to help us remember the different stages of the water cycle!” [Perform dance once as facilitators only]
- Ask the students to join in and remind them it is okay not to know the movements just to have fun. [Run the dance again with whole class]
- **Q: Can anyone raise their hand and tell me one thing you remember from the water cycle that we just acted out in the song?**
  - A: Condensation: the accumulation of water in a cloud (water vapor to liquid)

- A: Evaporation: when water particles change to a gaseous state due to a change in temperature and/or pressure (liquid to water vapor)
- A: Precipitation: when water falls from clouds as rain (water vapor reaches the Earth's surface)
- There are even MORE stages of the water cycle! (*Draw the water stages diagram—found in Appendix B—on the screen or white board to demonstrate the different steps of the water cycle, including the three listed below*)
  - Transpiration
  - Streamflow/runoff
  - Percolation or infiltration through groundwater
- Ask students to describe when/where they have seen these different stages of the water cycle in action
  - i.e. Precipitation when it is raining, evaporation from the steam when water is boiling, condensation when it gets really hot from your breath in the car and starts collecting on the windows
  - Some are harder to see, like transpiration from trees and plants, or the process of percolation in groundwater which mostly happens underground where we can't see!

### **Comic Strip (15 minutes)**

*Comic Strip Template (found in Appendix C)*

#### **Introduction**

- To help us think about all of these stages of the water cycle, you each are going to have a chance to draw your interpretation of a water droplet experiencing the water cycle!
- Your raindrop is about to head out on an adventure and needs your help! On its journey, it will travel through the water cycle. Keep in mind that as your raindrop evaporates it is in the form of gas, as it condensates the raindrop changes to a liquid state in the form of clouds, and precipitation is when it comes falls from the sky in the form of rain or snow, we see runoff in streams, and percolation/infiltration in the ground! With this information draw the journey for your raindrop! Feel free to use whatever colors and illustrations you feel will help you remember with it and have fun!
- Ask a few people share what they drew/wrote about, or ask if anyone would like for you to share their work with the class. [tell them that you can show their work if they do not feel like sharing it themselves]

## Discussion

- **Q: The smaller streams we sometimes see at Mt. Pisgah Arboretum are usually there during which season(s)?**
  - A: During the rainy season, late fall through early spring.
- **Q: What stages of the water cycle are these streams exemplifying to us?**
  - A: Precipitation and Streamflow/Runoff
- As we saw in this water cycle activity, water is constantly changing and is an extremely powerful force! Although water is strong and powerful, it also is a little lazy.
  - Water will ALWAYS find the easiest path, the path of least resistance to get where it needs to go. Sometimes, finding the easiest path takes a while, especially when humans intervene by making barriers to control where the stream goes.
- Explain how overtime, water finds the easiest path and changes the landscape.
  - We have seen this in our past field trips by the canals along the trails where stream run offs will develop during the rainy seasons. There are even larger scale changes that water has made at Mt. Pisgah Arboretum, that we are going to take a look at today.

## Topographic Map (15 minutes)

*Topographic Map of Mt. Pisgah Arboretum (found in Appendix C), Cross Section of Mt. Pisgah Arboretum (see Appendix D)*

(Reference: Restoring Connections 2018 Curriculum)

### Step 1: Looking at Maps

- A great way to look at the shape and features of the landscape is to look at a topographic map!
  - **Q: What does a map show us?**
    - A: A map is a visual representation of an area of land or sea showing physical features, cities, roads, waterways, etc. that can be found there.
  - **Q: What elements go on a map?**
    - A: Title: This tells the reader what the map is a representation of
    - A: Key or legend: This is where a reader can find symbols used throughout the map
    - A: Scale: This allows the reader to understand the relationship between a unit of measure on the map and a unit of measure in the real world.
    - A: Compass rose: This helps orient the person reading the map

### Step 2: Introduction to Topography

- So now that we know what goes on a map, let's learn how to interpret one. When thinking about how water flows in Mt. Pisgah Arboretum, we need to think about the elevation, or the steepness, of the area to understand why water takes certain paths. One way we can do this is by looking at a **[topo][graphic]** map...

- Write the word **topography** on the board.
- **Q: Does anyone know what topographic means?**
  - A: Well, let's break it down!
  - A: TOPO means "place" or "local and GRAPHIC means giving a very detailed picture (i.e. geologic features or water structures)
- Topographic maps are different from normal maps in that they use contour lines to show elevation (steepness)
- Write contour lines on the white board with the following definition: a line on a map joining points of equal height above or below sea level.

### Step 3: Potato Mountain

- Use the instructions from the Potato Mountain worksheet to help visualize the meaning of a topographic map (*found in Appendix E*)
  - Display the valley and hills you have already carved into the potato to the students.
  - Hold the potato in position in front of the class for everyone to clearly see the representation of the hills and the valley.
    - Explain that you already sliced the potato into layers to represent different elevations and intervals of steepness, just like contour lines do on a topographic map.
    - Explain that the bottom layer of sliced potato is the sea or ground level and the following layers represent increased heights.
  - Using a projector and a blank sheet of white printer paper, trace each layer of the potato with a black marker starting with the bottom layer and work to the top. Make sure that you are tracing each layer of the potato in its proper position, respective to the previously traced potato layer.
  - As you trace the layers of the potato explains that the outermost lines represent the lowest levels of elevation, and the innermost lines are the highest points of elevation.
  - Rearrange the layers of the potato to reconstruct the visual of two distinct hills of varying heights and a valley in the middle.
- Place the Topographic map of Mt. Pisgah Arboretum (*found in Appendix D*) under the projector screen adjacent to the traced potato layer diagram.
  - Explain how the layered lines on the potato diagram represent steep slopes, gentler slopes, peaks, and lowland areas, just like the Topographic map of Mt. Pisgah Arboretum does.
- **Q: What contour line on the Topographic map of Mt. Pisgah Arboretum represents the bottom, biggest layer of the potato?**
  - A: The bottom layer of the potato represents the lowest level of elevation on the map, or the outermost contour line.

- The larger contour circles represent the lowest elevation points, or the least steep points of the landscape.
- **Q: What contour line on the Topographic map of Mt. Pisgah Arboretum represents the top layer of the potato?**
  - A: The top layer of the potato represents the highest level of elevation on the map, or the innermost contour line, with no inner circles.
- **Q: What do the smaller contour circles, with no inner circles, represent on the potato layer diagram and the Topographic map of Mt. Pisgah Arboretum?**
  - A: The highest elevation points.
- **Q: How does understanding topographic maps help us better understand the effect that water has on a landscape?**
  - A: Understanding topographic maps helps us identify varying elevations that water flows through and can help us identify different sources of freshwater. Ex: wetlands, rivers, streams, creeks, puddles, channels, ect..
- Congratulations class! You now know how to interpret a topographic, this skill will help you in creating your very own topographic maps on your upcoming field trip.

#### **Transition/wrap up (5 minutes)**

- **Q: So, speaking of our upcoming field trip, who can tell me how we should dress so we can be prepared for our field trip to Mt. Pisgah Arboretum?**
  - A: layers, closed-toe shoes, rain gear (unless it's sunny, then also mention they should put on sunblock at home if they use it)
- **Q: What else do we need to do to prepare our bodies and minds for the field trip?**
  - A: bring a lunch, water, eat a big breakfast, dress appropriately
- **Q: “Who is responsible for you having a good time?”**
  - A: “Me” – instill that each student is responsible for themselves and for contributing to a fun day for their group. Everyone is doing their part by coming ready to participate! That is why we come prepared!
- Thank them for an amazing time, and share your excitement for their field trip!

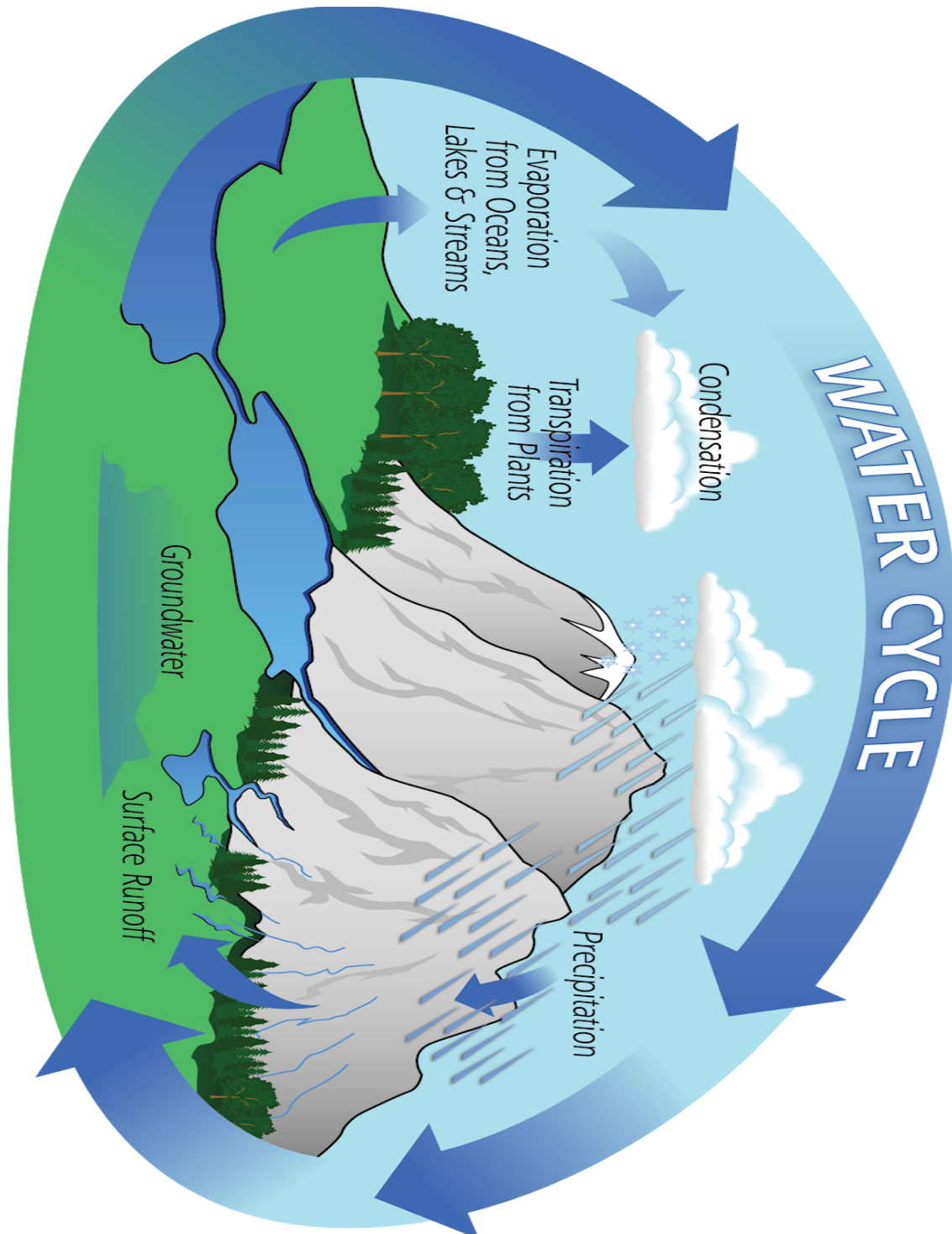


## Appendices For Winter Pre-Trip Lesson:

*(Refer to or print the following pages as needed)*

**Appendix A:** Water cycle song and dance (<https://www.youtube.com/watch?v=UrvxBujPMJw>)

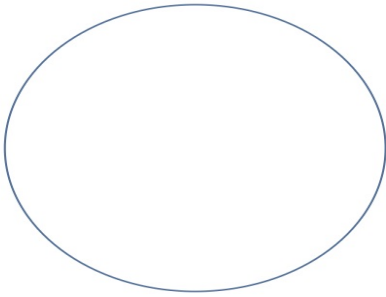
**Appendix B:** Water stages diagram



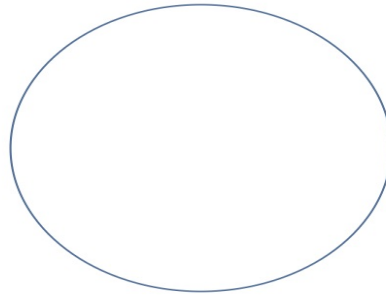
Appendix C: Water cycle comic template

## **Journey as a Raindrop**

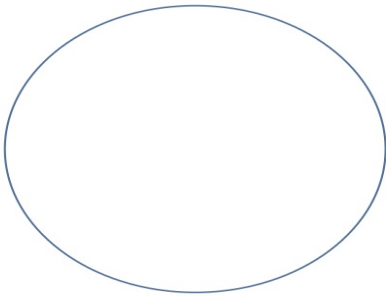
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Your name



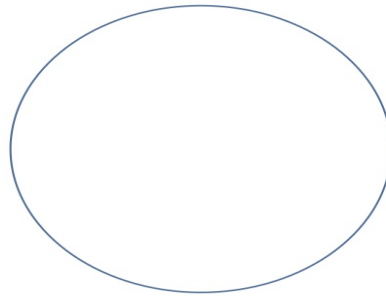
Evaporation



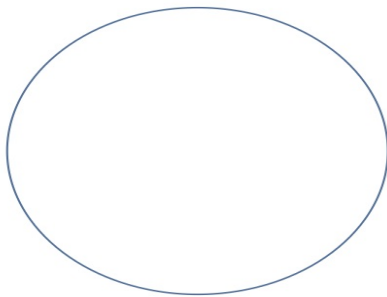
Condensation



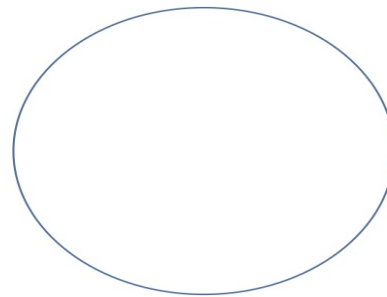
Transpiration



Precipitation

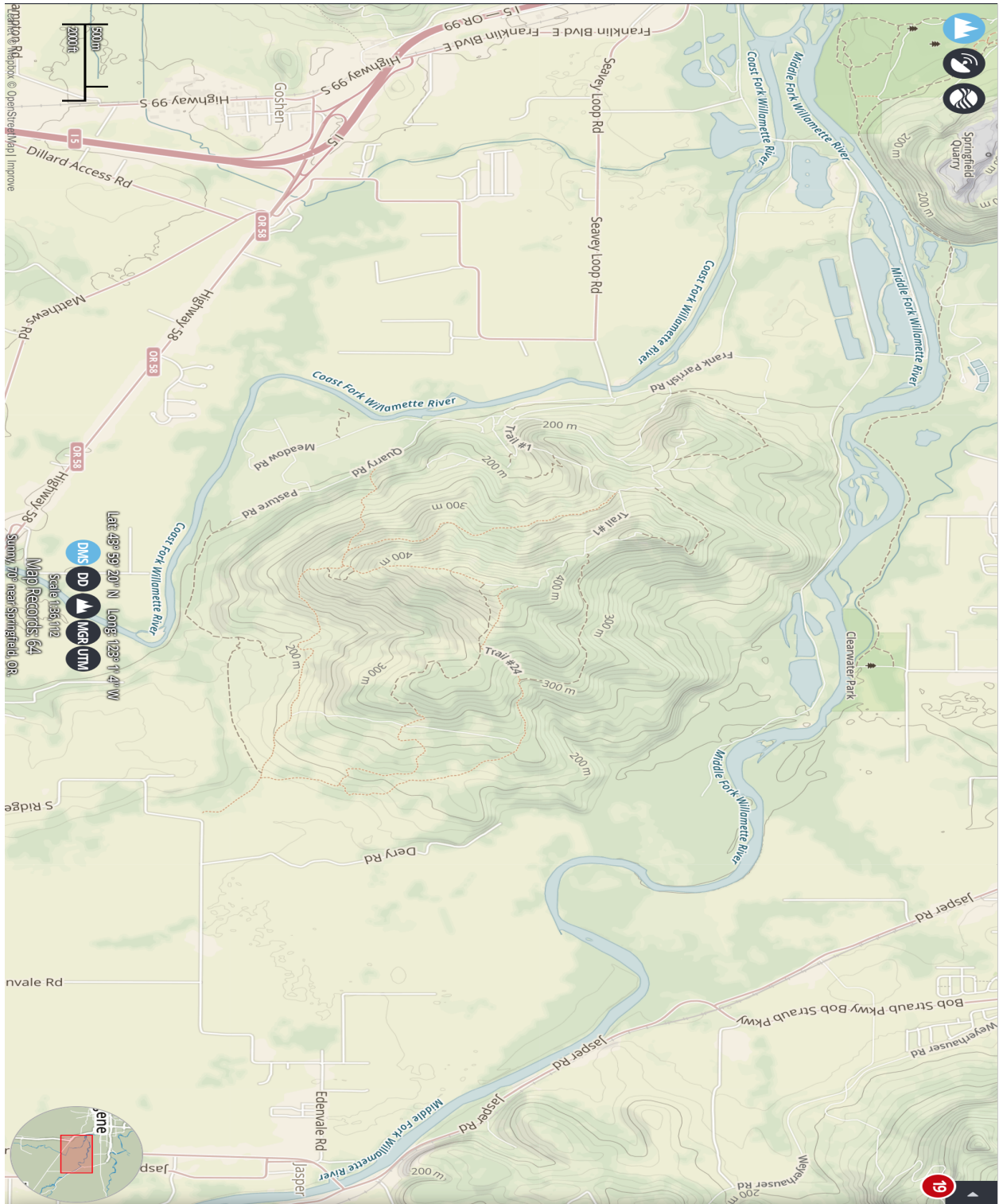


Percolation



Streamflow/Runoff

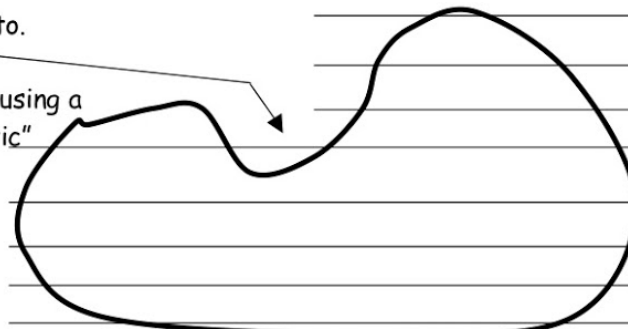
# Appendix D: Topographic map of Mount Pisgah Arboretum



## Appendix E: Potato Mountain Worksheet

1. Carve a "valley" into a potato.

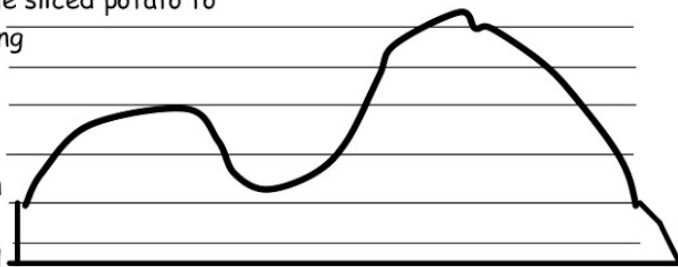
2. Slice the potato into layers using a food processor, "veg-o-matic" or a sharp knife.



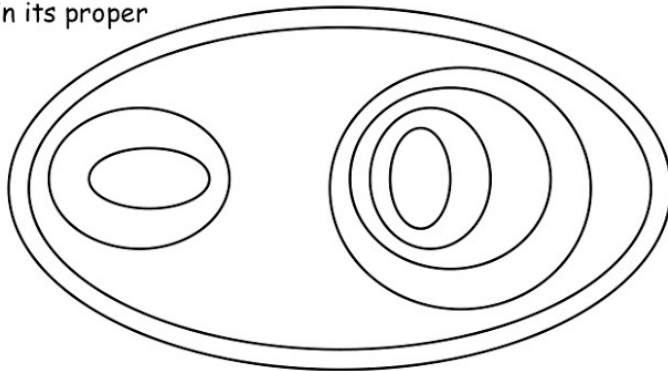
Side view of prepared potato

3. Use only the top half of the sliced potato to represent two hills of varying heights with a valley in the middle.

Hold the potato in position so the class can see the representation of hills and valley.



4. On the whiteboard in front of the class, trace each layer of the potato, being sure to keep each layer in its proper position in regard to the previously traced layer. The resulting pattern will be a topographic representation of the potato hills and valley.



5. Point out how the contour lines represent steep slopes, gentler slopes, peaks, and lowland areas.

# MOUNT PISGAH ARBORETUM

## Great Blue Heron

**Schedule**

**Great Blue Heron**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – Trail Hike to River Parts Activity
- 9:45 – River Parts Activity
- 10:10 – Trail Hike with Activity
- 10:20 – Snack and story time
- 10:35 – Water Cycle Rock Paper Scissors
- 10:50 – Trail hike back to pavilion
- 11:00 – Mapping Activity in Pavilion
- 11:30 – Wrap up/ Give Thanks
- 11:40 – Load Bus



- A - Parking Lots
- B - Office
- C - Information Kiosk
- D - Visitor Center
- E - Caretaker's House
- F - White Oak Pavilion
- G - Bathrooms
- H - Picnic Area
- I - Palms Baker Wildflower Garden
- J - Tree Round Exhibit
- K - Octopus Tree
- L - Viewing Platform



# **4th Grade - The Movement of Water - Winter Field Trip**

## **Agenda at a Glance: Great Blue Heron**

**9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)

**9:40** River Parts Activity (20 minutes)

*Go to a meandering stream and hand out cards to students, each card identifies different geological features along the river at Mt. Pisgah Arboretum. Then, students are asked to go find the geological features from their cards along the river and come back together and talk in a group.*

**10:10** Trail Hike with Activity (10 minutes)

*Walk to the view of the River. Encourage students to have conversations connecting their pre-trip activity (hydraulic mapping) to what they are seeing on the landscape.*

**10:20** Snack and story time (15 minutes)

**10:35** Water Cycle Rock Paper Scissors (15 minutes)

**10:50** Trail hike back to the Pavillion (10 minutes)

**11:00** Lets Get Mapping (30 minutes)

*In the Pavilion, students will get the chance to look at a topographic map and learn how to read it. They will then get the chance to construct their own topographic map of a Make-Believe place.*

**11:30** Wrap Up and Give Thanks (10 minutes)

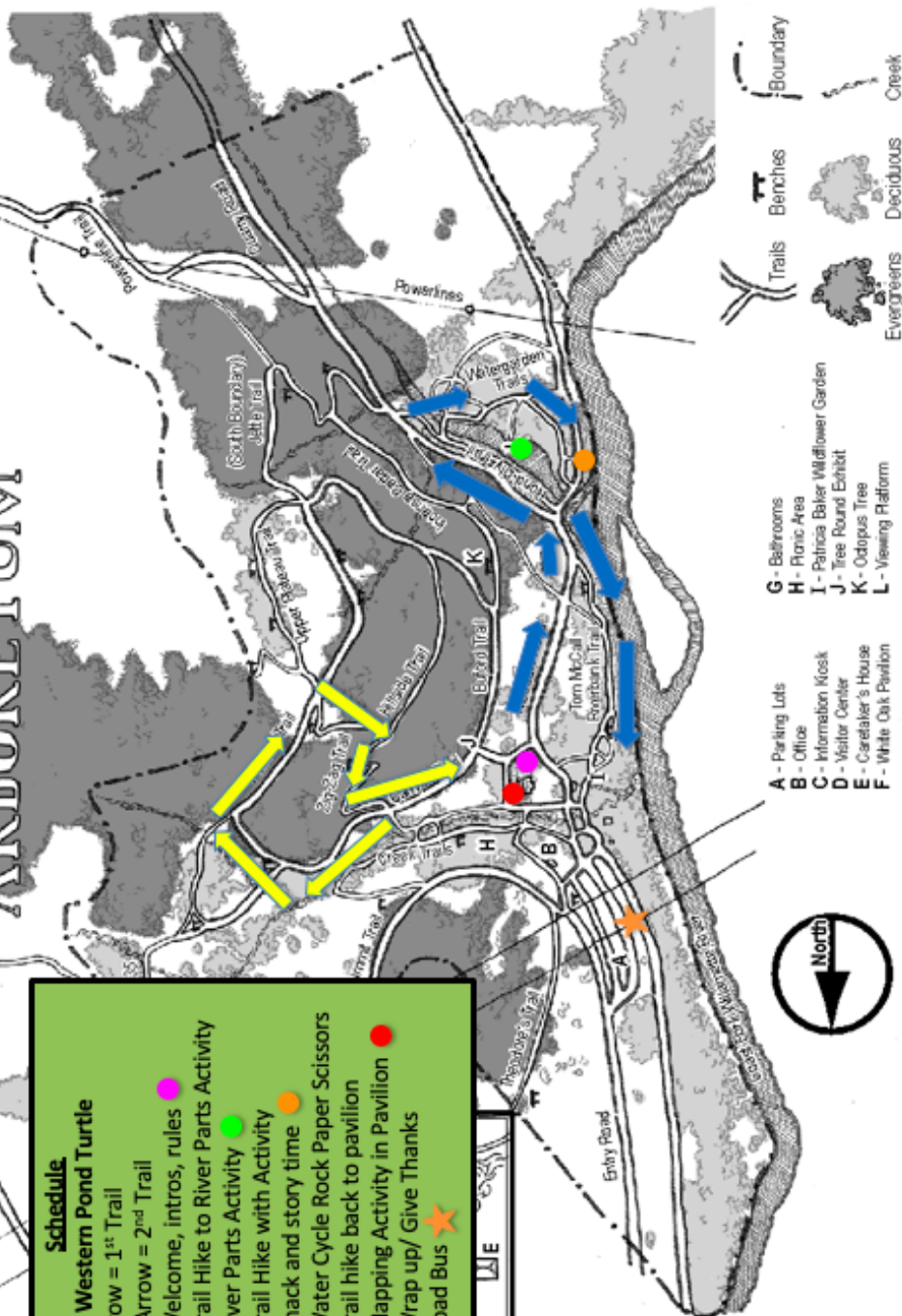
**11:40** Load Bus

# MOUNT PISGAH ARBORETUM

## Western Pond Turtle

### Schedule

- Western Pond Turtle**
- Blue Arrow = 1<sup>st</sup> Trail
  - Yellow Arrow = 2<sup>nd</sup> Trail
  - ~9:30 – Welcome, intros, rules
  - ~9:40 – Trail Hike to River Parts Activity
  - 9:45 – River Parts Activity
  - 10:10 – Trail Hike with Activity
  - 10:20 – Snack and story time
  - 10:35 – Water Cycle Rock Paper Scissors
  - 10:50 – Trail hike back to pavilion
  - 11:00 – Mapping Activity in Pavilion
  - 11:30 – Wrap up/ Give Thanks
  - 11:40 – Load Bus



- A - Parking Lots
- B - Office
- C - Information Kiosk
- D - Visitor Center
- E - Caretaker's House
- F - White Oak Pavilion
- G - Bathrooms
- H - Picnic Area
- I - Patricia Baker Wildflower Garden
- J - Tree Round Exhibit
- K - Odorous Tree
- L - Viewing Platform

- Trails
- Benches
- Boundary
- Evergreens
- Deciduous
- Creek



# 4th Grade - The Movement of Water - Winter Field Trip

## Agenda at a Glance: **Western Pond Turtle**

**9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)

**9:40** River Parts Activity (20 minutes)

*Go to a meandering stream and hand out cards to students, each card identifies different geological features along the river at Mt. Pisgah Arboretum. Then, students are asked to go find the geological features from their cards along the river and come back together and talk in a group.*

**10:10** Trail Hike with Activity (10 minutes)

*Walk to the view of the River. Encourage students to have conversations connecting their pre-trip activity (hydraulic mapping) to what they are seeing on the landscape.*

**10:20** Snack and story time (15 minutes)

**10:35** Water Cycle Rock Paper Scissors (15 minutes)

**10:50** Trail hike back to the Pavillion (10 minutes)

**11:00** Lets Get Mapping (30 minutes)

*In the Pavilion, students will get the chance to look at a topographic map and learn how to read it. They will then get the chance to construct their own topographic map of a Make-Believe place.*

**11:30** Wrap Up and Give Thanks (10 minutes)

**11:40** Load Bus





# 4th Grade - The Movement of Water - Winter Field Trip

## Agenda at a Glance: Pacific Tree Frog

**9:30** Welcome students as they get off the bus, ground, cultivate gratitude, intros involving students and chaperones, set group agreements for the entirety of the trip (10 minutes)

**9:40** River Parts Activity (20 minutes)

*Go to a meandering stream and hand out cards to students, each card identifies different geological features along the river at Mt. Pisgah Arboretum. Then, students are asked to go find the geological features from their cards along the river and come back together and talk in a group.*

**10:10** Trail Hike with Activity (10 minutes)

*Walk to the view of the River. Encourage students to have conversations connecting their pre-trip activity (hydraulic mapping) to what they are seeing on the landscape.*

**10:20** Snack and story time (15 minutes)

**10:35** Water Cycle Rock Paper Scissors (15 minutes)

**10:50** Trail hike back to the Pavillion (10 minutes)

**11:00** Lets Get Mapping (30 minutes)

*In the Pavilion, students will get the chance to look at a topographic map and learn how to read it. They will then get the chance to construct their own topographic map of a Make-Believe place.*

**11:30** Wrap Up and Give Thanks (10 minutes)

**11:40** Load Bus

# Winter: Field Trip

**Developed by:** ELP Restoring Connections Team 2019

**Time:** 2.5 hours

## Overview

During the winter field trip, students will be exploring the different functions of water by learning more in-depth about the water cycle and the impact that water has on the landscape at Mt. Pisgah Arboretum. Students will engage in activities related to hydrology and erosion and gain more insight into the creatures and systems that work within Mt. Pisgah Arboretum.

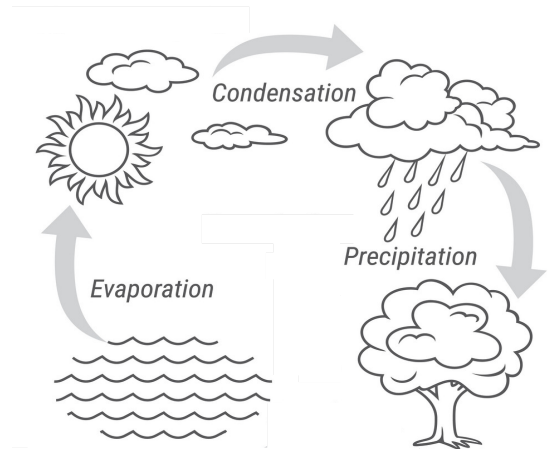
## Rationale

These activities aim to create a sense of wonder and appreciation for water and connect them to the surroundings. The riparian habitat is a great place to explore the different ways water interacts with landscapes and can affect the topography. Through activities such as observing the different parts of the river the students will gain a deeper understanding of how water can impact landscapes.

## Learning Outcomes

By the end of this field trip, students will be able to:

- Describe 3 physical characteristics of a healthy river or creek.
- Describe how water can erode and shape landscapes.
- Interpret the elevation of a landscape from a topographic map.
- Describe the 4 necessary elements of a map.



**Academic Subjects:** Science

### **Links to Standards**

#### **Next Generation Science Standards (NGSS): Pre-Trip and Field Trip**

- **4-ESS2-2.** Analyze and interpret data from maps to describe patterns of Earth’s features. [Clarification Statement: Maps can include topographic maps of Earth’s land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]
- **4-ESS2-1.** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Physical, living and human systems
- ✓ Interconnectedness of people and the environment

#### **Intelligences Developed**

- ✓ Nature Smart (Naturalist)
- ✓ People Smart (Interpersonal)
- ✓ Self Smart (Intra Personal)
- ✓ Body Smart (Bodily/Kinesthetic)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)

#### **Evaluation of Learning Outcomes**

The learning outcomes for this field trip are evaluated in part during the river parts activity by students teaching the rest of the group about their part of the river/creek. In the water cycle game we are able to tell that they have met the learning outcomes by if they can effectively play the game as it requires a basic understanding of the water cycle and the scientific terms used to describe it. Finally, our learning outcomes associated water changing a landscape and being able to interpret a topographic map are evaluated by the physical maps that students work with during the mapping activity. Their ability to accurately mark the highest points of elevation and track where water would move in seasonal streams across the landscape, both on a map of Mt. Pisgah Arboretum and their own make-believe landscape, demonstrates their understanding of tracking elevation on a two-dimensional map. The product of their traced maps, drawn imagined maps, and the answers to questioning can all be collected at the end of the day as part of evaluating the success of the learning outcomes.

## Materials Needed

### Trail Activities

- Backpacks should include:
  - Small notebook
  - Hand sanitizer
  - Two water bottles
  - List of groups/students/chaperones and teacher phone number
  - Map/agenda for the day
  - Small first aid kit (Band-Aids and gloves)
  - Field notebooks for each student, should be in a ziploc bag (students name labeled on each journal)
  - Ziploc bag of pencils (for field notebooks)
  - Tarp “sit spots” for children to sit on while they do their field observations and field journals (at least 12 per backpack)
  - Snacks (carrots and goldfish)
  - Each bag has a laminated picture of the group’s animal
  - Each bag has a laminated picture of topographic map of Mt. Pisgah Arboretum
  - If needed – rain ponchos (pickup and return to MPA visitor center each visit. Be sure if used, they are hung to dry at the end of the day)

### River Parts Activity

- River parts identification cards (*found in Appendix H*)

### Mapping Activity

- 30 printed copies of the topographic map
- 3 Laminated topographic maps (1 per focal species group)
- Expo markers
- Colored pencils

## Background Material

- *Meander*: a winding curve or bend of a river/road.
- *Meandering stream*: a stream that consists of successive meanders. They develop in flatter areas, including floodplains, or where sediment is composed of fine sands, silts, and mud.
- *Floodplains*: an area on low-lying ground that is adjacent to a river, it is formed of river sediments and subject to periods of flooding.
- *Main river*: the main course of water in a watercourse, can include any structure or appliance for controlling or regulating the flow of water in, into, or out of the main river.
- *Riverbanks*: the land that is either at or above the edge of a river.
- As the focus of this field trip, instructors should have some basic understanding of the fact that the river running through Mt. Pisgah Arboretum is the Coast fork of the Willamette which feeds into the Willamette river.

- Eugene switched its source of water from the Willamette to McKenzie River in 1927 because the quality of the water in the Willamette became too poor for consumption due to agricultural runoff.
- Instructors should have knowledge of the geologic features of the river at Mt. Pisgah Arboretum and the relationships that both humans and animals have to these features.
- Instructors should have an understanding of the importance and implications of humans on wetland and water environments.
- *Topographic Map*: a detailed two-dimensional map that represents elevation or relief, using contour lines, of natural and human-made features on the surface of the Earth.
- The 4 elements of a map include: a title, key/legend, scale, and compass rose.
- *Contour lines*: lines on a map that show elevation on a landscape (i.e. valleys and hills).

### **Additional Readings/Resources**

- Affolter, M., Inkenbrandt, P., Johnson, C., and Mosher, C. (2017). An Introduction to Geology: Chapter 11–Rivers, Streams, & Groundwater. Retrieved from <https://gotbooks.miracosta.edu/geology/chapter11.html>
- Mason, G. (2011). E. (n.d.). EWEB: The First 100 Years. Retrieved from <file:///Users/brittcala/Downloads/eweb-the-first-100-years.pdf>
- Meandering stream. (n.d.). Retrieved from <https://www.dictionary.com/browse/meandering-stream>
- National Geographic. (n.d.). Flood Plain. Retrieved June 09, 2019, from <https://www.nationalgeographic.org/encyclopedia/flood-plain/>
- RIVERBANK | definition in the Cambridge English Dictionary. (n.d.). Retrieved from <https://dictionary.cambridge.org/us/dictionary/english/riverbank>
- River ecosystems. (n.d.). Retrieved from <https://www.sciencelearn.org.nz/resources/439-river-ecosystems>
- Wikipedia contributors. (2018). Main river. Retrieved from [https://en.wikipedia.org/wiki/Main\\_river](https://en.wikipedia.org/wiki/Main_river)

The following links provide additional information about the parts of a river:

- <https://www.sciencelearn.org.nz/resources/439-river-ecosystems>
- [https://www.water.wa.gov.au/\\_data/assets/pdf\\_file/0007/3121/11439.pdf](https://www.water.wa.gov.au/_data/assets/pdf_file/0007/3121/11439.pdf)
- <https://www.nwf.org/Our-Work/Habitats/Floodplains>
- <https://www.co.walton.fl.us/733/Natural-Beneficial-Functions-of-Floodpla>

# **The Movement of Water: 4th Grade Winter**

## **Field Trip Activity Break Down**

### **9:30 – Welcome:** (10 minutes)

(Reference: Restoring Connections 2017 Second Grade Curriculum)

- As children exit the bus, separate into groups (Great Blue Heron, Western Pond Turtle, and Bullfrog) as quickly as possible, with all guides ready to go and holding pictures of their group species.
- Take lunch bins to the pavilion.
- Groups should spread out and circle up inside MPA, away from the bus.
- Start the day with cultivating gratitude: say what we are grateful for, how thankful we are to be here today, exploring this magical forest with them. Take note if anyone is cold or under-dressed for the weather – share extra hats, gloves, coats as needed and make use of the blue rain ponchos at MPA.
- Next, go around the circle, starting with your name and the coolest thing you learned from the last trip, and have each student do the same.
  - Take notes as this is an assessment opportunity
- Set ground rules so children are clear on expectations, but do it in a fun way that establishes a sense of exploring, adventure, freedom, and joy (rather than a list of rules!)
  - For example, it does not matter if they are in a straight line always, but that they are on the trail. So explain it in terms of respect for the plants rather than some seemingly arbitrary rule. Adams Elementary teaches their students to be safe, respectful, and responsible. Ask them how we should apply these familiar terms to today’s field trip.
- Remind students about their deer ears, owl eyes, raccoon hands, dog noses, and fox walking
- Check and see if anyone needs to use the bathroom at this time.

### **9:40 – River Parts Activity** (20 minutes)

*Go to a meandering stream and hand out cards (provided by Mt. Pisgah Arboretum) to students, each card identifies different geological features along the river at MPA. Then, students are asked to go find the geological features from their cards along the river and come back together to talk in a group.*

#### **Introduce the Activity**

- Inform the students that they will be getting up close and personal with the river (or stream) and all its features.
- Use the river part cards to teach students about the different geological features of rivers (oxbow lake, bend, floodplain, cutbank, etc.) and explain the stream at MPA provides a small scale example of larger river processes.

- Ask students to repeat the name of each feature after you are done explaining it.
  - Hand out these cards to the students evenly after you explain and repeat the name of each one.
- Once the students know what they are looking for, instruct them to find their feature(s) along the river or stream.
- Rules that must be followed for safety:
  - Explain to students that if they are not comfortable walking by themselves around the stream, then they should find an instructor/volunteer/chaperone and ask for assistance.
  - Emphasize the distance from the stream that the children can freely observe from, and remind them not to stray from that area.
- Tell them to come tell you once they find their feature so you can verify that they actually found an example of the feature on their card(s).
- Once you have verified that everyone found their geologic feature, circle everyone up and open a discussion about the different parts of a river by asking questions like:
- **Q: How do different geological features of rivers provide a habitat for different aquatic species? Example answers:**
  - A: Meandering streams- slow down a river, which makes it easier for smaller organisms to navigate (like macroinvertebrates, which they will learn about in the Spring)
  - A: Floodplains- create pools that aquatic species can inhabit, and can carry nutrient-rich sediments, further contributing to a fertile environment for vegetation
  - A: Riverbanks- Provide a habitat for riparian vegetation which prevents a lot of harmful debris from entering the river
  - A: Main River- provides life for many aquatic organisms such as fish, especially Salmon in the Pacific Northwest
  - A: Wetlands- Soak up excess water from river flooding and provide habitat for many juvenile aquatic species
  - A: Tributaries- Important for Salmon spawning and other migratory fish
  - A: In the event that a meandering stream continues to erode, Oxbow lakes can form.
- **Q: How might these features change during a flooding event? How do we know where the floodplain is?**
  - A: A floodplain is generally a flat area of land next to a river or stream
  - A: It stretches from the edge of the river to the outer edges of the valley in which the river lies
  - A: Floodplains usually only flood during rainy seasons
  - A: Flooding can erode river banks and surrounding areas depending on the size of the flood
- Ask students to volunteer information about the part of the river they identified



- Ask students what they think this river provides for Mt. Pisgah Arboretum and its wildlife.
- Ask the students what properties they noticed about their part of the river and what might be unique to their spot
- Conclude with a short summary of the ways in which a river provides hydration and nutrients to flora and fauna in an area.
  - Rivers play an important part in the water cycle since they act as drainage channels for surface water!
  - Certain species of aquatic plants like algae provide oxygen for aquatic animals.
  - Provides a cool habitat necessary for many aquatic organisms to survive in.

### **10:10 – Informative Trail Walk (10 minutes)**

- Facilitate this conversation with the following prompting questions:
  - **Q: Are these streams always here?**
    - A: No; seasonal with snow/rain
  - **Q: Where are they going to?**
    - A: The Coast Fork of the Willamette River
  - **Q: Where do they come from?**
    - A: Precipitation (collection of rain and snow), sometimes melting snow from the top of Mt. Pisgah Arboretum
  - **Q: Can you see the paths you drew that a water drop would take from the highest part of Mt. Pisgah Arboretum to the river?**
  - **Q: Does this seem to be the way that the water is moving?**
- Now that we have the chance to observe a water way, let's go take a break for snack time and we'll hear a story about the water cycle!

### **10:20 – Snack and story time (15 minutes)**

The story for Snack Time:

#### Water fairytale

She was born out of the salty ocean waves. The result of the swirling madness of the strong current. She arose from that state in parts and pieces, each part different, unique and vital to who she was to become. Eventually, each part and piece found its way together, and there she has created; a perfect droplet.

As she went up, the water droplet found herself in the frenzied madness up above. She rose and fell and danced, the energy around her swirling and electric. The state was one of chaos and confusion,

the movements jerky and lacking flow. There were many others around her, bumping and jostling. This gyrating madness continued on until (\*pause\*) stillness.

The electricity was gone. She was falling through the air. She watched the beings, people, animals, and insects alike, down below react to her and her other water droplet friends' arrival. Some scowled, some cursed the sky for raining on them, others stayed inside and watched it from afar. Yet, her personal favorites were those beings that danced and rejoiced in the falling rain.

She realized that this was how she wanted to move, in a cyclical fashion and constantly in motion, each part being just as important as the last.

As she kept falling the ground came closer and closer until she landed in a pond in the center of a beautiful garden. In the stillness, she was able to observe more of the small creatures and plants that surrounded her. There were no longer any external distractions to take her away from her own mind and nature. As the winter months came and went she changed shape slowly with the hardening of the water but otherwise she was completely still. In many ways, this was one of the most difficult parts of her journey.

She landed somewhere different, somewhere high up but touching ground, she was above the trees still and could see smoke billowing out of the chimneys of the quiet houses. In her raindrop form, she began to run down the hill, bumping into and slowly accumulating with a group of fellow raindrops. They ran over rocks, past insects birds and squirrels. Some of her friends stayed back, going on a different journey that brought them down into the soil, but she kept flowing. She and her friends entered a running stream, they danced around rocks and floating logs and then entered a river that flowed even faster. After a while, she arrived at the head of the river and mixed with the salty water of the ocean where she started.

Eventually, as she was lifted up in parts and pieces once more, she felt uncontainable excitement for the next adventure that was to come. As she went through the cycle each time she learned something different about herself and the environment around her. Each time was a new and exciting experience. She found the flow that she longed for and her life became a dance. She danced from one experience to the next and connected the act of falling, flowing, separating and coming back together each time with contentment and grace.

### **10:35 – Water Cycle Rock Paper Scissors (15 minutes)**

- **Introduction**

- Introduce the activity by telling the students they will be learning about the journey of water. This game will allow them to interactively learn the water cycle in a way that will allow them to better comprehend the relationships between each part.
- Talk about how the water cycle has many different steps. These are condensation which is water that forms into clouds, precipitation when the water falls in the form of rain, runoff when the water flows down into a river and accumulation when the water makes its way to the ocean ready to be evaporated again.

- Make sure to describe each part in a way that introduces the scientific term and says what it does. This way they have a small introduction into what the terms are so that they can connect the dots in the setup and then application of the game.

### **Playing the Game**

- Split the children into four sections: cloud group, rain group, river group and ocean group
- Put all the students in the ocean section of the space
- Have the ocean particle kids start to make swooshing motions
- Have them play rock paper scissors with other ocean particles
- If they win they will move on to the next stage of the water cycle
- They keep playing with the other students in their section
- As the students lose they always go back into the cloud position

### **10:50 -- Hike back to Pavilion (10 minutes)**

(Adapted from Young, J., Haas, E., and McGow, E. (2010). *Coyote's Guide to Connecting with Nature*. 2nd ed. Shelton, WA: Owl Link Media Corporation.)

Continue sharing stories, encouraging students that haven't participated as much to share something they were grateful for today or something interesting or new they saw

### **Questioning:**

When a student comes back from a sit spot, or from any nature experience, the most valuable thing we can do as mentors is be receptive and engaged listeners to their stories. You will see that kids are always eager to tell their stories to anyone who will listen to them. Unfortunately, most of the adults in their lives can't take the time to really engage in listening.

As a mentor listening to a story from a student or perhaps experiencing a story with a student, you can help drive learning further with careful use of questions. This is not the same thing as quizzing a student on their experience. We aren't looking to drill them on the answers. We are simply using questions as a way to direct their awareness and possibly stimulate memory and curiosity.

Questions usually can be lumped into three categories:

**Level 1 Questions** are questions that the student can easily answer. These are useful in helping the student recall more vividly their experience while also helping you show interest and engagement in what they are telling you. Again, don't quiz the student, just be curious and let the questions flow. Be sure to acknowledge the answers, too. Remember, your main job is to listen to them.

**Level 2 Questions** are usually about things that the student might not have thought about on his or her own but still can answer with a little thought. You are looking here for gaps in the student's awareness of what he or she experienced. She may have noticed the color of that bird's beak but didn't realize it was an interesting and important detail. Don't go overboard on these questions or it can start to feel like you are administering an exam. Let your own curiosity guide you.

**Level 3 Questions** are reserved for when you see an opportunity to break through a wall of awareness and understanding. A level 3 question is something that hints at a whole realm of understanding that the student hadn't ever considered before. Used well, these questions can set the student on a journey of independent discovery. But used poorly, these questions can be off-putting and uninteresting. Take your time and be thoughtful in the way you use these questions. They might be phrased more like "I wonder if...?" or "Why do you suppose...?"

### **11:00 – Let's Get Mapping (30 minutes)**

(Adapted from Young, J., Haas, E., and McGow, E. (2010). *Coyote's Guide to Connecting with Nature*. 2nd ed. Shelton, WA: Owl Link Media Corporation.)

#### **Introduce the Activity [In pavilion] (5 minutes)**

- Today we are going to explore some more mapping and how water has changed the shape and landscape of our favorite place, Mt. Pisgah Arboretum!
- **Q: Who can tell me a type of tool we use to help us understand where we are and where we can go?**
  - A: A map!
- **Q: Who can tell me the 4 elements of a map that we learned in our pre-trip class lesson?**
  - A: Title: This tells the reader what the map is a representation of
  - A: Key or legend: This is where a reader can find symbols used throughout the map
  - A: Scale: This allows the reader to understand the relationship between a unit of measure on the map and a unit of measure in the real world.
  - A: Compass rose: This helps orient the person reading the map
- **Q: Who remembers the big scientific word we learned in the pre-trip lesson for reading elevations of a landscape?**
  - A: Topography/Topographic map
- We have been visiting MPA for several years so now we are going to have the opportunity to create our own topographic maps of this awesome park and to help us visualize the way water flows here!
- Even earlier today we saw how the creek carves the landscape in finding the path of least resistance while making its way to the larger water source, the Coast fork of the Willamette River!

## Step 2: Interpreting a Map – making connections to water

- Hand out a printed topographic map of Mt. Pisgah Arboretum (*found in Appendix D*) to each student along with colored pencils. While teaching this activity, the instructor should follow along each step using a laminated version of the topographic map and an expo marker.
  - “Picture yourself as a bird looking down. That is the view a topographic map illustrates.”
- **Q: Who can tell me what the different lines on this map show?**
  - A: The different lines show levels of elevation. The intervals of the darker, thick lines are at every 50 meters with the lighter lines in between showing elevation changes of 10 meters at a time. The labeled lines are at every 100 meters.
- **Q: What is the highest point on this map?**
  - A: Center circle at the 460 m mark.
    - Mark the top of the different hills on your map. Use your expo-marker to put a dot on the highest point of each hill
    - This should be the “top” layer of the potato, or where there are no more inner circles.
- **Q: Where does the water for the seasonal streams come from?**
  - A: Precipitation! Rain, snow, sometimes from snow melting. Sometimes, water can be invisible during some seasons and then it reappears during other seasons! But it is always following the same paths down towards the River, the Coast Fork of the Willamette. We can see evidence of these streams -- called *ephemeral streams* -- at MPA, even if there is no water there now.
- **Q: What is the general pattern these streams take?**
  - A: The path of least resistance from highest elevation to lowest/larger water source.
- **Q: What are the main water sources that the streams are flowing towards? Trace them on your maps.**
  - A: The Coast Fork of the Willamette River and the Middle Fork of the Willamette River.
    - Note: We only see the side of MPA that has the Coast Fork, but on the other side of the mountain is the Middle Fork.
- With this knowledge, let’s trace where the rainwater flows in MPA during the rainy season (winter).
- Students’ maps should show water flowing from highest elevation to the water sources, specifically focusing on the Coast Fork. The paths should intersect running perpendicular to the elevation intervals and following the lowest point of the curve (*found in Appendix G*).

## Step 3: Make your own Topographic Map

- Now that you've gotten the chance to look at the map of Mt. Pisgah Arboretum and trace how water flows through it by following elevation and the path of least resistance to larger water sources, let's create our own make-believe maps!
- Instruct students to flip over their topographic maps and get their creative juices flowing!
- Using the colored pencils already on their tables, take a couple minutes for students to draw their own map of a make-believe place, noting its peaks and valleys, rivers and seas, caves and meadows, and how they are all connected in their make believe world.
- **Q: Can anyone tell me how we are going to show peaks and valleys on a piece of paper?**
  - A: Contour lines! Make it a topographic map!
  - It's okay if it's not accurate, this is our own make believe world anyway and it's okay to practice!
- Allow them at least ten minutes to draw, and ask them questions to pull out more information and get their brains processing in new ways. Example:
- **Q: So how does water flow from one end of your map to the other?**
  - A: From higher points of elevation to lower points along rivers, streams, and creeks.

#### Step 4: Discussion

- **Q: Does anyone want to share the maps that they made?**
  - How did you show different elevations on your map? How did the higher parts like mountains and the lower parts like the seas and meadows connect?
    - How do you think the water would change the landscape overtime?
  - Did water flow easily? Were there places that water pooled in your map, like lakes or ponds?
- Those were some amazing and very creative maps! Thank you all for sharing.
- **Q: Can anything share one new thing they learned today about topographic maps? Or how water moves across the landscape?**
- So, now we that we have become experts at topography, make sure to look for places that water moves in the landscapes around your home and school. See if you can take note of the different elevations and how steepness affects seasonal streams that occur from precipitation!

#### 11:30 – Wrap Up and Give Thanks (10 minutes)

Have all groups join together for a group circle to cultivate gratitude and give thanks.

Moment of gratitude:

- Tell them to ground their feet like roots.
- Have everyone take a deep breath together, raising their arms above their heads like the trees extend their branches, and then tell everyone to let it out.

Discussion:

- Have the students think about one thing they were grateful for, such as the trail, shade, birds, etc.

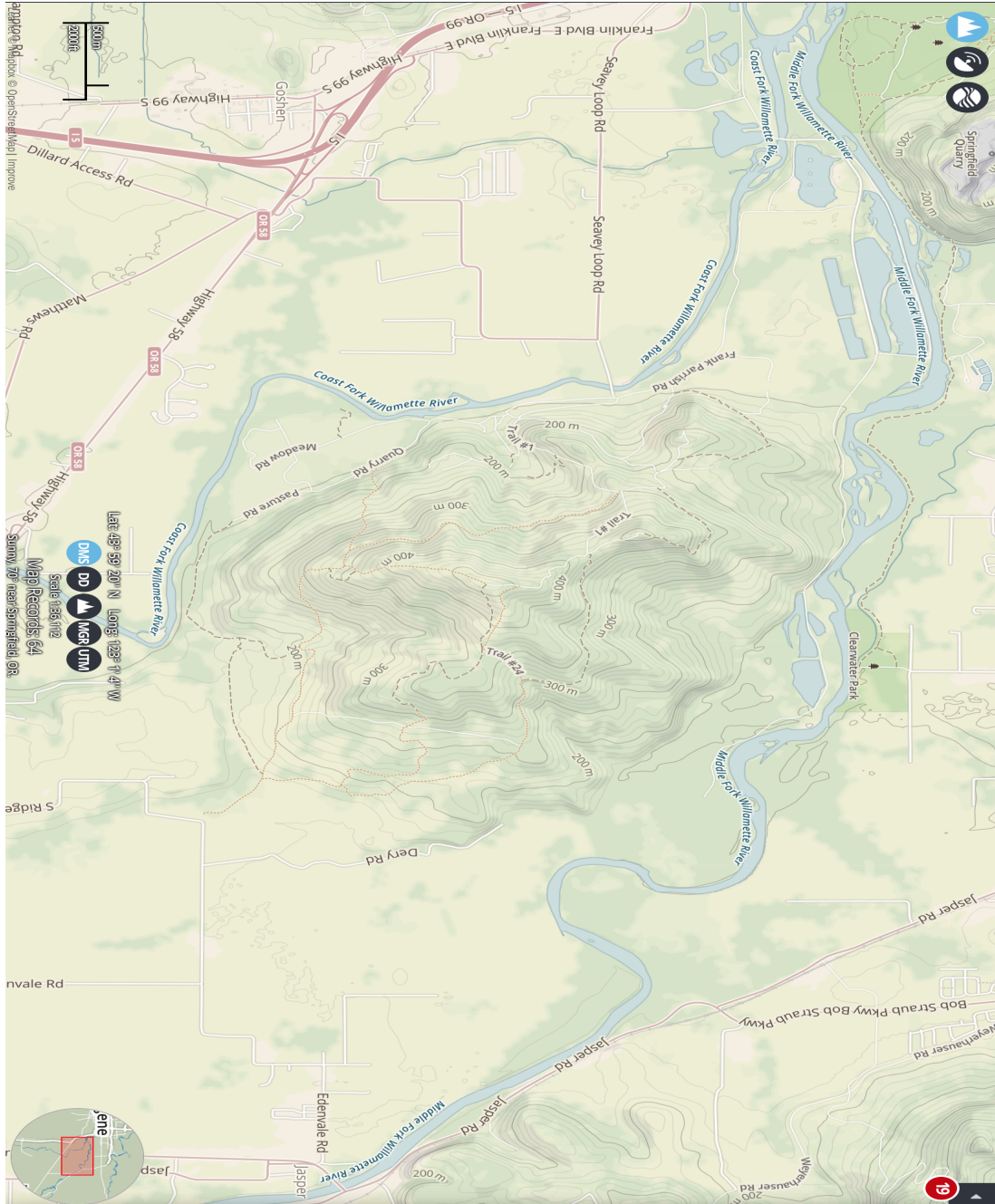
- Next, call on each of the focal species asking for one person to share, with a quiet hand, one thing they saw, heard, smelt, or experienced today!
- After everyone has gotten the chance to share, take a second to thank the chaperones, guides, and students for being there.

**11:40 – Load Bus**

# Appendices For Winter Field Trip:

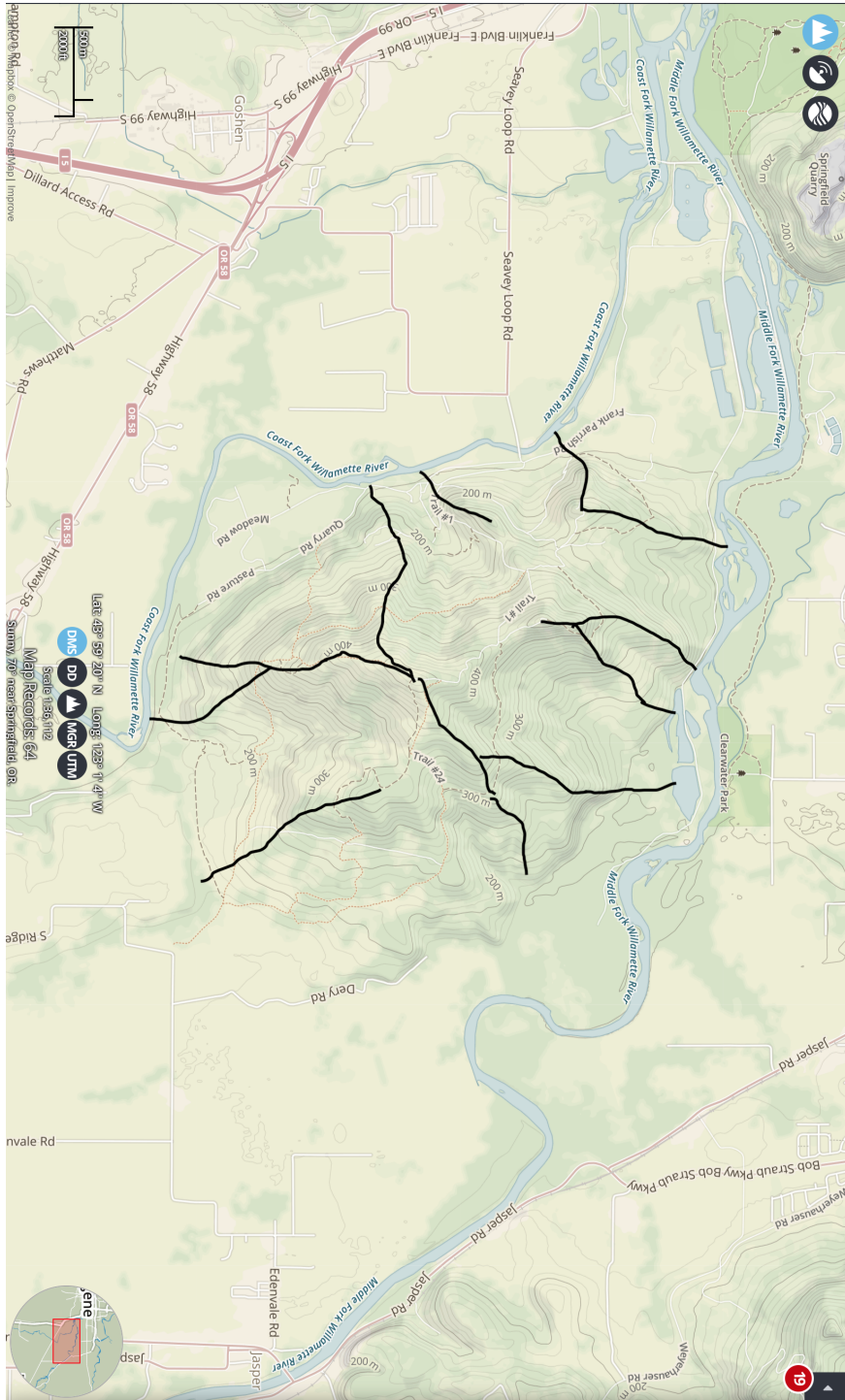
*(Refer to or print the following pages as needed)*

## Appendix D: Topographic Map of Mt. Pisgah Arboretum



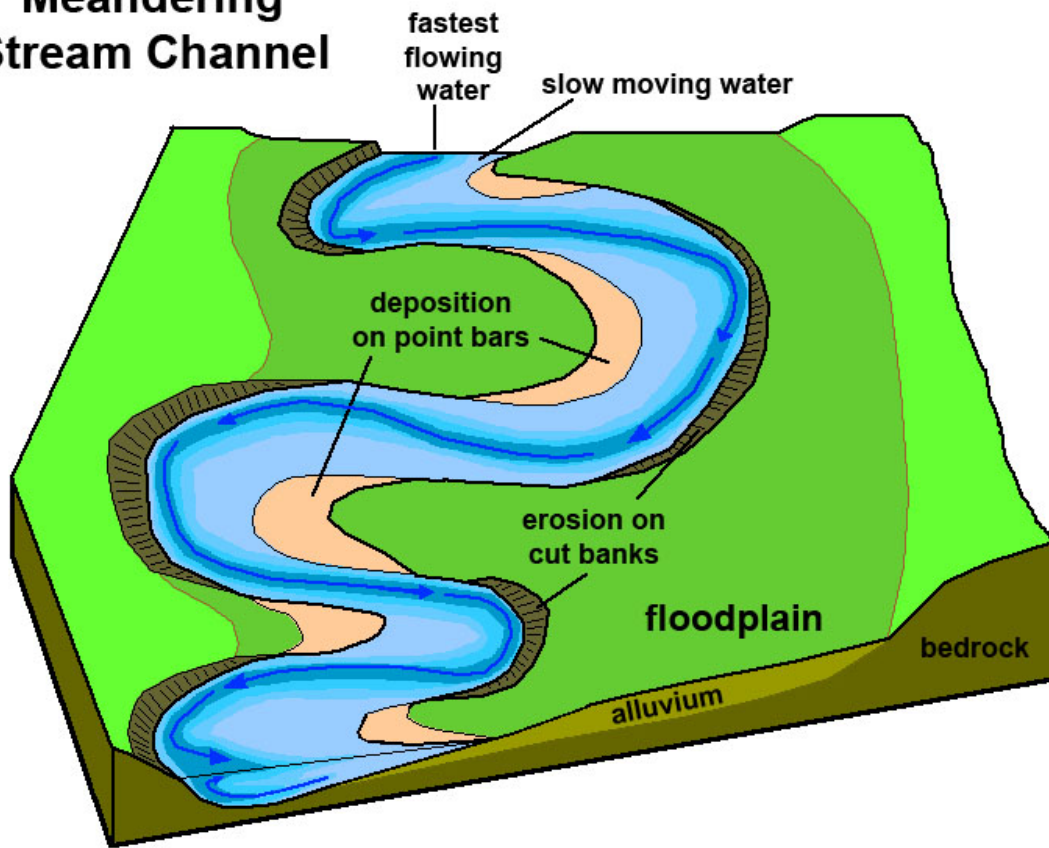


# Appendix G: Completed Accurate Waterways Map



Appendix H: Floodplain Diagram

## Meandering Stream Channel



# Spring: Pre-Trip Lesson

Developed by: ELP Restoring Connections Team 2019

**Time:** 45 minutes

## Overview

This lesson introduces the terms macroinvertebrate and riparian to fourth grade students and helps them become familiar with common types of macroinvertebrates that can be found in the riparian areas of Mt. Pisgah Arboretum. The focus of this lesson is to identify organisms that can help determine health characteristics of riparian habitats. The background information learned on this spring pre-trip lesson will help provide a frame for their stewardship project on their field trip at Mt. Pisgah Arboretum. These activities will teach students about the different anatomical features of six different macroinvertebrate species and the function they serve in a riparian environment. Using creative elements of charades and artistic expression, students will learn how macroinvertebrates are indicators of water quality and will get excited about their upcoming visit to Mt. Pisgah Arboretum!



## Rationale

Being able to identify indicators of both poor and healthy water quality is an important concept in understanding the different ecosystem functions of a riparian area. By learning about the different survival techniques macroinvertebrates use to adapt to life in riparian areas, students will be able to critically think about their unique contributions to riparian ecosystems. These activities were created to actively engage the 4th graders with aquatic habitats within Mt. Pisgah Arboretum.

## Learning Outcomes

By the end of this pre-trip classroom lesson, students will be able to:

- Define a macroinvertebrate
- Describe three physical characteristics of at least one macroinvertebrate (Mayfly, Copepod, Caddisfly, Pouch Snail, Isopod, or the Larval Northwestern Salamander)
- Identify at least one way in which macroinvertebrates use their external senses to support their survival in riparian habitats.

**Academic Subjects:** Science & Language Arts

### **Links to Standards**

#### **Next Generation Science Standards (NGSS): Pre-Trip and Field Trip**

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- **4-LS1-2.** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

#### **NAAEE**

- Strand 1.F: Working with models and Simulations -- Learners understand that relationships, patterns, and processes can be represented by models.
- Strand 1.G: Drawing conclusions and developing explanations -- Learners can develop simple explanations that address their questions about the environment.
- Strand 2.2: The Living Environment (2.2a and 2.2c)
  - Looking directly at organisms and grasping the similarities and differences between a wide variety of living organisms. Understanding the basic way in which organisms interact with one another and with their environments.
  - What does the presence or absence of macro-organisms in a wetland tell us about that area's ecological health?
- Strand 2.3: Humans and their Societies
  - Students have an understanding of the multiple ways that humans connect to the environment (culture, political and economic systems, conflict).

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Physical, living and human systems
- ✓ The interconnectedness of people and the environment

## Intelligence Developed

- ✓ Nature Smart (Naturalist)
- ✓ People Smart (Interpersonal)
- ✓ Self Smart (Intra Personal)
- ✓ Body Smart (Bodily/Kinesthetic)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)

## Evaluation of Learning Outcomes

At the of the jigsaw activity, we collect their macroinvertebrate drawing sheets to evaluate the effectiveness of our teaching methods. The sheets should have a fun fact and a drawing of one macroinvertebrate. This tells us how well students were paying attention and that they learned something. Charades is also a testimony of their knowledge. This tells us how well they remember the behavioral motions of the macroinvertebrates.

## Materials by Activity

- Jigsaw Activity
  - Printed out pictures of the 6 microorganisms with descriptions and a list of their habitats on the back
  - 30 Draw Your Own Macroinvertebrate sheets
  - Coloring & drawing supplies (i.e. colored pencils)
- Charades
  - Hat or some item to keep pieces of paper
  - 6 individual paper slips with macroinvertebrate names

## Background Material

- *Macroinvertebrates*: Organisms without backbones (*invertebrates*), and are visible to the eye without having to use a microscope (*macro*).
- *Riparian*: Relating to wetlands adjacent to rivers and streams; areas on the sides of rivers and streams but not the river itself.
- *Habitat*: The natural home or environment of an animal, plant, organism, and non-living things.
- *Wetland*: A land or area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem.

### **Additional Readings/Resources**

- Dictionary by Merriam-Webster: America's most-trusted online dictionary. (n.d.). Retrieved from <https://www.merriam-webster.com/>
- Pilliod, D.S., and Rohde, A.T., 2016, Insect community responses to climate and weather across elevation gradients in the Sagebrush Steppe, eastern Oregon: U.S. Geological Open-File Report 2016-1083, 50 p., <https://doi.org/1.3133/ofr20161183>
- Restoring Connections 2017 Second Grade Curriculum

# Testing the Waters: 4th Grade Spring

## Pre-Trip Lesson

### **Preparation before the lesson:**

- Practice the motions for each macroinvertebrate (motions listed on the back of the information sheets)
- Print 6 macroinvertebrates \*double-sided to save paper\* (see Appendix B)
- Print approximately 30 “Draw Your Macroinvertebrate” sheets (also see Appendix B)
- Gather colored pencils or markers for students to draw with
- Make 6 small sheets of paper, each with the name of one macroinvertebrate and put them folded into a hat

### **Introductions (5 minutes)**

- Introduce yourself to the students, talk about why you are there
  - “Hi my name is \_\_\_ and I am from the University of Oregon....”
- Ask students with a quiet hand to share about previous experiences at Mt. Pisgah Arboretum.
- Ask students if anyone remembers what habitat they are studying this year
  - Work towards answer: **Riparian Habitat (riparian means relating to rivers)**
- Ask what seasons they have seen at Mt. Pisgah Arboretum already that year.
  - Answer: Fall and Winter
- Ask what season it is now
  - Answer: Spring
- Create a conversation about what their expectations are for spring time, what they think it will look like.
  - Accurate answers: there will be flowers, bring in a couple of the focal species (i.e. Oregon Ash, Great Blue Heron, Bullfrog, Osoberry, etc.) There is also an abundance of water because of all the snowmelt from winter and the rain! Water is a huge part of life in Oregon.
- Lead conversation towards the importance of water and Riparian **Habitats** for each of their focal species.
- Transition: Talk about how **Riparian Habitats** are home to a large variety of animals. Some species are big and easy to see like the focal ones, but some are not as obvious and are harder to see. Both are equally important in maintaining a riparian habitat.

### **Introduce New Vocabulary (5 minutes)**

- Write the word **Macroinvertebrate** on the board or projector. Have them repeat that word back to you.
- Break it down
  - **Macro** -- Big! In this case, a bug big enough to be seen without a microscope
  - **Invertebrates** -- No spine! **In** is negative; **vertebrates** relates to the spine. Has anyone ever heard of vertebrae? (Have them feel the bumps along their spines) These are the discs that make up our spines. The organisms we are looking at don't have those!
- Then, write the word **Riparian** on the board and ask if anyone has any ideas about what it might mean.
  - **Riparian:** Relating to wetlands adjacent to rivers and streams; areas on the sides of rivers and streams but not the river itself. (This includes wetlands they will see on their field trip)

### **Jigsaw Activity (15 minutes)**

*Macroinvertebrate Informational Sheets (Found in Appendix A). Draw your own macroinvertebrate Template (Found in Appendix B).*

#### **Step 1: Learning about the macroinvertebrates**

- Tell students that they now get the chance to learn about six different macroinvertebrates that can be found at Mt. Pisgah Arboretum!
- Instruct them that they will be split into 6 groups (use table groups if possible) and each group will be taught about one macroinvertebrate. Stress the importance of paying attention to information about their macroinvertebrate because they will be teaching their classmates about it later on.
- Then, explain that each group will have a few minutes to draw their macroinvertebrate, and that it's okay if your drawing isn't exactly like the picture. We just want to practice drawing our macroinvertebrates so we remember what they look like on the field trip. Afterwards the teacher will walk around and visit each group and teach them a few facts about their macroinvertebrate.
- Designate six different areas of the classroom for all the 1's, 2's, 3's, 4's, 5's, and 6's to meet.
- After instructions have been given, walk around and number students off 1-6. Have them hold their number up, and once everyone is counted off send each group to their area of the classroom.
- Each macroinvertebrate has a specific motion related to it described on the back of the macroinvertebrate information card. When teaching, reinforce the motion that is associated with that specific macroinvertebrate (*demonstrated in Appendix D*).
  - Reiterate that after a couple of minutes, they will get the chance to teach another group about their macroinvertebrate and learn from their classmates about their macroinvertebrate.



- Have the students read aloud the information about their macroinvertebrate and write down at least one fact.

### **Step 2: Students get to teach each other**

- Now, gain the attention of the students and explain that you will be creating 3 new groups. Designate an area of the classroom for all the 1's, 2's, and 3's to gather and share. Walk around the room and number students off in threes. Tell students to form a tight circle (elbow to elbow) to ensure everyone is learning and paying attention.
- Tell the students that since they are experts now, they will get the opportunity to teach each other about the macroinvertebrate they learned about in their group!
- Have them use their fox feet to transition quietly and efficiently to their area of the classroom.
- Transition: Have each group say their macroinvertebrate and show the rest of the class the motion.
  - Make sure everyone in the group knows the different motions that are associated with the 6 different macroinvertebrates (*Found in Appendix D*)
- Collect the macroinvertebrate sheets from the students

### **Charades (15 minutes)**

*Macroinvertebrate Names (Found in Appendix C) and Motions for Charades (Found in Appendix D)*

(Reference: Restoring Connections 2018 3rd Grade Curriculum)

- Ask students if they have ever played charades before. Have them tell you the rules they know, then follow up with any remaining rules that were left out.
  - General answers: No talking while someone is performing, no cheating by doing the motion or saying which one it is, and only the team of the person acting can guess which one it is.
- Give the instructions for our version of charades:
  - The class will be split into two teams
  - One person alternating from each group will go up to the front and draw a macroinvertebrate name out of the hat without anyone else knowing what it is
  - Then the student will act out the motion for that macroinvertebrate
  - Only the students on their team can guess the macroinvertebrate
  - If their team guesses correctly then they win a point, but if not, the other team gets to guess for a point
  - Call people up as long as time allows
  - After giving instructions, divide the class down the middle to create two teams, Team 1 and Team 2
- Start the game, reiterating friendly competition and being a good sport. This game is for learning purposes and is supposed to be fun!

- Repeat the names and motions of all six macroinvertebrates before you call the first student up to act
- After each performance be sure to show the picture, say the name, and list a couple key habits.

Transition:

- Mention how cool it is that we get to see these little bugs in their natural habitats on our field trip!
- On top of looking for these critters, we are also going to show you some other ways to test for water quality and of course look at all of the beautiful plants in bloom.

**Wrap up (5 minutes)**

**Q: So, speaking of the field trip, who can tell me how we should dress so we can be prepared for our field trip to Mt. Pisgah Arboretum?**

A: layers, closed-toe shoes, rain gear

**Q: What else do we need to do to prepare our bodies and minds for the field trip?**

A: bring a lunch, water, eat a big breakfast, dress appropriately

**Q: “Who is responsible for you having a good time?”**

A: “Me” – instill that each student is responsible for themselves and for contributing to a fun day for their group. Everyone is doing their part by coming ready to participate! That is why we come prepared!

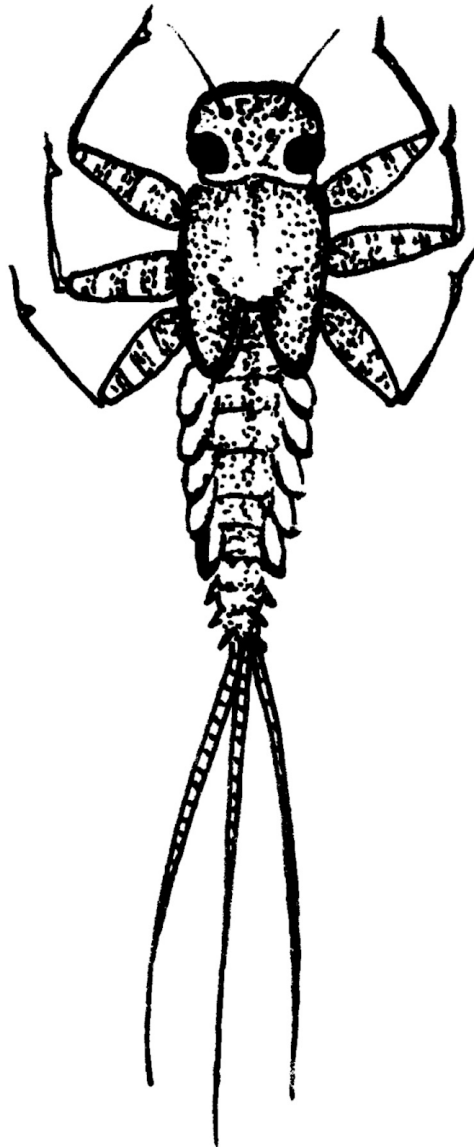
- Mention how they will be getting the opportunity to do a stewardship project and talk about why stewardship is important. (Mt. Pisgah Arboretum lets us look at and study all the wonderful plants and animals and be a guest in their home, so we are going to give back by testing the quality of the water to make sure it’s healthy!)
- Thank them for an amazing time, and share your excitement for their field trip!

## Appendices for Spring Pre-Trip

*(Refer to or print the following pages as needed)*

**Appendix A:** Macroinvertebrate Information Sheets (Print double sided)

### Mayfly

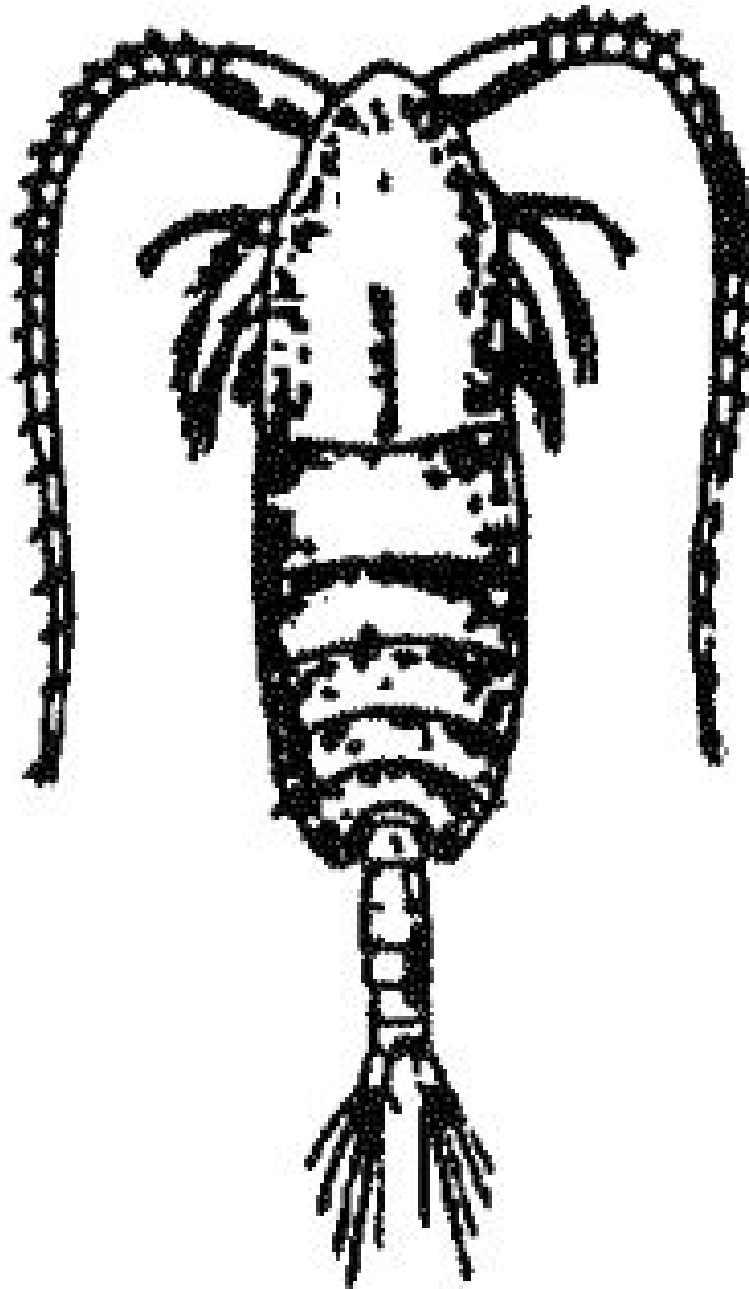


**Mayfly Facts :**

- They begin as eggs on the surface of the water and sink down to the bottom
- After months of eating and growing as naiads, they rise to the surface and molt into an adult than they molt again a few hours later as sexually mature and mate for the remainder of their life
- They eat algae and detritus(debris)
- They have six legs with a claw on each
- Babies are called nymphs or naiads and the adults only live a few hours to a few days to reproduce
- They can be found clinging to rocks in streams and well-oxygenated water
- Their mating promotes an eating frenzy for the fish, they are one of their favorite foods
- birds and spiders also like to eat them

(Action: Start with your hands by your sides, then bring them up and clap above your head)

# Copepod



**Cyclop or Copepod Facts:**

- Molt into small crustaceans found in almost every freshwater and saltwater habitat
- They can be as small as a speck of dust
- It may be the most abundant single species of animals on the planet!!
- Their body's a teardrop shape with large antenna
- Their exoskeleton is clear and most have a single red compound eye in the center of their head
- They do not need a heart or a circulation system, they can just absorb oxygen directly into their body
- They are extremely fast and will jump with high speed over just a few millimeters if they sense a predator
- They feed on plankton and are fed on by small fish and seahorses love them

(Action: Starting with your arms above your head, quickly push down your arms out to the side, as if pushing through water)

## Caddisfly Larvae



**Caddisfly Larvae Facts:**

- They have aquatic larvae and terrestrial animals
- They use silk to make a protective tube-shaped structure out of sand, twigs or pieces of debris to camouflage them
- People will give them special gems to make their shells out of them
- They are an indicator of healthy water, they will die if the water is too polluted just like mayflies
- They move by sticking their front legs out of the case and carrying the case
- Their abdomen has 8 segments with gills on each side
- They eat algae, leaves, and rotting wood
- They grow and encase themselves in their structures to become pupae

(Action: Starting with your hands at your forehead, pretend you're grabbing onto a ledge and pulling yourself onto it)



Pouch snail

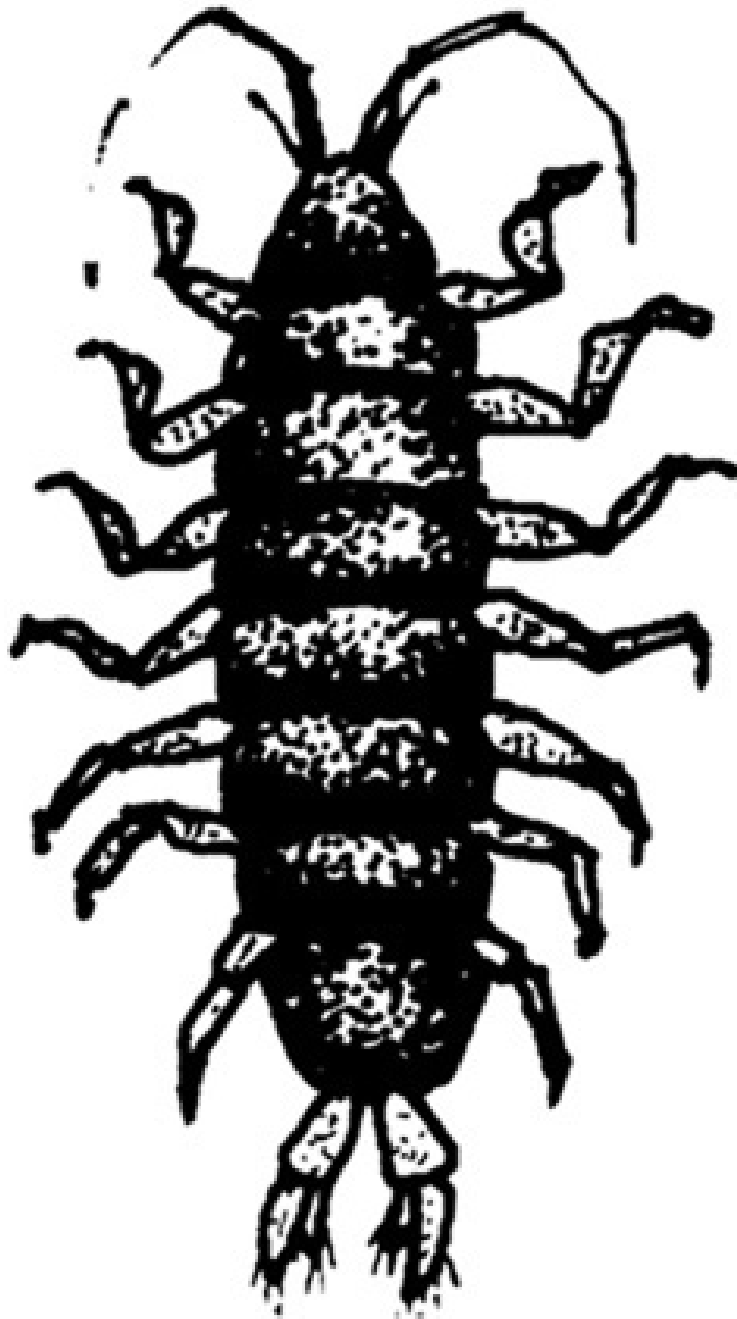


**Pouch Snail Facts:**

- They are known as the vacuum of the stream
- They are eaten by fish, birds, and turtles
- They eat algae and underwater plants
- They do not have gills they have a lung sac that they fill with air to breathe underwater
- They are up to ½ inch long and are brown, grey or black in color
- A large amount of pouch snails in one area means low quality but high nutrients

(Action: Crouch down into a ball on the ground)

Isopod



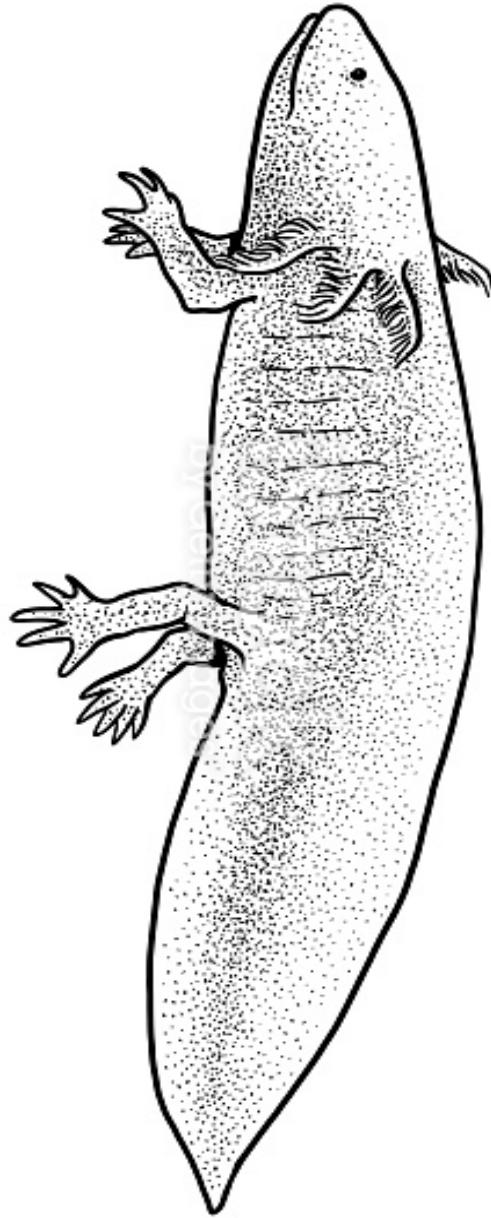
**Isopod:**

- These little guys are omnivores, they will eat any organic matter they come upon
- They are about 10mm to 20mm long
- They crawl in rock crevices and root masses or aquatic vegetation
- They have two pairs of antennae and 7 pairs of legs
- Their body is broken into three parts, the head, thorax, and abdomen
- Their eyes are very sensitive to light so they are mainly active during the night

(\*Action: Lift your arms and legs alternatively, lifting your right arm and leg at the same time, in a motion resembling a sumo wrestler)

\*This mimics how these isopods crawl through crevices in rocks

## Larval Northwestern Salamander



### **Larval Northwestern Salamander**

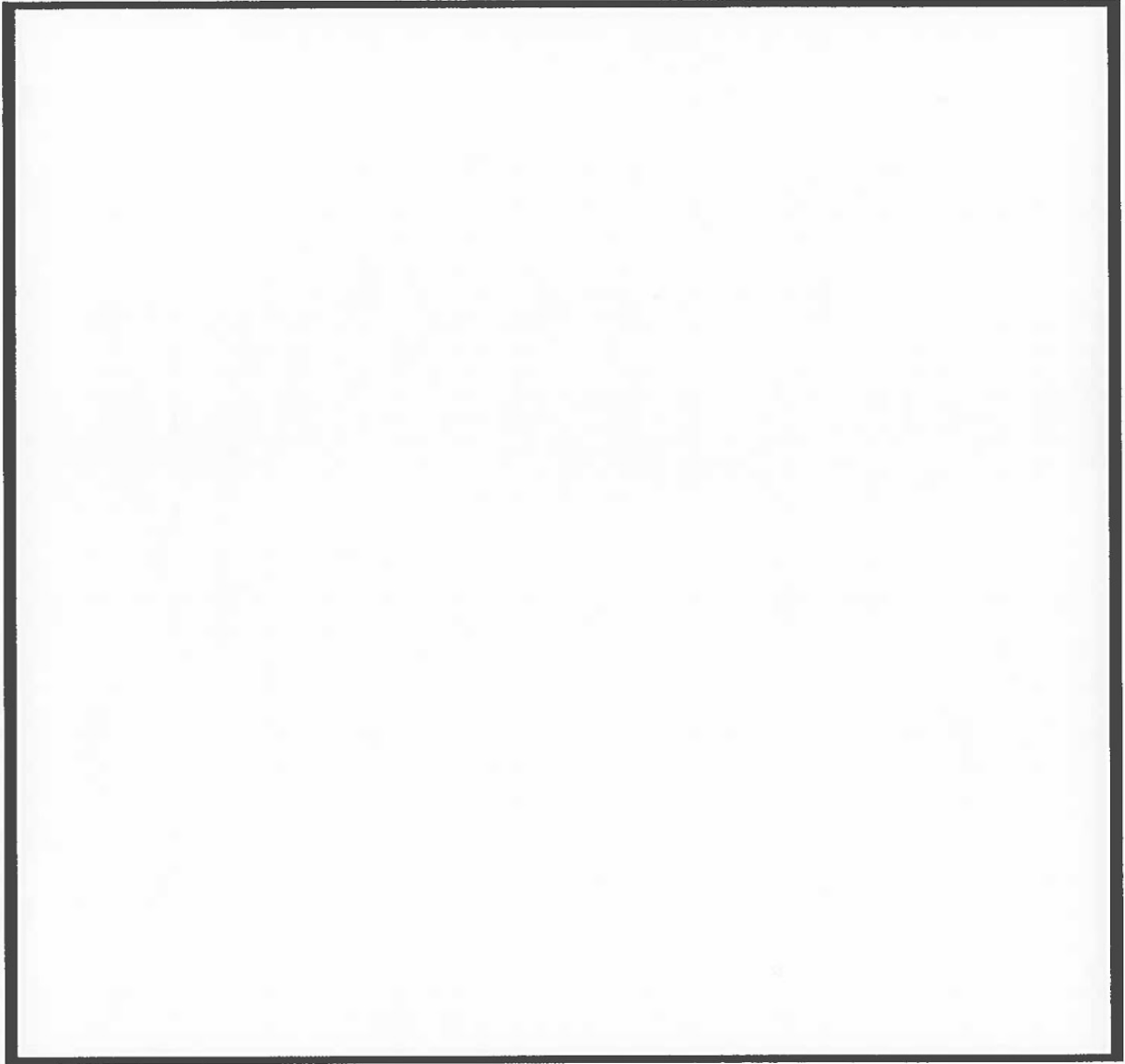
- After they hatch from eggs they grow a large-tailed fin which they use to swim
- They are brown or olive green in color
- They have feathery gills alongside their head
- They will reach up to 3.5 inches before turning into an adult
- The adult stage occurs after about 12-14 months
- Some never transform into adults and turn into “neotenic” adults
- The adults are poisonous and will butt heads and raise their tails while emitting this sticky white poison

(Action: Make feather gills alongside your head with your hands, with the back of your hand on your cheeks)

**Appendix B:** Draw your macroinvertebrate sheet

Your Name: \_\_\_\_\_

## Draw Your Macroinvertebrate



Name of Macroinvertebrate: \_\_\_\_\_

**Appendix C: Names of Macroinvertebrates**

**Mayfly**

**Copepod**

**Caddisfly Larvae**

**Pouch Snail**

**Isopod**

**Northwestern Salamander Larvae**



**Appendix D: Macroinvertebrate Charades motions:**

***Isopod***



***Copepod***



***Pouch Snail***



*Larval Northwestern Salamander*



*Mayfly*



*Caddisfly*



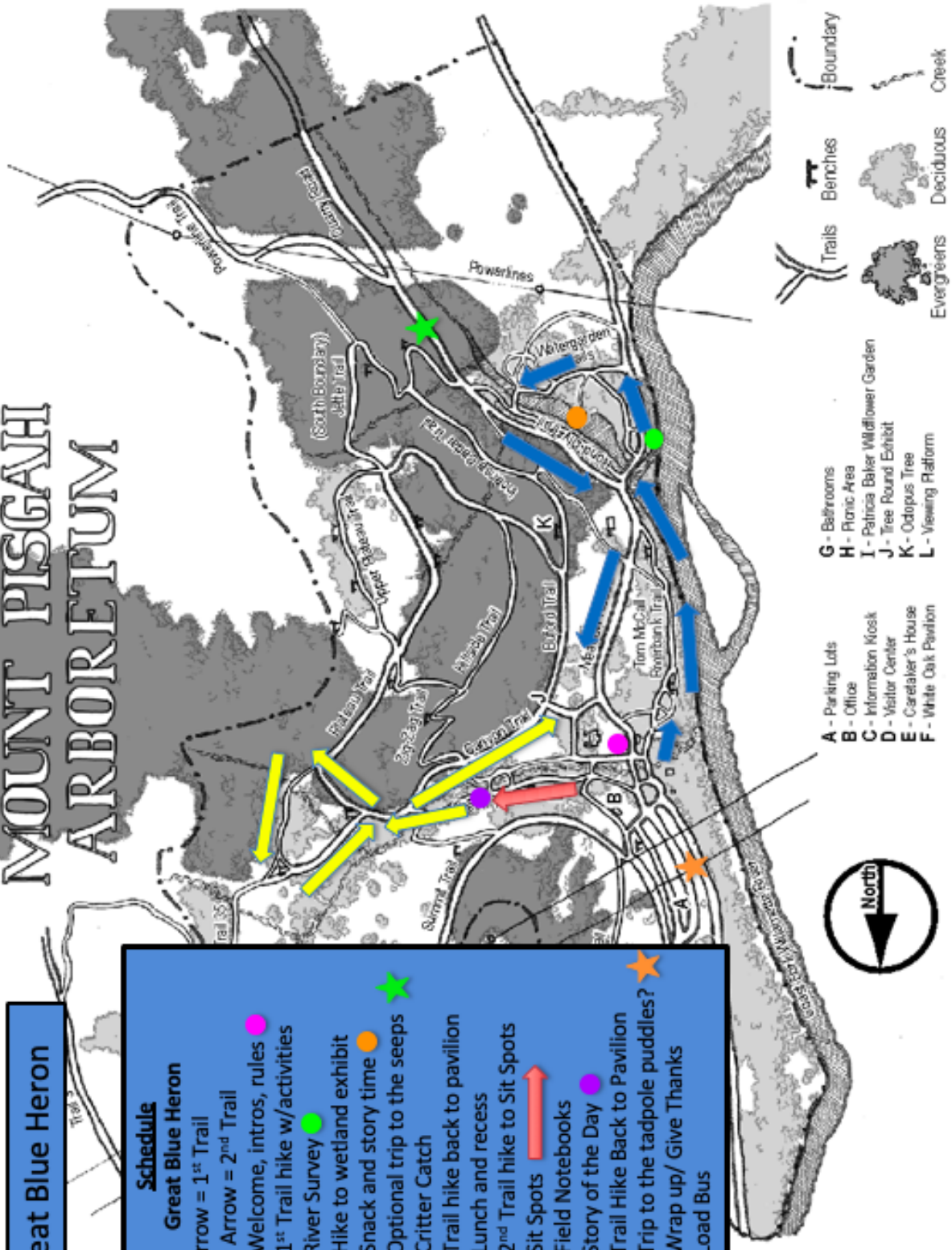
# MOUNT PISGAH ARBORETUM

## Great Blue Heron

**Schedule**

**Great Blue Heron**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – 1<sup>st</sup> Trail hike w/activities
- 9:55 – River Survey
- 10:25 – Hike to wetland exhibit
- 10:35 – Snack and story time
- Optional trip to the seeps
- 10:50 – Critter Catch
- 11:15 – Trail hike back to pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- Trip to the tadpole puddles?
- 1:45 – Wrap up/ Give Thanks
- 2:00 – Load Bus



## **4th Grade - Testing the Waters - Spring Field Trip**

### **Agenda at a Glance: Great Blue Heron**

- 9:30** Welcome, ground, cultivate gratitude, intros, group agreements (10 minutes)
- 9:40** Trail hike to river bank (15 minutes)  
*Plant Parts: Inside and Out*
- 9:55** Water quality data collection (30 minutes)  
*River survey and data collection*
- 10:25** Hike to wetland exhibit (10 minutes)
- 10:35** Snack and story time (15 minutes)
- 10:50** Critter Catch (25 minutes)
- 11:15** Trail hike w/activity back to the pavilion (15 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 11:30** Lunch and recess (40 minutes)
- 12:10** Trail Hike (20 minutes)  
*On hike out, set the tone for sit spots and using observational skills.*
- 12:30** Sit Spot (15 minutes)
- 12:45** Science Time: Field Notebooks (15 minutes)  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** “Story of the Day” sharing time (15 minutes)
- 1:15** Trail hike w/activity back to the pavilion (30 minutes)  
*Use the Art of Questioning*
- 1:45** Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)
- 2:00** Load bus



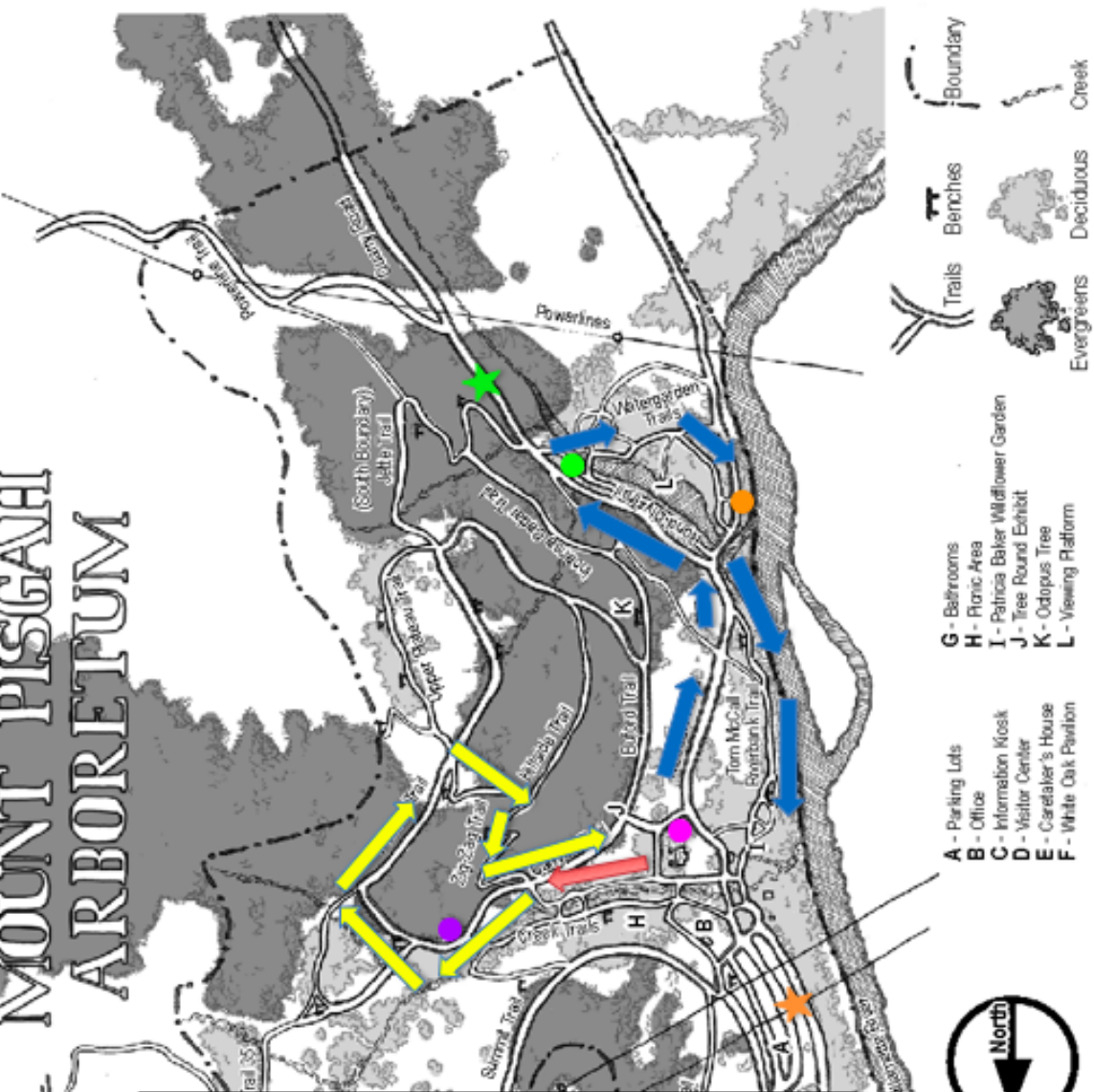
# MOUNT PISGAH ARBORETUM

## Western Pond Turtle

**Schedule**

**Western Pond Turtle**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – 1<sup>st</sup> Trail hike w/activities
- 9:55 – Critter Catch
- 10:25 – Hike to wetland exhibit
- 10:35 – Snack and story time
- Optional trip to the seeps
- 10:50 – River Survey
- 11:15 – Trail hike back to pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- Trip to the tadpole puddles?
- 1:45 – Wrap up/ Give Thanks
- 2:00 – Load Bus



## **4th Grade - Testing the Waters - Spring Field Trip**

### **Agenda at a Glance: Western Pond Turtle**

- 9:30** Welcome, ground, cultivate gratitude, intros, group agreements (10 minutes)
- 9:40** Trail hike to wetland exhibit (15 minutes)  
*Plant Parts: Inside and Out*
- 9:55** Critter catch (30 minutes)  
*River survey and data collection*
- 10:25** Hike to river bank (10 minutes)
- 10:35** Snack and story time (15 minutes)
- 10:50** Water quality data collection (25 minutes)
- 11:15** Trail hike w/activity back to the pavilion (15 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 11:30** Lunch and recess (40 minutes)
- 12:10** Trail Hike (20 minutes)  
*On hike out, set the tone for sit spots and using observational skills.*
- 12:30** Sit Spot (15 minutes)
- 12:45** Science Time: Field Notebooks (15 minutes)  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** “Story of the Day” sharing time (15 minutes)
- 1:15** Trail hike w/activity back to the pavilion (30 minutes)  
*Use the Art of Questioning*
- 1:45** Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)
- 2:00** Load bus

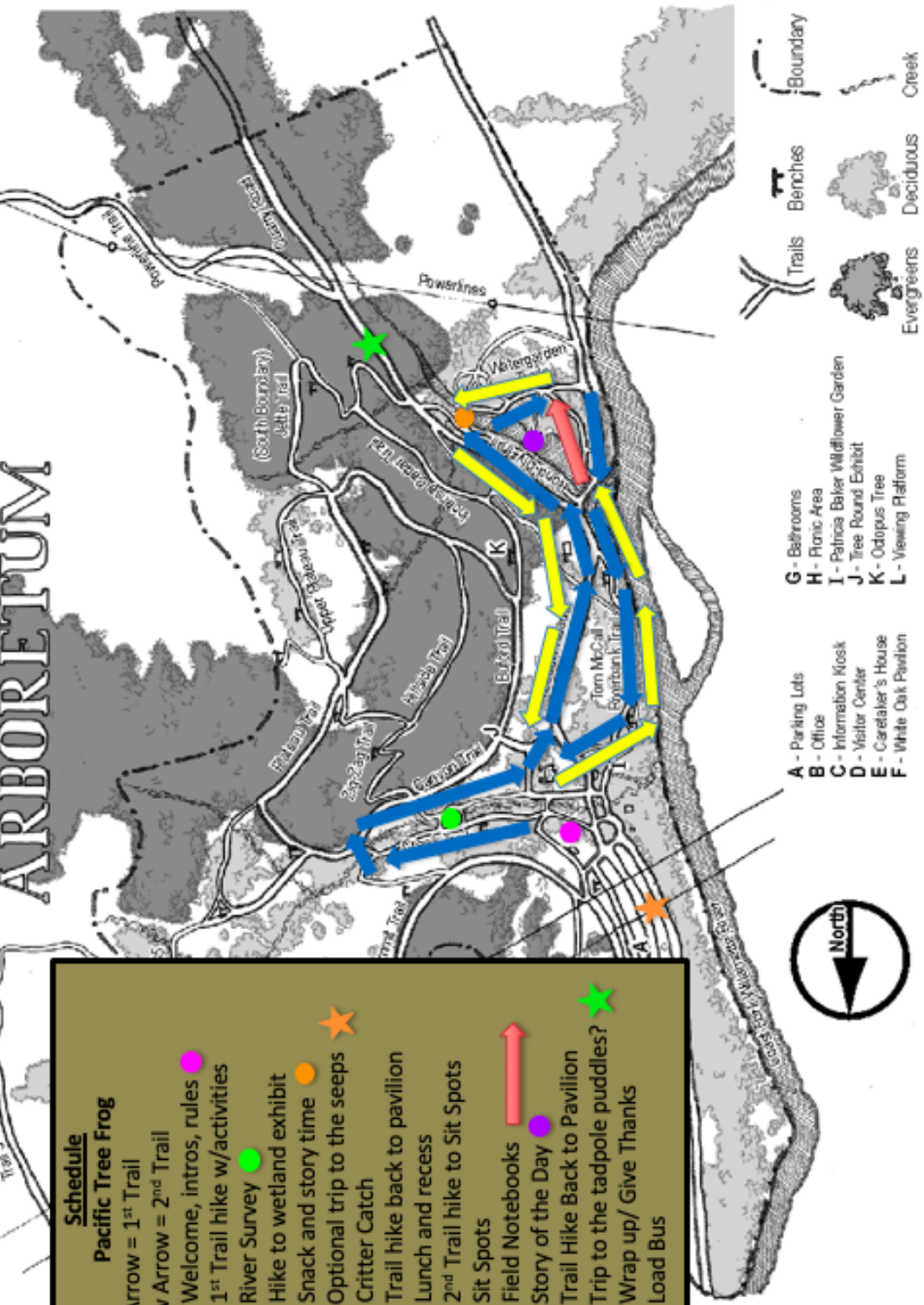
# MOUNT PISGAH ARBORETUM

## Pacific Tree Frog

**Schedule**

**Pacific Tree Frog**

- Blue Arrow = 1<sup>st</sup> Trail
- Yellow Arrow = 2<sup>nd</sup> Trail
- ~9:30 – Welcome, intros, rules
- ~9:40 – 1<sup>st</sup> Trail hike w/activities
- 9:55 – River Survey
- 10:25 – Hike to wetland exhibit
- 10:35 – Snack and story time
- Optional trip to the seeps
- 10:50 – Critter Catch
- 11:15 – Trail hike back to pavilion
- 11:30 – Lunch and recess
- 12:10 – 2<sup>nd</sup> Trail hike to Sit Spots
- 12:30 – Sit Spots
- 12:45 – Field Notebooks
- 1:00 – Story of the Day
- 1:15 – Trail Hike Back to Pavilion
- Trip to the tadpole puddles?
- 1:45 – Wrap up/ Give Thanks
- 2:00 – Load Bus



## 4th Grade - Testing the Waters - Spring Field Trip

### Agenda at a Glance: Pacific Tree Frog

- 9:30** Welcome, ground, cultivate gratitude, intros, group agreements (10 minutes)
- 9:40** Trail hike up the creek (30 minutes)  
*Plant Parts: Inside and Out*
- 9:55** Water quality data collection (30 minutes)  
*Creek survey and data collection*
- 10:25** Trail hike on pond lily trail to bridge (10 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 10:35** Snack and story time (15 minutes)
- 10:50** Critter Catch at bridge (20 minutes)
- 11:15** Trail hike w/activity back to the pavilion (15 minutes)  
*Encourage careful observations using deer ears, owl eyes, dog noses, and coyote walking!*
- 11:30** Lunch and recess (40 minutes)
- 12:10** Trail Hike (20 minutes)  
*On hike out, set the tone for sit spots and using observational skills.*
- 12:30** Sit Spot (15 minutes)
- 12:45** Science Time: Field Notebooks (15 minutes)  
*If it is raining, skip this part and enjoy exploring in puddles for wildlife.*
- 1:00** “Story of the Day” sharing time (15 minutes)
- 1:15** Trail hike w/activity back to the pavilion (30 minutes)  
*Use the Art of Questioning*
- 1:45** Wrap up at pavilion – group circle for cultivating gratitude, giving thanks (15 minutes)
- 2:00** Load bus



# Spring: Field Trip

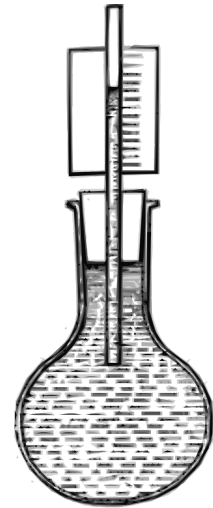
Developed by: ELP Restoring Connections Team 2019

Time: 5 hours

## Overview

In the spring field trip fourth grade students will dive deeper into learning about riparian wetlands and the organisms within it. Students will take a closer look into the ecosystem functions of a wetland area by exploring macroinvertebrates and the purpose they serve within a riparian area. We will explore questions such as, what ecosystem services do wetlands provide and what are the roles of macroinvertebrates in the ecosystem?

This season focuses on the water quality of wetland and riparian areas and implements elements of conservation and sustainability in relation to water resources. In the pre-trip lesson, students learn the anatomy of aquatic macroinvertebrates including both form and function. In the field trip, students examine those aquatic macroinvertebrates in their natural environment in order to assess the quality of their habitat and utilize a variety of other testing methods to decipher the health of different riparian sites at Mt. Pisgah Arboretum. Students will be performing water quality tests including pH levels and turbidity of the Willamette river which flows along MPA. This teaches students the different things that affect the quality of the water that is in their own backyard. The Spring lesson and field trip creates a real connection to nature, especially that relating to water, for the children at Mt. Pisgah Arboretum.



## Rationale

This interactive field trip is great for teachers who wish to teach their students about the biodiversity of riparian habitats, which are particularly important in Oregon. Students are able to examine the riparian ecosystems at a large scale when observing the Willamette river and at a small scale when observing the macroinvertebrates. These lessons introduce students to water quality testing which teaches them the importance of indicators of health.

## Learning Outcomes

By the end of this field trip, fourth grade students will be able to:

- Describe 3 adaptation techniques that help wetland residents survive in the Riparian system.
- Name three different techniques that can be used to test water quality.
- Explain how macroinvertebrates receive information through different features
- Explain the relation between macroinvertebrate population levels and water health.
- List three ecological functions of a wetland

**Academic Subject:** Science

### **Links to Standards**

#### **Next Generation Science Standards (NGSS)**

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- **4-LS1-2.** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]
- **4-ESS3-2.** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.\* [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]
- **4-ESS3-1.** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

#### **Oregon Environmental Literacy Strands**

- ✓ Systems thinking
- ✓ Interconnectedness of people and the environment
- ✓ Personal and civic responsibility
- ✓ Investigate, plan and create a sustainable future

## **Intelligences Developed**

- ✓ Nature Smart (Naturalist)
- ✓ People Smart (Interpersonal)
- ✓ Self Smart (Intra Personal)
- ✓ Word Smart (Linguistic)
- ✓ Picture Smart (Spatial)
- ✓ Number Smart (Logical/Mathematical)

## **Evaluation of Learning Outcomes:**

In order to evaluate the efficacy of our curriculum activities, we collect the water quality data sheets students use to record data and compile the results. The goal of this is to eventually have a consistent yearly evaluation of the water quality at Mt. Pisgah Arboretum. This also shows us how well students retained the water quality information as well as how engaged they were with the individual tests. We also use gratitude and wrap-up at the end of the day to give students the opportunity to share something they learned during the field trip and something they are grateful for. These answers also help us figure out how well students responded to our curriculum.

## **Materials by Activity**

- Trail Activities
  - Backpacks should include:
    - Small notebook
    - Hand sanitizer
    - Two water bottles
    - List of groups/students/chaperones and teacher phone number
    - Map/agenda for the day
    - Small first aid kit (Band-Aids and gloves)
    - Field notebooks for each student, should be in a ziploc bag (students name labeled on each journal)
    - Ziploc bag of pencils (for field notebooks)
    - Tarp “sit spots” for children to sit on while they do their field observations and field journals (at least 12 per backpack)
    - Snacks (carrots and goldfish)
    - Each bag has a laminated picture of the group’s animal
    - If needed – rain ponchos (pickup and return to MPA visitor center each visit. Be sure if used, they are hung to dry at the end of the day)
- Plant Parts: Inside and Out
  - Magnifying glasses
  - Laminated plant part cards

- ❑ Critter Catch (2 sets of materials for Great Blue Heron/Western Pond Turtle and another for Pacific Tree Frog)
  - ❑ 1 large plastic tub (to be filled with macroinvertebrates)
  - ❑ Critter Catch worksheets
  - ❑ Macroinvertebrate reference sheets
  - ❑ 3 magnifying observation containers
  - ❑ Pencils
- ❑ Water Quality Testing (2 sets of materials for Great Blue Heron/Western Pond Turtle and another for Pacific Tree Frog)
  - ❑ Water quality testing cards
  - ❑ pH reference sheet
  - ❑ pH strips
  - ❑ Small, clear capped cylinder to conduct pH testing
  - ❑ Contaminated pH water container
  - ❑ 1 turbidity water testing tube
  - ❑ 1 water scooper
  - ❑ Stream Health Data collection sheets
  - ❑ Thermometer

## Background Material

Water quality testing cards information: (refer to activity)

Plant Parts Vocabulary Breakdown:

- *Stamen*: The reproductive part of the flower that contains the anther and the filament. The anther produces pollen and filament connects the anther to the base of the flower head.
- *Pistil*: The reproductive part of the flower that contains the stigma, style, and ovary. The stigma is at the center of the flower and receives pollen, the style transports pollen tubes to the ovary, and the ovary contains the seeds.
- *Phloem*: The part inside the stem that transports sugars to the plant's organs (i.e. fruits, flowers, buds, and roots).
- *Xylem*: The part inside the stem that transports water from the roots to the rest of the plant.
- *Epidermis*: The protective outer layer or "skin" of the stem.
- *Vascular bundles*: Contain the xylem and the phloem
- Describe 3 adaptation techniques that help wetland residents survive in the Riparian system.
  - *Webbed feet for swimming in water, blending into environment with a turtle shell, structure of neck bones help Great Blue Heron strike prey, large vocal sack for BullFrog reproduction*
- Name three different techniques that can be used to test water quality.
  - *pH testing, turbidity, levels of macroinvertebrates*

- Explain how macroinvertebrates receive information through different features
  - *I.e. copepods through antenna*
- Explain the relation between macroinvertebrate population levels and water health.
  - *Macroinvertebrate population levels are directly related to water health.*
- List three ecological functions of a wetland
  - *Ex: filtration, flood control, habitat for baby species.*

### **Additional Readings/Resources:**

The following links provide additional information about focal plant/animal species:

- [https://www.illinoiswildflowers.info/woodland/plants/cow\\_parsnip.html](https://www.illinoiswildflowers.info/woodland/plants/cow_parsnip.html)
- <http://www.mountpisgaharboretum.com/>
- <http://www.animalspot.net/western-pond-turtle.html>
- <https://www.nationalgeographic.org/encyclopedia/map/>

The following links provide additional information about wetlands:

- <https://www.epa.gov/wetlands/what-wetland>
- <https://nepis.epa.gov/Exe/ZyPDF.cgi/200053Q1.PDF?Dockkey=200053Q1.PDF>
- <https://static1.squarespace.com/static/5a8318548fd4d2229e6b6458/t/5ae73389562fa7d975dd3490/1525101452258/WetlandsBINGO.pdf>

## Testing the Waters: 4th Grade Spring Field Trip Activity Break Down

### **Before students arrive (Get there by 8:20 to prepare the field trip)**

- Have Jenny Laxton at Mt. Pisgah Arboretum teach you how to properly scoop macroinvertebrates from the bottom of the riparian environment, or ask Jenny to scoop them for you
- Print data collection sheets (30 copies per class, safely)
- Print and pack appendices for Plant Parts activity
- Ask Jenny Laxton to help you gather the water quality testing supplies (Water testing boxes, turbidity tubes)
- Familiarize yourself with how to administer each water quality test
- Set out two water quality testing boxes in their respective location, one at location for Great Blue Heron and Western Pond Turtle Groups, one at location for Pacific Tree Frogs
- Make a note to emphasize stewardship if you see volunteers doing work on the trails

### **9:30 – Welcome (10 minutes)**

- As children exit the bus, separate into groups (Great Blue Heron, Western Pond Turtle, and Bullfrog) as quickly as possible, with all guides ready to go and holding pictures of their group species.
- Take lunch bins to the pavilion.
- Groups should spread out and circle up inside MPA.
- Start the day with cultivating gratitude: say what we are grateful for, how thankful we are to be here today, exploring this magical forest with them. Take note if anyone is cold – share extra hats, gloves, coats as needed.
- Next, go around the circle, starting with your name and the coolest thing you learned from the last trip, and have each student do the same.
- Take notes as this is an assessment opportunity.
- Set ground rules so children are clear on expectations, but do it in a fun way that establishes a sense of exploring, adventure, freedom, and joy (rather than a list of rules!) For example, it does not matter if they are in a straight line always, but that they are on the trail. So explain it in terms of respect for the plants rather than some seemingly arbitrary rule. Adams Elementary teaches their students to be safe, respectful, and responsible. Ask them how we should apply these familiar terms to today's field trip.
- Remind students about their deer ears, owl eyes, raccoon hands, dog noses, and fox walking
- Check and see if anyone needs to use the bathroom at this time.

## **9:40 – Plant Parts: Inside and Out (15 minutes)**

*Picture of the cross section of a stem and common flower parts (Found in Appendix D)*

- Stop before entering the first trail, and use the laminated plant anatomy cards to teach the students about the internal and external structures of plants (stamen, pistil, anthers, filament, ovary, xylem, phloem, etc). When explaining the internal structures, compare and contrast it to human anatomy. How do we intake sugar and water? How do we get our oxygen? Tell them they will get the chance to look for these structures during our first hike.
- Put students into pairs and give each pair a laminated plant anatomy card and a magnifying glass to use while they're hiking.
- When you reach an example of osoberry (one of their focal species) next to a snowberry bush, make sure you ask questions that compare and contrast the two so your students can see the visible differences side by side.

As you're walking, ask questions like:

**Q: What are the three nutrients plants need to survive?**

A: Sunlight, water, CO<sub>2</sub>

**Q: Where do you think this plant gets water from?**

A: from rain, underground, snow, etc.

**Q: How do you think this plant processes the water for survival and growth?**

A: Take in CO<sub>2</sub> in their leaves (stomata = pores in leaves), take in water through the roots which grow horizontally

**Q: Why do you think the petals are this size?**

A: Different pollinators visit different flowers, bumblebees require larger petals to land on because they are bigger than other pollinators such as flies

**Q: Why would one stem of a flower be thicker than another stem?**

A: Could have better access to essential nutrients (ask if they remember the three nutrients a plant needs to survive which are water, sun, and soil)

**Q: Why are some plants lower to the ground on the forest floor compared to others that are higher in the shrub layer of the forest?**

A: Competition for sunlight and native plant species being outcompeted by invasive plant species

**Q: What does the thickness of the roots indicate about the health of the surrounding environments?**

A: Really thinned roots mean that it is a water deprived environment, meaning that the roots have to stretch out further

**Q: What do you notice about plants that are near water versus plants that are not?**

A: Plants near the water are usually bigger because they have more access to water and less competition for nutrients.

A: Trees also shade the stream which makes it more habitable for macroinvertebrates like the ones you learned about on Tuesday!

A: Trees that fall over into aquatic environments, or logs, can also become habitats for fish and other aquatic species.

**Entering the Wetlands Exhibit:**

(Before Critter Catch for Great Blue Heron/Western Pond Turtle and before Story of the Day for Pacific Tree Frog)

- Before you have the students enter into the wetland exhibit explain that you will all be entering a wetland habitat through a woven tunnel that is a wildlife viewing blind, so everyone needs to be quiet to try to see any animals in the pond through the holes.
- Align the students into one single file line, and explain that when the group is walking through the woven tunnel, the student in the front of the line will read one phrase/sentence along the trail and then move to the back of the line. All the comments within the wildlife viewing blind will be read aloud to the group by each student.
- Once you have entered into the wetland exhibit explain to the students that there's a game inside with a close up picture of an animal or plant and a written clue. They use these to guess what the animal or plant is, and then they slide to the next picture to see if they are right. After every student has been able to explore the exhibit discuss which animals they knew and which they had trouble figuring out.
- After they have a few minutes to play the game and look for wildlife, use the map in Appendix F to show how water travels from the river and into the wetlands when there is flooding.

**9:55 – Stewardship Project (30 minutes)**

**Introduction (5 minutes)**

- We're going to find some rare creatures that live in water.
- **Q: Who can define *macroinvertebrate* for me?**
  - A: macro: big enough to see with just your eyes, invertebrate: no spine (mostly insects)



- A bunch of those strange creatures called aquatic macroinvertebrates that we learned about in class live here in this pond or the nearby river.
- **Q: What are some of the macroinvertebrates we met in class?**
  - A: caddisfly, mayfly, isopod, copepod, northwestern salamander larvae, and pouch snails.
- Today we get to see those macroinvertebrates up close! We are also going to use our scientific skills to help MPA and the creatures that live here by recording the health of the water so that we can track it over time!

### **Critter Catch Activity (25 minutes)**

*Water Quality Testing/Critter Catch Worksheet (found in Appendix E)*

- Before entering the space for critter catch -- at wetlands (at the bench before the open space, after the covered tunnel) or at the river bank (circle up on bank blocking the tub of critters)-- establish that students will have about 10 minutes to look at the macroinvertebrates that have been collected for them, using sheets to identify as many as they can.
  - Suggest students use the Aquatic Macroinvertebrates Chart to try to identify the creatures.
  - Explain students use their “Critter Catch” activity worksheet to draw and record the species they see and are able to identify.
- Fill the observation bin with 3 inches of water from the pond and place it near the water, close enough to the water to observe the habitat and with enough room for the students to gather around the bin.
- Once the muck settles, show the students how to look for critters by slowly moving your finger around any debris and looking for movement. Look closely at the sorting bin with the group and find as many critters as you can in it.
- Have students scoop critters that they find in the small observation containers to take a closer look, identify them, and record them in their field notebooks.
  - Once again, use the Aquatic Macroinvertebrates Chart
  - After students have identified and passed around critters caught in small, magnified observation containers, demonstrate gently placing the critters back to the main observation bin.
- Encourage students to...
  - Notice how the structures of macroinvertebrates work with their locomotion and feeding strategies, and that those, in turn, affect where they can be found.
  - Wonder why nobody usually notices these strange creatures in the water.
  - Feel that the pond is full of life, even if fauna cannot be seen at first glance.
- Ask students
  - How do they think these animals receive information
- Have students gently return the creatures to the water.
  - Give students positive feedback for taking good care of all living things.
- Wrap up:

- Ask how macroinvertebrates receive information through different features
  - *I.e. copepods through antenna*
- Ask the relation between macroinvertebrate population levels and water health.
  - *Macroinvertebrate population levels are directly related to water health.*

### 10:35 – Snack/Story Time (15 minutes)

#### Mayfly Poem

A mayfly flies  
 In May or June.  
 Its life is over  
 Far too soon.  
 A day or two  
 To dance,  
 To fly  
 Hello  
 Hello  
 Good-bye  
 Good-bye.

### 10:50 – Water Testing (25 minutes)

Introduce the activity by emphasizing that maintaining the quality of water sources is important. To explain why, talk about how we used to get our water from the Willamette River but since landfills and dump sites were once located right along the river, the water quality steadily decreased until we could no longer use it as our source of drinking water. Today, Eugene gets its water from the Mackenzie River. Also make sure they know that this is the Coast Fork of the Willamette. For the Western Pond Turtle and Great Blue Heron groups, you will encounter a sign that reads “Sometimes Polluted” before you reach your water quality testing spot. Use this to discuss the difference between water that is healthy for aquatic life and water that is healthy for humans. Humans need a higher quality of water because we are not adapted to survive in the same environment.

#### **Q: Does this water look healthy?**

A: students will have a variety of answers; allow them to explain their thought process

#### **Q: What are some ways we can tell if the water is healthy?**

A: Observations like looking at vegetation, if animals live in the water, how clear the water is. Tests like pH, turbidity, temperatures etc.

- If someone shows interest in any of these tests, assign them to be your “person.” Or, assign roles randomly for students so that you have a “person” or pair responsible for each test.

**Q: Who are we testing water health for?**

A: The animals at MPA (big and small!), specifically macroinvertebrates we just identified.

- Explain that we will be testing the water to determine its quality and searching for macroinvertebrates that determine healthy water ecosystems.

**Q: What are some variables we can use to test the quality of water over time?**

A: Replicability, accuracy, validity

- Explain that repeatedly testing the water in different places over time will give us good data on how the water quality changes over time. Tell them the importance of paying attention to how the tests are done so they can do them correctly and record good scientific data. Finally, explain the importance of validity and how everyone should agree on the numbers they get for the various tests they are about to do.

**\*\*\*Note: Ignore the card for testing water “velocity”**

## **Water pH Test**

**Q: Has anyone here heard of pH? Can anyone tell me what pH means?**

A: System of testing how acidic or basic water is on a scale of 0-14. The lower the number on the pH scale means that it is more acidic, the higher numbers more basic.

- Give examples of acidic substances: citrus, cola, batteries; and examples of basic substances: bleach, lye, soap
- Explain that the range of water that humans drink is also the range that the majority of life lives at (7-8) and show the pH strip colors associated with these numbers.
- If a student knows a lot about pH or seems engaged, assign them to be your “pH person.”
- After showing the colors associated with different pH levels, take one of the pH strips and put it in the small test tube.
- If there is a left over sample, have students assess what level they think the previous group decided for pH.
- Dump the used pH water and old test strip into the “bad water” jar which should be in the water testing bin.
- Collect a small sample of water from the river while your “pH person” holds the small test tube with the test strip inside it.
- With everyone circled around to see, pour the river water into the test tube and place the cap on tightly.
  - Allow every student a chance to shake the test tube strip.
    - The shaking of the water with the strip does not really change or do anything for the process, but makes the test more engaging for everyone and passes the time necessary for the test strip to work.

- When the water has settled, hold up the test tube against a white background and have the pH color guide for students to match.
- Once students have all agreed on the same pH level, make sure they record in the first box of their water testing sheet.
- Record the corresponding scores in the score column.

### **Water Clarity (Turbidity Test)**

#### **Q: Does anyone know what turbidity means? How can it help us tell the health of the river?**

A: Measure of how clear the water is due to the presence of suspended particulates. The more suspended solids, the murkier it looks, and the higher the turbidity.

#### **Q: What might affect the turbidity of the river here?**

A: Runoff from farms, floods, storms, fires, etc.

- Explain that we can test turbidity by seeing how high up we can fill the turbidity tube while still being able to see the cross section at the bottom of the tube.
- “We will fill it gradually and check after we add more water to see if we can still see the cross at the bottom.”
- Assign a turbidity person and have them hold the Turbidity Tube
- Collect a sample of river water with the yogurt cup in the water testing bin.
- Have your turbidity person hold the Tube steady while you gradually fill it with river water, stopping every 5 inches or so.
- Make sure everyone gets a chance to look at the tube after each incremental filling so that the group can arrive at a scientific consensus.
- As soon as you can no longer see the bottom check the number and record the number of centimeters and corresponding score.
- Note: MPA has very clean water, so most likely you will be able to fill the entire tube and still be able to see the cross at the bottom. That is okay and still good data to record! The numbers have mostly worn off the sides of the turbidity tubes, so have students note in the turbidity section that they arrived at a “full tube” and ensure that Jenny at MPA will know what that means when she reads the data.
- Record the corresponding scores in the score column.

### **Water Temperature**

#### **Q: Our next box in the data sheet is for temperature. Why do we care about temperature?**

A: Temperature influences water chemistry through dissolved oxygen levels in the water. This affects the photosynthesis of aquatic plants, metabolic rates of aquatic organisms, and the sensitivity of these organisms to pollution, parasites and disease.

- Have your “temperature student” hold the end of the string on the banks of the river while you throw the thermometer into the water.

- Wait a little for the thermometer to read the temperature. While you wait, start a discussion with the following questions:

**Q: What kinds of factors do we think affects water temperature?**

A: Sunlight, depth, turbidity, speed, etc.

- Allow about 1-2 minutes for the temperature to settle. Once the temperature person notices that the temperature regulates and has steadied, show the group so that everyone comes to a consensus.
- Record the degrees (Celcius!!)
- Record the corresponding scores in the score column.

**Bank Stability**

**Q: Along with physical tests such as pH, turbidity, and temperature, there are also observational tests for river health. When we say “bank stability,” what do you think that means and how do you think it addresses river and water health?**

A: Bank stability refers to how eroded the sides of the river or stream are. The stability is affected by the placement of houses, weight on the river bank, vegetation, tectonic (earthquake) activity, and water saturation of surrounding areas. Healthy river ecosystems have stable banks that are supported by the roots of vegetation surrounding the river.

- This test should not be assigned to a specific person, but rather as a group observation activity that students discuss until they arrive at a consensus.
- Make sure students note what side of the bank they are looking at (right/left). Then use the following ranking to decide how stable the bank is. Note: these connotations should also be on the “Bank Stability” card in the water quality test bin.
- 10-9; Bank stable: no evidence of erosion or bank failure; little potential for future problems
- 8-6 Moderately stable; infrequent, small areas of erosion mostly healed over.
- 5-3; moderately unstable; up to 60% of banks in site have areas of erosion; high erosion potential during floods
- 2-0; unstable; many eroded areas; “raw” areas frequent along straight sections and bends; obvious bank collapse or failure; 60-100% of the bank has erosional scars
- Once the students have reached a conclusion, have them record the number on their data sheet.

**Habitat Types**

**Q: Why do you think is important for a river to be a habitable place for the species of that area?**

A: Guide students toward an answer referring to how the animals need appropriate habitats in order to reproduce and have places to rest while moving along the river.

- Go over each habitat type on the card and define them

**Q: What animals would benefit from these different habitats? Choose one habitat type and ask them what animal it would benefit**

A: "Pools" are good for fish needing to rest while swimming up river

- Have students point to where they think each habitat type is.
- Tell students to record their findings by checking the corresponding box on the data sheet.
- Record the corresponding scores in the score column.

**Cover for fish**

**Q: By looking at the river what other things could create good habitat for fish and other critters to rest or live?**

A: Rocks and debris that slow the speed of the river to create a place suitable for fish to live.

- Explain to the students that by observing a river with your eyes there are ways that you can tell if it has good habitat for fish.
- Have the students guess the approximate percentage of coverage for fish based on the percentages provided on the cards.
- Record the corresponding scores in the score column.

**Streambed Substrate**

**Q: What do you think that the substrate of a streambed is?**

A: The composition of the bottom of the river.

- Go into each type of streambed substrate outlined on the card.

**Q: Why do you think that this is important for the health of the river?**

A: "Rocks at the bottom of a stream give animals a place to live. They also help protect from erosion because larger rocks are harder to move." (Quoted from the cards from Jenny)

- Have one student with a quiet hand make a guess as to what they think the streambed substrate is based on the card.
- Make sure the whole group is in agreement with that scientific guess.
- Record the corresponding scores in the score column.

**Conclusion (5 minutes)**

- Wrap up activity; reminder of learning outcomes
  - Ask students three different techniques that can be used to test water quality
    - *pH testing, turbidity, levels of macroinvertebrates*
- List three ecological functions of a wetland
  - *Ex: filtration, flood control, habitat for baby species.*
- Ask the relation between macroinvertebrate population levels and water health.
  - *Macroinvertebrate population levels are directly related to water health.*

**11:15 – Trail hike with activity back to pavilion (15 minutes)**

Encourage students to use observation skills while hiking back to the pavillion and review functions of the wetland habitat.

**11:30 – Lunch and Recess (40 minutes)** Invite those who have finished lunch to play the game; other students can continue eating but let them know they have about 10 minutes left.

**~11:50 – Game: Bullfrogs at the Pond (15 minutes)**

Invite those who have finished lunch to play the game; other students can continue eating but let them know they have about 10 minutes left.

**How to play:**

- Set-up.
  - Create the Playing Field. For this game, you will need to mark a large rectangle as a playing field, using bandanas or backpacks to mark the four corners and some of the sides. Make it 15-20 large paces long, and 5-10 paces wide (a wider field will make it easier to not get tagged, but will make the game take longer to complete).
  - *Tell the students:* “We’re going to play a game! Line up shoulder to shoulder at one side of this long rectangle and I will tell you the rules.”
  - *Have everyone stand in a line facing you in the middle. Tell them:* “Imagine this big rectangle made with (bandannas or whatever you use for boundary markers) is a pond and you are now standing safe on the shore. In this pond will be a big Bullfrog that wants to eat anything it can catch! You will all get to be an animal that lives at the pond and will try to cross the pond without getting tagged by the Bullfrog!”
- Assigning Roles
  - Everyone will choose a pond animal to be in this game. You can choose to be a Pacific Tree Frog, a Great Blue Heron, or a Western Pond Turtle!
    - [If you have more time, you might ask them to first tell you what creatures live at the pond you just visited. You can draw a list of three animals from that list.]
  - *Ask:* “Would anyone like to be the Bullfrog who will chase the other animals as they cross?” *Invite that student out to the middle to join you as you explain the rest of the rules.*
- Game Rules

- *Tell them:* “The player who is the Bullfrog will start the game by calling out one of the three animals. They might call Frog, Dragonfly, or Turtle.
- When you hear your animal name, you will run through the “pond” to the other shore without getting tagged by the Bullfrog. If you get tagged, you are transformed into a young bullfrog tadpole, who is so weak you must stay where you are. New tadpoles must stand where they were tagged but they can still reach out to tag those animals who pass near and turn them into Bullfrog tadpoles too!
- Any time you get tagged you become another tadpole who can’t run but can reach out to try to tag other animals who pass.
- ONE LAST RULE! If the Bullfrog person calls out, **Bullfrogs in the Pond!** then all the animals have to run across to the opposite shore without getting tagged by the Bullfrog or any standing tadpoles.”
- Game Play:
  - The game goes on like this, with animals running back and forth from shore to shore as they are called out until all the animals have transformed into Bullfrog tadpoles.
  - If it’s close to 12:30 and the game has not ended, then just use your attention-getting technique to get everyone’s attention and let them know that the time has ended and to clap for the remaining animals who escaped getting eaten by the Bullfrogs.
  - If there is time to play another round: The last animal to be tagged gets offered the chance to be the Bullfrog for the next game.

## 12:10 – Trail Hike (20 minutes)

### Activity: Green Glass Door Riddle (15 minutes)

#### Instructions:

- The goal of this game is for the students to uncover what can be taken through hypothetical green glass doors. The instructor should introduce the game by first asking students to raise their hand if they have ever played this game before, and then politely asking those students not to spoil the secret for those that have not.
- Start the game by stating “I’m going through the green glass doors and I’m bringing \_\_\_\_\_, but not \_\_\_\_\_”, filling in each blank with an object that can pass through the doors and an object that cannot, respectively. The first blank will be a word that has double letters in it, such as glass or door, and the second word will lack any double letters. Players that know the secret to the



game can assist in providing hints, or further confusing other students, by stating the same phrase: “I’m going through the green glass doors and I’m bringing \_\_\_\_\_, but not \_\_\_\_\_”.

- Players who know the secret might say things like this:
  - I’m going through the green glass doors and I’m bringing a poodle, but not a dog.
  - I’m going through the green glass doors and I’m bringing the moon, but not the sun.
  - I’m going through the green glass doors and I’m bringing grass, but not dirt.
  - I’m going through the green glass doors and I’m bringing a room, but not a bed.
  - I’m going through the green glass doors and I’m bringing roots, but not flowers.
- Other players that do not know the secret of the game can attempt to create their own sentences, to try and figure out the riddle. If the player guesses wrong, the instructor should respond with “Nope, that cannot go through the green glass doors”, while simultaneously shaking their head sympathetically.

### **12:30 – Sit Spot (15 minutes)**

Remember: it is critical to space the children out so that they don’t distract one another. Encourage them to look for signs of spring.

#### **Introduction:**

*For this sit spot activity:* “This is your chance to potentially see some of the animal species that have been hiding from our noisy group today. Remember to use your skills from walking here to be \*extra\* alert to any sounds, sights, smells, etc. as they may give you a hint that wildlife is nearby! During this last sit spot session use all of your senses to remember what you experienced here today.

#### **Instructions:**

- Start with a story of one of your past sit spot experiences. This story does not need to have been at Mt. Pisgah Arboretum, but it should incorporate all the rules of sit spots: staying quiet, keeping still, using all your senses, and exploring all depths of the surrounding environment.
- After completing the story, instruct the students that you will be placing them, one at a time, at their own special sit spot. After 15 minutes at their sit spots, you will hand them their notebooks and pencils so that they can record what they experienced. At the end, you will “crow call” and the volunteer at the end of the line will sweep the students to you at the other end.
- For the remaining time remind the students to focus on their surrounding natural area, and use their senses to deduce what might be lurking nearby.

### **12:45 – Field Notebooks (15 minutes)**

The facilitator will hand out the field notebooks and writing utensils.

- Walk down the path the students are doing sit spots on and one-by-one hand the students their field notebook, opened to the two pages they will be using.

- Advise each student to first write in their field notebooks their location, the time of day, the date, and what the weather is like. Then, tell them to draw anything they saw, smelled, heard, touched, or just experienced during their sit spots.

### **1:00 – Story of the Day (15 minutes)**

Circle up the students to share their most spectacular or surprising discovery of the day, or what they love most about Mt. Pisgah Arboretum. Use the art of questioning to dive deeper into their observations. Be sure questions push them to use all their senses.

#### **Instructions:**

- Starting with the facilitator, go one-by-one around the circle and share one thing seen, heard, felt, smelled, or experienced during the field trip so far.
- After everyone has shared, ask follow-up questions to encourage the students to describe some of what they previously shared in more detail.

#### Example questions:

- Where do you think the noises you heard were coming from? Was it an animal, the river, or maybe the wind blowing against the trees?
- Were the sounds loud, or did you have to use your deer ears to hear them?
- What did the smells you experienced remind you of? Have you smelled them before, and if so in what context?
- Did you notice you heard or saw things that were different than others?
- If time permits:
  - Encourage the students to take a minute or two to stay silent and listen again, seeing if they can use their senses to acknowledge different things after hearing feedback about what their peers experience.

### **1:15 – Trail Hike Back to Pavilion (15 minutes)**

(Adapted from Young, J., Haas, E., and McGow, E. (2010). *Coyote's Guide to Connecting with Nature*. 2nd ed. Shelton, WA: Owl Link Media Corporation.)

Continue sharing stories, encouraging students that haven't participated as much to share something they were grateful for today or something interesting and new they saw

- Encourage the students to take a minute or two to stay silent and listen again, seeing if they can use their senses to acknowledge different things after hearing feedback about what their peers experienced.

#### **Questioning:**

Questions usually can be lumped into three categories:

**Level 1 Questions** are questions that the student can easily answer. These are useful in helping the student recall more vividly their experience while also helping you show interest and engagement in what they are telling you. Again, don't quiz the student, just be curious and let the questions flow. Be sure to acknowledge the answers, too. Remember, your main job is to listen to them.

**Level 2 Questions** are usually about things that the student might not have thought about on his or her own but still can answer with a little thought. You are looking here for gaps in the student's awareness of what he or she experienced. She may have noticed the color of that bird's beak but didn't realize it was an interesting and important detail. Don't go overboard on these questions or it can start to feel like you are administering an exam. Let your own curiosity guide you.

**Level 3 Questions** are reserved for when you see an opportunity to break through a wall of awareness and understanding. A level 3 question is something that hints at a whole realm of understanding that the student hadn't ever considered before. Used well, these questions can set the student on a journey of independent discovery. But used poorly, these questions can be off-putting and uninteresting. Take your time and be thoughtful in the way you use these questions. They might be phrased more like "I wonder if...?" or "Why do you suppose...?"

### **1:45 – Wrap Up and Give Thanks (15 minutes)**

Have all groups join together for a group circle to cultivate gratitude and give thanks.

Moment of gratitude:

- Tell them to ground their feet like roots.
- Have everyone take a deep breath together, raising their arms above their heads like the trees extend their branches, and then tell everyone to let it out.

Discussion:

- Have the students think about one thing they were grateful for, such as the trail, shade, birds, etc.
- Next, call on each of the focal species asking for one person to share, with a quiet hand, one thing they saw, heard, smelt, or experienced today!
- After everyone has gotten the chance to share, take a second to thank the chaperones, guides, and students for being there.

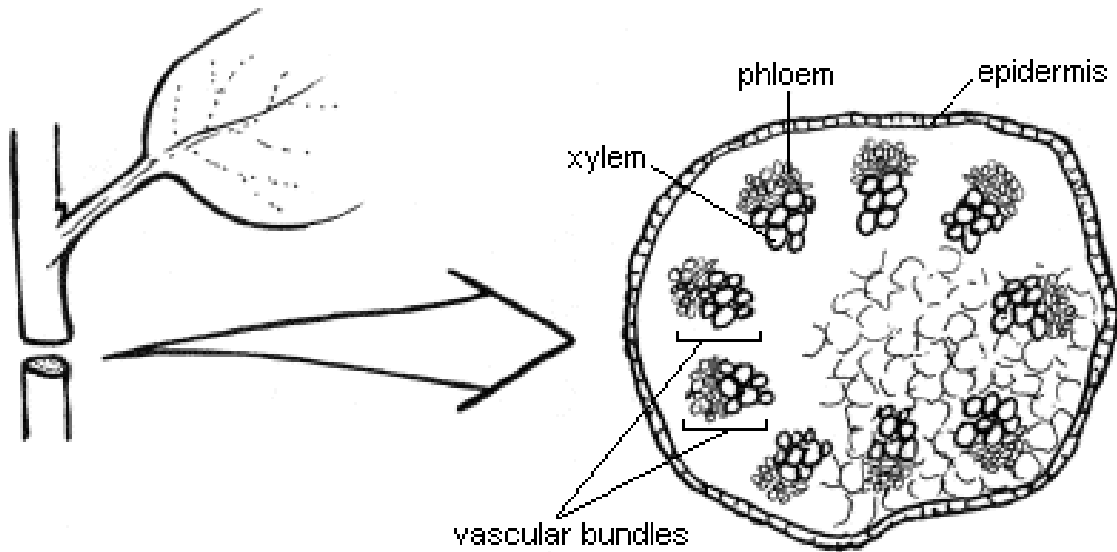
### **2:00 – Load Bus**

## Appendices for Spring Field Trip

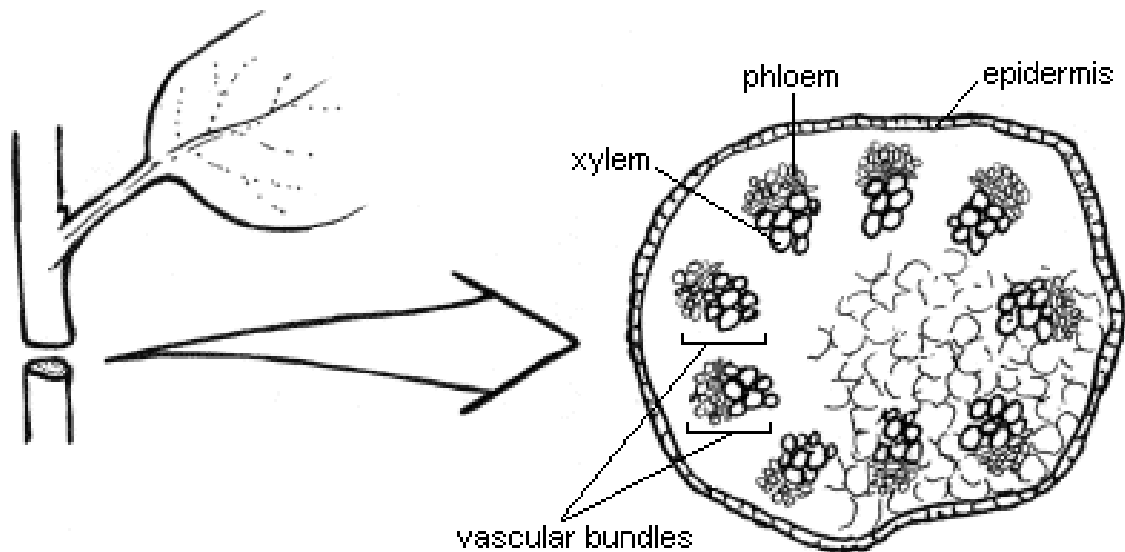
*(Refer to or print the following pages as needed)*

**Appendix A:** Laminated picture of the cross section of a stem and parts of a flower (Print double sided)

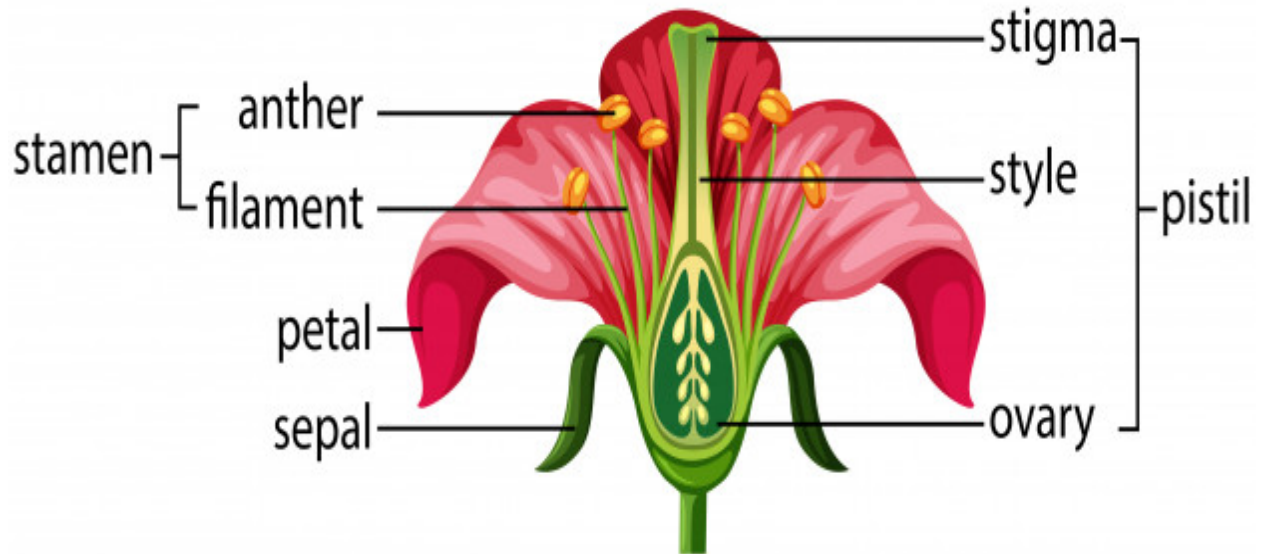
### **Cross Section of a Stem**



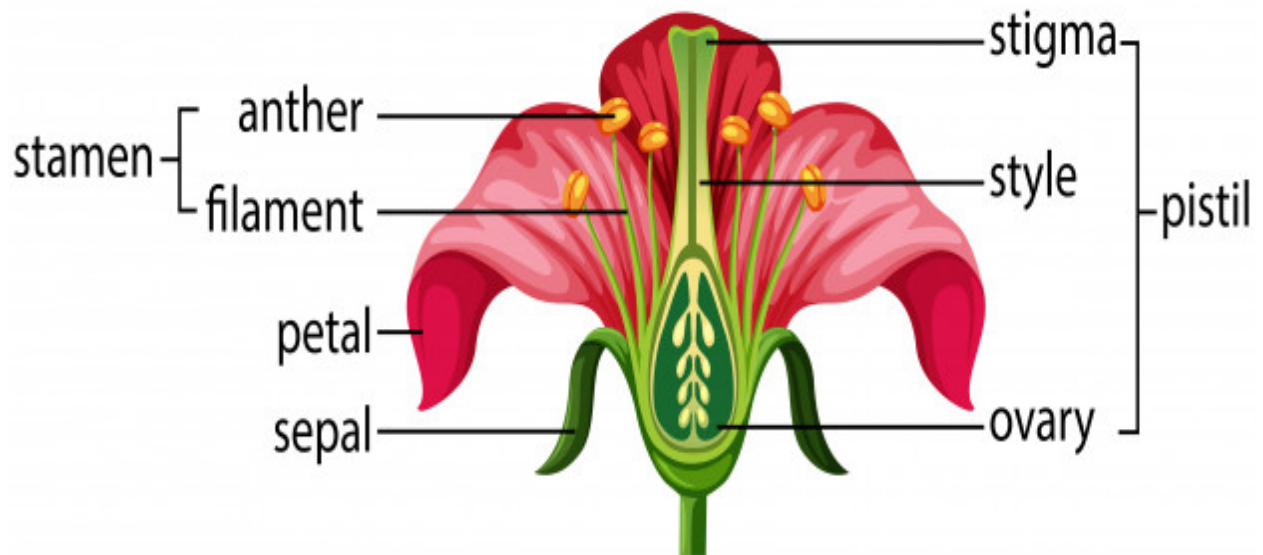
### **Cross Section of a Stem**



# Common Flower Parts



# Common Flower Parts



**Appendix B: Water Quality Testing/Critter Catch Activity Worksheet**

**Name :** \_\_\_\_\_

## Stream Health Data Sheet

Test Type	Measurements	Score
Water pH	pH	
Water Clarity	cm	
Water Temperature	°C	
Habitat Types	<input type="checkbox"/> Riffles <input type="checkbox"/> Pools <input type="checkbox"/> Bends <input type="checkbox"/> Straight/ Continuous Run	

**Extra Tests:**

Cover for Fish	% of stream	
Bank Stability	% of bank protected	
Streambed Substrate		

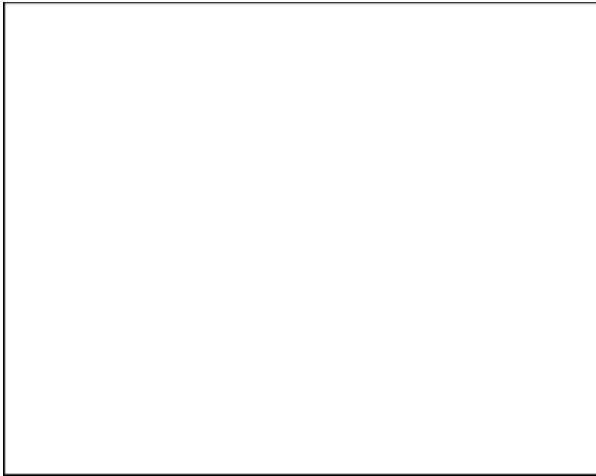
**Total:** \_\_\_\_\_

**How healthy is the stream?**

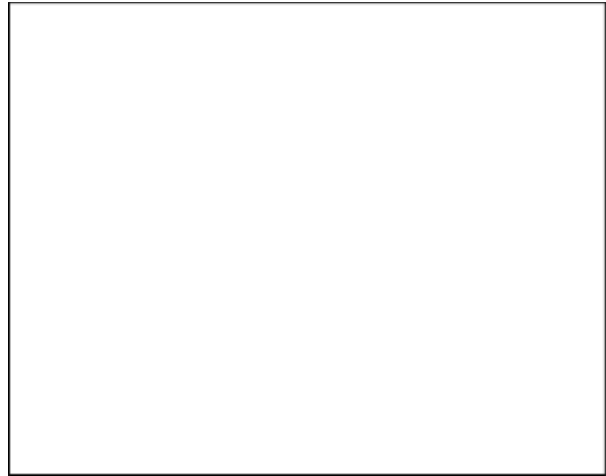
NAME: \_\_\_\_\_

## CRITTER CATCH

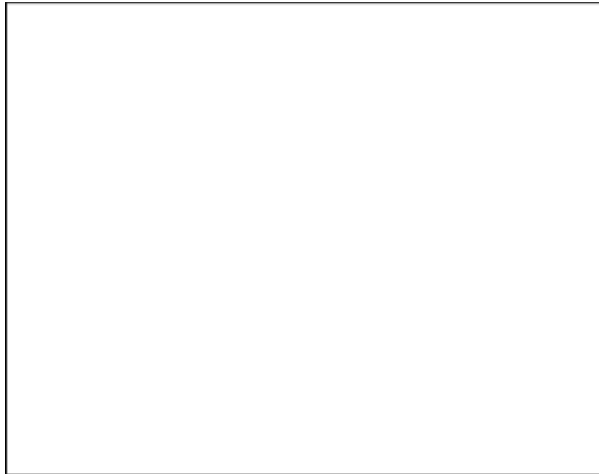
WHAT DO YOU SEE?



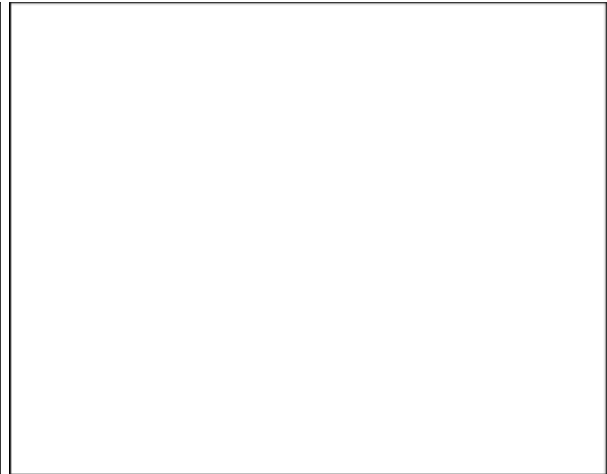
NOTES:



NOTES:



NOTES:



NOTES:

**Appendix C: Map of how water travels from the river to the wetlands**





## **Works Cited**

Activities and the curriculum were adapted from the list of resources below:

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