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## **Introduction to Wetlands**

**Abstract:** Students will be able to describe the characteristics of a wetland, identify plants and animals found there, and how those plants and animals have adapted to their environment.

**Grade Level:** Grades 2-6

**Benchmark:** Utah has diverse plant and animal life that is adapted to and interacts in areas that can be described as wetlands, forests, and deserts. The characteristics of the wetlands, forests, and deserts influence which plants and animals survive best there. Living and nonliving things in these areas are classified based on physical features.

### **Utah State Core Curriculum Standards:**

**-Standard V:** Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

*-Objective 1:* Describe the physical characteristics of Utah's wetlands, forests, and deserts.

*-Objective 2:* Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live.

### **Intended Learning Outcome/Process Standard:**

1. Use Science Process and Thinking Skills b. Observe simple objects and patterns and report their observations.

4. Communicate Effectively Using Science Language and Reasoning  
b. Report observation with pictures, sentences, and models.

**Instruction Time:** 2 to 3 - 45 min. sessions

### **Materials:**

- wetland poster
- a bag, such as an old pillowcase or sturdy paper bag
- cattail stalk and flower (fuzzy “hot dog” part)
- feather
- shell (clam, oyster, scallop, mussel)
- crab claw or dried shell
- wetland mud (in a baggies; smells like rotten eggs)
- turtle shell
- fur (small piece, pelt, or stuffed specimen- muskrats, beaver, and other mammals that have fur)
- toy stuffed animals that could live in a wetland
- flower (wetlands have multiple flowers but make sure to avoid endangered species)
- tap water (in a small container)

- leaves (grasses, wetland trees, etc.)
- a toy frog, fish, insect, duck, etc.
- snake skin
- bird's nest (only one that has fallen from a tree)
- pictures of animals and that live in a wetland
- pictures of different wetlands from around the world (marshes, swamps, bogs, moors, etc.)
- CD of wetland sounds
- Video on types of wetlands and the plants and wildlife in it

### **Terminology:**

- wetland- often transitional zones between dry lands and deepwater. A lowland area, such as a marsh or swamp, which is saturated with moisture, especially when regarded as the natural habitat of wildlife.
- environment- the whole complex of factors (as soil, climate, and living things) that influence the form and the ability to survive of a plant or animal or ecological community
- hydric soils- soil with a high moisture content
- hydrophytic plants- a plant that grows partly or wholly in water whether rooted in the mud, as a lotus, or floating without anchorage
- marsh- an area of soft wet land usually overgrown by grasses and sedges
- swamp- wet spongy land often partly covered with water
- bog- wet spongy ground

### **Background Information:**

“Wetlands cover about six percent of the earth’s surface. They can be found in everyone of the United States and on all continents except Antarctica. They are found in rain forests, river deltas, coastal swamps, peatlands, salt pans, cranberry bogs, river estuaries, salt tidal flats, moist alpine tundra, and wet river bottom forests.

To be a wetland, an area must have three characteristics for wetlands during most of the growing season: hydric (saturated) soils, water tolerant plants, and enough water to either cover the plants or cover the land to a shallow depth.”

from *The Wonders of Wetlands*

### ***Wetland types***

- bog or moor or muskeg (peatlands)
- mangrove swamp or mangal
- marsh or fen
- swamp
- bayou or slough
- constructed wetland

### **Invitation to Learn:**

Several days before beginning the wetland unit, display a “clue” from the wetland each day. You can acknowledge the clues you put out and have the students write down guesses of what the “mystery topic” is, or you can choose not to acknowledge the clues and see if they notice the changes/additions to the room. You can bring a toy animal from the wetland, plants, and flowers

depending on the time of year. You could also bring mud for them to smell and touch if they want. On the last day, have a class pull on what they think they will be studying according to the clues, or hang up pictures or a poster of a wetland hang up a wetland poster (with the title covered). Then, on the first day of the unit, use the pictures and/or poster to introduce the topic students are studying or address the results from the class pull.

### **Prior Knowledge Assessment:**

Do a KWL to assess what they know, what they want to know, and eventually what they learned. The L part of the KWL can also serve as another assessment. KWLs assess the students' prior knowledge of wetlands, and you can then build on what they know and don't know about wetlands.

### **Procedures:**

#### Activities

##### *Who Let the Cattail Out of the Bag*

1. Look at the materials list and pick materials that could be experienced with the five senses (turtle shell, fur, leaves, etc.). Place those materials in a pillow case or sturdy paper bag.
2. Call a volunteer to the front of the room. Blind fold the volunteer and ask them to reach into the bag and remove one object, or place one object in their hands. The object should also be held out for the class to see.
3. Ask the volunteer to feel (and smell, if appropriate) the object, then describe their sensation to the class. Provide descriptive words to choose from if the volunteer needs help. After providing descriptive words the volunteer can try to guess what the item is. Remind the volunteer that the item would have to do with wetlands. If the volunteer gets stuck on guessing what the item is have members of the class provide clues to help the volunteer.
4. After the volunteer tries guessing remove the blindfold so they can see the object, and see if their guesses they made were correct. Have the class find the item, or something similar to it on a wetland poster, or start sorting the objects into categories.
5. Repeat the process of drawing items out of the bag for several volunteers or until you run out of objects.
6. Review all of the objects in the bag with the student. If you sorted the item into categories have them explain the classification system of the categories.
7. Ask the students, or have them write in their science journal, why they think the objects, or several specific items, in the bag belong in the wetland. Would any of the objects in the bag appear in a dry area? Why or why not? Ask the students if they know of a wetland in their area, or if they have ever been to a wetland? If students have ever been to a wetland have the students tell where it is if they know. Have them describe the characteristics of the wetland and the plants and different types of animals found there.

##### *Wetland Stations*

1. Make different wetland stations of materials which have been classified according to their similar characteristics (pictures of different wetlands, wetland plants, animals, etc.).

2. Divide the students up into small groups and have the students to each station and make observations of what is there. Have them list the characteristics that each group contains in their science notebook or on a worksheet.
3. Have a class discussion about the items at each station, and have a class discussion about the environment necessary to create a wetland and about the animal and plants that live there.
4. Ask the students why the objects they observed at the stations belong in a wetland. Would any one of the objects appear in a dry area? Why or why not? Ask the students if they know of a wetland in their area, or if they have ever been to a wetland? If students have ever been to a wetland have the students tell where it is if they know. Have them describe the characteristics of the wetland and the plants and different types of animals found there.

*Visualization activity: A Guided Imagery Tour Through a Wetland*

1. Get a CD of wetland sound (animal calls, running water, a rainstorm) for the visualization activity.
2. Turn off the lights in the classroom, if you want to, and have the students find their own spot in the room or just sit at their desks and close their eyes. Play the CD of wetland sound. Have the students picture a wetland in their minds.
3. Lead students through an imaginary tour of a wetland. Have them picture the wildlife with that lives in the wetland, have them dangle their feet in the water and stick their feet in the mud. Describe the plants and wildlife in the wetland. "Over across the stream you see a beaver working his lodge, and over head a majestic egret spreads his wings and flies.
4. An alternative activity would be to view a video about the wetlands. After viewing the video have the students draw a picture or write about the plants and wildlife they saw while watching the video.

**Adaptations and Modifications for Special Learning Needs:**

For students with special need you could start with familiar items like flowers and leaves and work your way up to less familiar ones like toy stuffed animals (beaver, egret). You could also have a volunteer or the teacher play 20 questions with certain familiar items.

**Assessment:**

- Have the students describe the characteristics of a wetland and animals and plants that could live there.
- Compare the students' thoughts and feelings about wetlands before and after they were introduced to wetlands.

**Sources:**

- Slattery Eckhardt, Britt, et al. The Wonders of Wetlands. St Michaels: Environmental Concern, Inc, and the Watercourse, MD, 2003.

# Wetland Wierdos

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Spring, 2005

**Grade Level:** 4-12

**Science Benchmark:** Utah has diverse plant and animal life that is adapted to and interacts in areas that can be described as wetlands, forests, and deserts. The characteristics of the wetlands, forests, and deserts influence which plants and animals survive best there. Living and nonliving things in these areas are classified based on physical features.

## **Core Standard and Objective:**

Standard V Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment. Objective 2: Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live. B. Cite examples of physical features that allow particular plants and animals to live in specific environments (e.g., duck has webbed feet, cactus has a waxy coating).

## **Specific Lesson Objective:**

Students will recognize that plant and animal adaptations can be inferred from observations of organisms' physical structures.

## **Intended Learning Outcome/Process Standard:**

1. Students will be able to use science process and thinking skills. H. Use observations to construct a reasonable explanation.
4. Students will be able to communicate effectively using science language and reasoning. B. Report observation with pictures, sentences, and models.

## **Main Knowledge Construction Purpose:**

The lesson is intended to introduce and develop the ability to recognize infer about animal and plant adaptations.

**Connections:** This unit can easily be connected to Utah Studies, which includes aspects of indigenous people, wildlife, and plant life of Utah as well as early explorers. Connections can be made to how early people survived based on their adaptations to the environment and use of available resources.

## **Key Vocabulary:**

1. adaptations-specialized characteristics that plants or animals have developed over time in response to environmental pressures which helps it to survive in its environment.
2. cattails- emergent wetland plants that have a long stalk with a "hot dog" like flower at its top.
3. ovaries-the female reproductive part of a plant.

4. pollination-the conveying of the fertilizing element of flowering plants.
5. seed germination-the beginning of growth from seed into a plant.
6. pith-the soft spongy central tissue in the stem of the cattail.xylem-part of the plant root that aids in sending water and nutrients upward.
7. phloem-part of the plant that sends food.
8. metabolism-the process of energy production in a plant.
9. aerenchyma-air conducting vessels in a plant that help make it buoyant.
10. gland-an organ in animals which produces and secretes a substance, like oil.
11. emergent-rising above a surrounding water level, as in a wetlands cattails.

**Materials:** copies of “Cattail Investigation” and “Beaver Tales,” magnifying lens, dissection scopes and tools (scalpel for parent volunteers—one for each table of 6--to assist in cutting), cattails for every 3 students, craft supplies, pencils, stuffed beaver or model.

**Background:** Adaptations are specialized characteristics that plants and animals have developed over time in response to environmental pressures. Adaptations may be physical features or specialized behaviors. These “tools” help the plant or animal to survive in specific conditions, such as the wet or alternately wet and dry conditions in wetlands. Within the wetland habitat, some species have adapted to living in the wettest parts, while others are more suited for dry conditions.

Adaptations come in many forms. For example, they might help an animal compete for specific kinds of foods; enable locomotion in air, water, and trees, and on land; or provide protection through color (blending with surroundings), armor (as with the turtle), or the ability to fight or flee. Plant adaptations provide means for obtaining oxygen, nutrients, water, sunlight, and other necessities.

**Cattails:** Cattails are emergent plants (they stick up out of the water). The part that looks like a cat’s tail or a hot dog (could they be renamed “Hottails”?) is the female flowering structure, and there is a thinner male structure above it during the early part of the growing season. If you pull the flower apart, you will find thousands of fuzzy white things that blow around. Each one contains an ovary (the thin, tan bulb in the center of the white stuff) halfway up a little stalk. If the ovaries are pollinated (fertilized by action of wind, gravity, insects, birds), they soon become fertilized seeds with a bulb at the tip. Cattails reproduce by seed germination and through use of underground horizontal stems called rhizomes. In the classroom, it may take three weeks or so to germinate seeds. Keep them wet--in a zippered plastic bag.

Long narrow leaves are attached at the base of the plant, overlapping each other and surrounding the stem. The bundle of leaves and stem near the cattails’s roots form the shoot, the white part of which is edible and tastes a little like cucumber. If you cut a cross section of the shoot, you will see what looks like a slice of a bunch of celery; the leaves overlap each other, making almost a spiral pattern.

The leaves have vertical channels filled with a starchy material that is part of the vascular system of the plant. They contain xylem and phloem, which transport water and nutrients during growth and metabolism. If you cut a piece of a mature leaf several inches up the leaf, the cut surface will be D-shaped and will show a honey-comb structure that helps strengthen and support the leaves.

A stem supports the cattail's flowering bodies. A stem cross section reveals a pattern of holes in the center of the stem, and some in the individual blades, are air-conducting vessels called aerenchyma. They transport oxygen down to the roots, since there is little oxygen in wetland soil for roots to take up. Only wetland and aquatic plants have this adaptation. In plants with floating leaves, aerenchyma help make the stems buoyant. The holes arranged around the outside of the stem are water-conducting vessels closely bound with fibers that provide support for the stem.

Note: See *Cattails Investigation* page

**Beavers:** See *Beaver Tales* student page

### **Prior Knowledge Assessment:**

In third grade, students reached various Science Benchmarks, such as understanding how some types of plant and animals survive well, while others cannot. They learned to demonstrate how organisms interact with their environment through the use of models. Additionally, they can (Objective 2) describe the interactions between living and nonliving things in a small environment. Thus, I will begin with a review of what they know about animal survival with the example of local animals surviving the winter.

### **Invitation to Learn:**

What does the word **adapt** mean? **Adaptation?** When a student moves from another state or country, what changes do they have to do make to survive in a new school? What do they do to "fit in?" Ask students if they have ever had to make a big change in their life. Ask for varied responses; learn a new language, make new friends, find new clothes, etc. This is a wonderful opportunity for an immigrant to tell about changes.

Next, ask students:

Also, what is special about an animal that is made to live in a dry, hot climate with little water?  
A wet climate?

What is special about a plant that also lives in a hot, dry climate? A wet climate?

**Instructional Procedures:** The students will look closely at two species that are adapted for life in wetlands: cattail and beaver.

### **Part I --Day 1**

- 1) With the whole class prior to this investigation, discuss an example of a flower. Ask students what is the purpose of a flower, stem and leaves? Explain how parts of a typical flower (like a daffodil or other easily acquired spring bloom) have to do with reproduction and its leaves are intended for energy production (metabolism) and circulation. **Pollination**, or how a plant is fertilized is related to the **Ovaries**, which release the seed, and **seed germination**, like a baby plant. Other terms, such as pith, stigma, and style will be shown in the *Cattails Investigations* handout as part of a diagram. All are plant structures that are adaptations for living in a wet environment.
- 2) Have students conduct their own studies using the *Cattails Investigation* student page. For the cattail investigation, collect or have students collect several cattails.

- 3) Explain the procedure before they begin and leave time at the end of class for sharing discoveries.
- 4) Students will be grouped in 2's or 3's and look at the cattails on their table without cutting them up. Consider questions about the structure of the cattail. Working together, each student group will come up with **2 Questions** (written in individual lab notebooks) to **hypothesize** about the structure of the cattail. What do they think its purpose might be?
- 5) After students have studied the plant's structure, discuss the answers and ideas together. What methods could they have used to find out the correct answers? They will go to the computer lab and visit an interactive website about wetlands plants and animals. They may also visit the school library, ask an expert, etc.)
- 6) The results of this search will be recorded in a **Conclusions Section** of their lab notebooks. The Cattail fruit, or fertilized seeds, will be placed in baggies with a wet paper towel, observed daily, and recorded in lab notebooks.

## **Part II-- Day II**

- 1) Before giving students the copies of the *Beaver Tales*, **ask** for what makes the beaver special, just by looking at it? Try to have a stuffed beaver, a model of one, or detailed diagram and photos.
- 2) Students will **ask 2 questions** in a similar manner as they did for the Cattails. Hand out the Beaver page to do in pairs or on their own. What features of the Beaver are adapted for its survival? What habits does it have which enable it to survive? Ask students to write a **Hypothesis** in lab notebooks about these habits and adaptations. Record **conclusions** in lab notebooks.
- 3) After students complete the questions for *Beaver Tales*, invite them to imagine and list characteristics of a beaver that are adapted to living in a desert instead of a pond. Prompt students to list as many adaptations as they can think of.
- 4) Have students present their lists or creations as part of a group discussion. Ideally, visit a nearby beaver pond. Beavers are most active at night, but signs of activity can be seen during the day.

**Closure:** Ask students to summarize ways that cattails and beavers are adapted to their environment. Have them think about other wetland plant and animal adaptations ( e.g. water lilies-floating on the water; pitcher plants; and cranberries, which can survive in a bog's acidic environment, etc.)

## **Part III --Day 3**

Have students imagine an organism that lives in a place with a strange climate and unusual landscape, and create a drawing, name, AND a story about this organism and its environment. Students should identify ways in which the organism has adapted to the environment. Include as many details as they can. They can look at pictures of Utah animals for a launching point. Options for technology—look at native Utah animals, and choose 2 to borrow ideas.

Websites:

[www.usoe.org](http://www.usoe.org) Go to 4<sup>th</sup> grade science-click on core resources—Utah animals  
[www.wildlife.utah.gov](http://www.wildlife.utah.gov). Go to species- click on animals--birds, amphibians, reptiles, fish-distribution of species

**Possible Adaptations**

Students will have the opportunity to work with partners on the activity sheets and questions, and work in groups to share ideas. This supports cementing the material to be learned and reinforcement for upper level students.

**Assessment: Use of rubric 1 (not there), 3 (Getting there), 5 (Got it!)**

Student brainstorm about adaptations

Student considered 2 questions about Cattails, 2 questions about Beavers in lab notebook

Student wrote questions, hypothesis, and conclusions for each in lab notebook.

Student completed Cattail Investigation sheet, Beaver Tales sheet

Student drew their own pictures of each part on a separate sheet.

Student recorded observations and discoveries of pollinated ovaries in individual lab notebooks, updated biweekly once evidence of growth is evident.

The student applies knowledge of adaptations of Cattails to infer the functions of plant parts.

The student examined and described the functions of beaver body parts, inferring how Beavers have adapted to the environment in which they live.

Student creates colored drawing of animal with creative adaptations.

Student writes a story and titles the drawing.

**Closure and Home Activity with parents:** What do animals in cities do to adapt to living near people? What animals or birds in your neighborhood can you observe and recognize some special adaptations? (squirrel, mouse, pigeon, dog, cat, sparrow, etc.) If you live near a park or go to a natural area, listen and watch to observe what types of plants and animals might live there. Read about another place, or climate with different weather. Find out the animals and similar adaptations they made to survive.

**Source:**

Slattery Eckhardt, Britt, et al. The Wonders of Wetlands. St Michaels: Environmental Concern, Inc, and the Watercourse, MD, 2003.