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Wetlands

Abstract:

- This is an introductory lesson about the wetlands. Students will learn what a wetland is, where they can be found, and what types of plants, animals and characteristic are associated with the wetlands. Students will participate in an activity to explore and enhance their knowledge of specific animals, plants, and characteristics that are found in the wetlands.

Grade Level: Fourth Grade

Core Standard:

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.

- **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.

Specific Lesson Objectives:

- The students will become aware of sensory qualities of wetland inhabitants.
- The students will identify plants, animals, and other characteristics of the wetlands.

Instructional Time:

- 1 Hour

Intended Learning Outcomes:

- Use Science Process and Thinking Skills
- Understand Science Concepts and Principles
- Communicate Effectively Using Science Language and Reasoning

Background Information:

- **Wetlands:** are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. (U.S. Fish and Wildlife Services: National Wetlands Inventory; <http://wetlands.fws.gov/definition.htm>)
- Water from the wetlands comes from two sources: groundwater & surface water. **Groundwater**- enters wetlands by seepage or underground springs. **Surface Water**- is precipitation, snowmelt, runoff, or water from streams or rivers.
(http://www3.gov.ab.ca/env/resedu/pubs/Wetlands_Teacher_Guide.pdf)
- Six percent of the earth's surface is covered by wetlands. You can find a wetland in every state of the United States, and on every continent except for Antarctica. There are many places that a wetland can be found such as, rain forests, river deltas, marshes, coastal swamps, river estuaries, salt tidal flats, alpine tundra, and wet river bottom forests. (Kesselheim, 2003.)
- A wetland must consist of three characteristics during most of the growing season: hydric (saturated) soils, water-tolerant plants, and enough water to saturate the soil or cover the land to a shallow depth. Many types of plants and animals make their homes in the wetlands because they are able to adapt which helps them thrive in wet conditions. (Kesselheim, 2003.)

Connections:

- Students' curiosity about the wetlands will be increased when they feel different textures and shapes of objects of wetlands. This is a hands-on learning activity that encourages an appreciation of the uniqueness of wetlands.

Key Vocabulary:

- Wetlands- see background information
- Cattail- tall reedy marsh plants with brown furry fruiting spikes.
- Groundwater- see background information
- Surface Water- see background information
- Marsh- a tract of soft wet land usually characterized by monocotyledons (as grasses or cattails)
- Swamp- wetland often partially or intermittently covered with water

Materials:

- A Pillowcase Cattail
- Feather Shell (Oyster, Clam, etc.)
- Crab Claw Wetland Mud
- Turtle Shell Fur (Small Specimen)
- Flower Tap Water
- Leaves (Grasses, Wetland Trees)
- Toy Frog, Fish, Insect, Duck, etc.
- Snake Skin
- Bird's Nest

Invitation to Learn & Assessing Prior Knowledge:

- Ask students if they know what wetlands are. Have students fill out a concept map of the types of plants, animals, and characteristics, they know are in the wetlands. (Middle circle: Wetlands, Branch: animals, Branch: plants, Branch: characteristics, etc.)
- Introduce key vocabulary and have the students brainstorm what each term means. Explain and define some terms with the students, then group the students into pairs to define the remaining terms. They will need to write these words and their meanings in their lab notebooks. (Students can also add these terms in their concept map.)
- Tell the students that we are going to play a game to explore various types of plants, animals, characteristics of wetlands.
- This assessment will allow me to see what the students already know about the wetlands, and to discuss and cover what they do not know about the wetlands. Let the students know that the more they know or will learn about the wetlands, the better prepared they will be for the game that we are about to play.

Instructional Procedure:

- Place an object from the materials list into the pillowcase. Ask a student volunteer to come up to the front of the class. Blindfold the student and ask him/her to reach into the pillowcase and pull out the object that is inside.
- Ask the student to feel and smell the object. Ask the student to describe to the class, in detail, what he/she feels or smells. Then have the student try to identify the object by touching and smelling it. If the student needs help identifying the object, have the other students in the class offer hints to help out.
- Students will write down and draw their observations in their lab notebook, and classify each animal as an amphibian, fish, bird, reptile, mammal, or insect each time a student pulls an object out of the bag. (If applicable)
- Have students think of additional plants, animals, and characteristics (that have not been discussed) of wetlands by the information they have gathered from the game.
- Have students write down a question they have about the wetlands.
- After the game is complete, brainstorm (on an overhead projector) and discuss what wetlands are, what types of plants, animals, and characteristics the students found, and why they are part of the wetlands.
- Have students respond to two classmates' questions (in lab notebook) after discussion of the wetlands.

Possible Adaptations:

- Have the students form small collaborative groups, providing each group with the same materials (listed above).
- Students will write down and draw their observations in their lab notebook, and classify each animal as an amphibian, fish, bird, reptile, mammal, or insect each time a student pulls an object out of the bag.

- Students will discuss in their groups additional plants, animals, and characteristics of wetlands by the information they have gathered from the game.
- Students will then think of a question they have about the wetlands.
- Have students review others' questions and respond to two of their group member's questions after discussion of the wetlands. (Lab notebook)

Assessment/Criteria:

- Have students turn in their lab notebooks with their definitions, observations, and notes about the wetlands. Lab notebooks will be graded by completion and accuracy of definitions, completion of observations and notes.
- Have students describe in 2 paragraphs, and while using at least three new vocabulary terms, what a wetland is, plants, animals, and characteristics of the wetlands. Will be graded by completion of two paragraphs of the description of a wetland and its characteristics, and the use of at least 3 new vocabulary terms within the paragraphs. Grading will be out of 10 pts.
- Review students' questions and check responses to classmates' questions.

Extensions:

- The following week plan and implement a field trip to a local wetland so the students can explore and become familiar with different aspects of the wetlands.
- Have each student collect 2 objects from the wetland to create their own mystery bag of wetland objects. Take the students mystery bags back to the classroom and have them play the exploring activity with their classmates.

References

Kesselheim, A. S. (2003). *Wow! The Wonders Of Wetlands*. St. Michaels: Environmental Concern Inc.

U.S. Fish and Wildlife Services: National Wetlands Inventory; (n.d.) Retrieved April 5, 2005, from <http://wetlands.fws.gov/definition.htm>)

Wetlands: Webbed Feet Not Required Teacher's Guide. (March, 2005). Retrieved April 5, 2005, from (http://www3.gov.ab.ca/env/resedu/pubs/Wetlands_Teacher_Guide.pdf)

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Spring, 2005

Wetland Wonders

Abstract: This lesson will demonstrate how wetland plants take in pollutants from the water into their tissue. Students will be able to describe the process of removing pollutants from the water and how plants are involved.

Grade Level: Fourth Grade

Utah State Core Curriculum Standards:

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.

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.

- Describe Utah's wetlands (e.g., river, lake, stream, and marsh areas where water is a major feature of the environment) forests (e.g., oak, pine, aspen, juniper areas where trees are a major feature of the environment), and deserts (e.g., areas where the lack of water provided an environment where plants needing little water are a major feature of the environment).

Instructional Time: Lesson takes place over two days. 1st day: 20 minutes to set up experiment and to make hypothesis. 2nd day: 30-45 minutes to see results of experiment and to do assessment worksheet.

Materials:

- Celery stalks with leaves at the top
- Jar of water
- Food coloring
- Knife
- Paper
- Pencils (colored and writing)
- Assessment sheet (at the end of the lesson)
- Filter or sieve

Terminology/Key Vocabulary:

- **Wetlands:** a marsh, swamp or other area of land where the soil near the surface is saturated or covered with water, especially one that forms a habitat.
- **Purification:** the process of ridding something of anything harmful or unwanted.
- **Filters:** a device made of or containing a porous material used to collect particles from a liquid or gas passing through it.
- **Pollutant:** something that pollutes, for example, chemicals or waste products that contaminate the air, soil or water.
- **Toxin:** a poison produced by a living organism, especially bacteria, capable of causing disease.

Intended Learning Outcomes:

- Use Science Process and Thinking Skills
- Manifest Scientific Attitudes and Interests
- Understand Science Concepts and Principles
- Communicate Effectively Using Science Language and Reasoning

Background Information:

A healthy wetland environment can carry out some important functions in cleaning polluted runoff water and wastewater. Pollutants from human activity are found in all populated environments. Pollutants may be made up of different petroleum products, heavy metals, litter, excess nutrients from household use or commercial products (e.g. nitrogen and phosphorus), industrial waste and pesticides. The vegetation that exists in a wetland (the soil, the roots, stems and leaves) help slows the flow of the water through a wetland by acting as a filter. Because this action takes place, water typically flows into a larger body of water in a cleaner condition. Many communities are now using wetlands to help in the water treatment process.

Wetlands are not only beneficial for purification purposes; they are helpful in flood control. The vegetation around the edges of wetlands can act as a hold for floodwaters. The floodwaters can be release slower through the vegetation rather than all at once. This can be related to what the wetland vegetation does for pollutants in the water. The vegetation can hold back the pollutants and release them slowly into the larger bodies of water. This reduces the effects that can result if the pollutants were released in large amounts into the larger body of water.

The vegetation and soil in a wetland can not only trap and hold pollutants, but they may change them over time. The water moves slowly through a wetland and through the natural barriers created by the wetlands allowing the pollutants to settle into the soil and flow in the water farther. The vegetation can act as a filter for larger particles in the water as well like trash and litter. Pollutants settle into the soil (including trash) and soil layers form on top of them. The soil often bonds to the pollutants making them larger objects that will no longer flow out into an open body of water. Sometimes the

microorganisms and other microbial activity in the soil can change the pollutants and make them harmless.

Vegetation does not only act as a filter in a wetland environment, but plant life and activity can also play a significant role in the purification process. When a plant metabolizes, it draws water, nutrients and air through its roots. During the day, plants use carbon dioxide and produce oxygen—this is the photosynthesis process. At night, the plants produce carbon dioxide during respiration. The gas exchanges that are taking place happen through pores in the leaves. The pores also allow for water to escape through them and out of the plant and minerals can leave the plant through this process.

When a plant takes in water, it also takes in any nutrients in that water. These plants can metabolize the extra nutrients in the water that are from human use, thus protecting the open water from these nutrients. The wetland plants also take in pollutants and toxins when they use water. These may be stored in the plants until they are excreted or until the plant dies. It is at this time that the toxins are released into the soil or water and the process will most likely start again. However, some plants may convert the compound to a harmless substance such that its re-release into the environment has little impact. This is called bio-remediation. This is not to say that wetlands can purify and clean all the water. Even wetland plants have their limits. They can only be used to aid in the process, not completely be the only process of cleaning the water.

Eckhardt Slattery, Britt, Higgins, Susan, Kesselheim, Alan, & Schilling, M. (2004). *WOW! The wonders of wetlands*. Bozeman, MT: The Watercourse.

Invitation to Learn: The instructor will ask the students what happens to all of the pollutants in the water. Where do they go? What happens to them? Does anything help clean the water besides more chemicals? The instructor will then talk about the importance of cleaning pollutants from an environment. The instructor will ask why it is important to clean pollutants from an environment.

Prior Knowledge Assessment: Discuss the introductory lesson to the wetlands unit (Wetlands). Discuss the different types of plants that were/are found in a wetland environment. Discuss the types of plants are found in wetlands? Discuss some of the names of plants found in wetlands? The student's responses to the questions asked would lead directly into the lesson or further into a review about the wetland environment and the types of plants found in wetlands. If the students have a sound grasp on the plants in a wetland environment, proceed with lesson.

Instructional Procedure:

1. On day one of the lesson, the students will be paired, each pair being given the material needed to set up the experiment (jar, water, food coloring and leafy stalk of celery).
2. The students will carefully put water and food coloring into the jars. Some assistance may be needed for this.

3. Discuss what **pollutants** and **toxins** are and the students will give examples of pollutants and toxins. Discuss how the food coloring is acting like a pollutant in the water—in our wetland environment.
4. The students will then put a stalk of celery into the jar to sit over night.
5. The students will need to create a title for their wetland plant—they need to name their wetland plant according to the different types of plants that are found in the wetlands. They can make a sign to tape onto the jar.
6. The pairs of students will create a hypothesis pertaining to what they think will happen to their wetland plant in the polluted water.
7. The students will pull out their jars of water and celery at the beginning of class the next day.
8. Students should keep in mind that the jars represent small versions of a wetland environment and the celery stalk to represent a wetland plant.
9. Discuss pollutants and toxins again--refresh the discussion from the previous day.
10. The students will take the celery stalks out of the polluted water.
11. Cut off a section of the celery stalk to show that the colored/polluted water seeped into the celery.
12. The students can see what happened to the celery. Why is the celery colored now?
13. Discuss how the celery helped “clean” the water and relate this to plants in wetland environments and how they are used to cleanse the water. Discuss the word **filter** and **purification**.
14. The students will be asked to draw a picture of what took place in the celery and draw conclusions based on the results of the experiment.
15. They will be asked to write down the tasks that we have just completed and the outcome of those tasks, particularly, what do the celery and other wetland plants have in common and why? They will complete a sheet as to the steps in the experiment, what we were asking and what happened.

Possible Adaptations:

- Students who may need extra help will be placed with another student who can properly help.
- Drawings may be the only assessment needed for understanding.
- ELL or ESL students may only have to draw the phenomena and not write a description—or the other way around.

Assessment:

- Informal- the discussion on the experiment and how plants affect pollution in the water
- Formal-the sheet that the students will fill out on the procedures and outcome of the experiment. Criteria: the students will need to verbalize what the hypothesis was, what the materials were, the procedure and the outcome. The answers will need to be in complete sentences and will need to be relevant to what we are learning. They will also need to draw a representation or picture of what took place during the experiment.

*Adapted from The Wonders of Wetlands

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Spring, 2005

Wetlands Adventure

Abstract: In this lesson, we will be analyzing and identifying the different plants and animals that make up a wetlands ecosystem. If there is a wetlands near by, a field trip to the wetlands will enhance this lesson. This lesson is written with the idea that there is a wetlands near.

Grade Level: 4th Grade

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 2 a: Identify common plants and animals that inhabit Utah's forests, wetlands, and deserts.

State Benchmarks:

- 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

Instructional Time: 3-4 hours, depending on the proximity of the GSL.

Materials:

- Cards with animals and plants of wetlands on them
- Journals
- Digital Camera to take pictures of animals and plants that the students are unable to identify
- Transportation to and from wetlands habitat
- Field guides to identify different plants and animals
- Magnifying glasses
- Ziploc baggies to collect samples of plants
- Permanent marker to mark baggies
- Plant and animal field guides for each of the groups
- Parent volunteers
- Student lunches
- Sunscreen
- First-Aid kit (for teacher to take on the field trip)

Terminology:

- Wetlands: A lowland area, such as a marsh or swamp that is saturated with moisture, especially when regarded as the natural habitat of wildlife.
- Adaptation: The process by which an organism or species becomes suited to its environment
- Invertebrate: Not having a backbone.
- Vertebrate: Having a backbone

- Bird: A feathered vertebrate with a beak, two wings, and two feet, egg-laying and usually able to fly. Examples: red-tailed hawk, barn owl, lark, robin, crow
- Reptile: Any cold-blooded scaly animal of the class Reptilia, including snakes, lizards, crocodiles, turtles, tortoises, etc. Examples: snakes, frogs, toads, tortoise, salamander
- Fish: A vertebrate cold-blooded animal with gills and fins living wholly in water. Examples: trout, catfish, carp
- Mammal: Any vertebrate of the class Mammalia, usually a warm-blooded quadruped with hair or fur, the females of which possess milk-secreting mammae for the nourishment of the young, and including human beings, dogs, rabbits, whales, etc. Examples: muskrat, beaver
- Insect: Any arthropod of the class Insecta, having a head, thorax, abdomen, two antennae, three pairs of thoracic legs, and usually one or two pairs of thoracic wings. Examples: mosquito, moth, butterfly, bee, wasp

ILOs:

- Use science process and thinking skills.
- Manifest science interests and attitudes.
- Understand important science concepts and principles.
- Communicate effectively using science language and reasoning.
- Demonstrate awareness of the social and historical aspects of science.
- Understand the nature of science.

Background Information:

- Students will need knowledge of the plants and animals of the wetlands habitat. This information can be found in the Project Wetlands book, as well as the 4th grade science text, in this case, Globe Fearon Concepts and Challenges Earth Science. Animals include muskrat, beaver, trout, carp, catfish, mosquitoes, mink, fox, hawks (goshawks, red-tailed hawks), avocets, black-necked stilts, Wilson's phalarope, American white pelican, eared grebe, northern pintail, California gulls, pickle weed, ink weed, brine shrimp and brine flies, bison, cattails, cottontail rabbits, mice, rats, jackrabbits, skunks, porcupines, raccoons, voles, weasels, coyotes, antelope, deer, badgers, bobcats, bighorn sheep, greasewood, iodine bush, alkali dropseed, saltbush, salt grass, dragonflies, herons, lizards, turtles, garter snakes, crappie, red-winged blackbird, swallows, flamingo and microscopic bacteria. These can also be found on <http://mrhall.org/gsl/gsl.htm>, a super website for kids that is very interactive.

Invitation to Learn:

- Ask the students, "How many of you know an animal or plant that lives in a wetlands? Think of the Great Salt Lake. What lives there? Today, we will be visiting the wetlands of the Great Salt Lake, where we will be identifying the different plants and animals that live there. Before we leave, we are going to play concentration, using animals and plants that live in the wetlands of the Great Salt Lake."

Prior Knowledge Assessment:

- The invitation to learn is also a prior knowledge assessment, because it gets the students thinking about what they've learned in past lessons.

- Have students play concentration using the Great Salt Lake cards (found in Great Salt Lake Story). Have students pay close attention to the markings and the identifying characteristics of the plants and animals.
- If students know their plants and animals pretty well, they are ready for the field trip. If the students don't know the material very well, it may be important to give them a copy of the concentration cards, or give each group a field guide so that they can look up the different plants and animals that they see. It may also be helpful to frontload which animals and plants the students can expect to see, so that they can have an idea of what to expect.

Procedures: (Things that should be done before the field trip are in BOLD)

- **Be sure to get parent volunteers for the field trip.**
- **Note: It is important to get a parent permission slip signed for any field trip. Be sure that all students have parent permission slips signed!**
Visit this site for information about planning a field trip to the Antelope Island area:
<http://www.xmission.com/%7Efogsl/education/pdf/LLBookPrep.pdf>
- **A week or two before the field trip, go to the area you are planning to take the students. Look it over for any possible problems or areas of concern. Talk to park rangers and the appropriate people at the GSL to set up the field trip so that they know you're coming.**
- **Make sure all students have a lunch, water-bottle, sunscreen and/or a hat.**
- The day of the field trip, have students play concentration.
- Talk with the class about the wetlands. Review with them what they are. Go over the terminology with the class so that they know what you are talking about and what kind of things that scientists say.
- Divide students into groups of three or four, depending on class size.
- Explain to the class the expectations once everyone arrives at the location, i.e., no running in the water, no running on the road, stay in sight of the teacher or a parent volunteer, stay with your group, pick up all trash, etc.
- Hand out field guides to each group. Go over how to use them.
- Show/tell the class about possible animals and plants that they will see at the wetlands. Show them pictures of the most common birds, animals and plants. Have students look up different animals and plants in their field guides, to get some practice. (Be sure to explain to students that they shouldn't try to touch any of the animals, as some of them could possibly be poisonous.)
- Once this is done, have students get their things and load up on the bus to go to the GSL.
- Once at the wetlands area of the GSL (the area before crossing the Causeway to Antelope Island), have students find their groups and stand with them.
- Once at the wetlands of the GSL, tell students that they are going to be scientists today. They are going to be identifying animals and plants that they see. They can collect a piece of the plant to identify it later. (Put it in the baggie). To really see the animals, though, the students need to be really quiet. The students will record in their lab notebooks which animals and plants that they see. Have them draw pictures of some of the plants (5 or so), and of the animals that they see.

- Give each group baggies, as well as magnifying glasses.
- Be sure to tell students that they can't go into the water or the mud.
- Let them get started. Spread the groups out some so that they aren't all in one spot.
- Walk around from group to group, helping students where they need it.
- Have the groups switch areas. Are there any differences in the animals and plants?
- After students have had a chance to get to all of the different places, gather back at the bus.
- Once on the bus, ask students what they found. Which animals did they see? Which plants? Were they surprised by any of the plants or animals that they saw? How did they know which animal it was? Or which plant? Were there any that they didn't see?
- Once back to the classroom, have the groups present what plants and animals that they saw and any that they didn't know. Have the rest of the class try to help identify them. Download the pictures and identify these specimens as well.
- Possible resources for identifying plants and animals are:
 - [The Audubon Society Field Guide to North American Birds Western Region](#)
 - [The Audubon Society Field Guide to North American Reptiles and Amphibians](#)
 - [The Audubon Society Field Guide to North American Mammals](#)
 - [The Audubon Society Field Guide to North American Insects and Spiders](#)
 - [The Audubon Society Field Guide to North American Fishes, Dolphins & Whales](#)
 - [Audubon Guides to National Wildlife Refuges: Rocky Mountains](#)
 - [National Audubon Society First Field Guides for Amphibians](#)
 - [National Audubon Society First Field Guide for Birds](#)
 - [National Audubon Society First Field Guide for Fishes](#)
 - [National Audubon Society First Field Guide for Insects](#)
 - [National Audubon Society First Field Guide for Mammals](#)
 - [National Audubon Society First Field Guide for Reptiles](#)
 - [Redington Field Guide to Biological Interactions: Plants in Wetlands](#) by Charles B. Redington
 - <http://mrhall.org/gsl/gsl.htm> A website for kids that has a lot of information about the different plants and animals in the wetlands at the GSL

Adaptations and Modifications for Special Learning Needs:

- For early finishers, have them try to identify the different birds that they see, apart from the obvious gulls and herons, i.e., flamingo (for the last couple of years, a flamingo that escaped from the Tracey Aviary has been migrating to and from the GSL).
- For physically handicapped students have specimens made available to them for identifying.
- For ELL students, have them work with students who know their language and who can help them.

Assessment:

- Have students write a reflection about the animals and plants that they saw in Utah's unique wetlands. Were they surprised at what was there? Why or why not? What did they like? Dislike? What was the best part of this field trip?
- Look at the lab notebooks. Make sure the students drew the plants and animals that they saw with as much detail as needed to tell what they are. Make sure the

pictures are labeled. If students have drawings of at least 7 animals and 7 plants, then they get 10 points. If they have 5-7, they get 8 points, 2-4, they get 5 points.

Wetland Wonders

Name_____

Name of Wetland Plant? _____

Hypothesis...what is the question that we are asking?

Materials Used:

Procedure...what did you do and Why?

What happened?

Why did we put food coloring in the water? What did it represent?

What happened to the celery? Why?

Why do wetland plants help clean the water?