

# Utah Waters Van Wetlands



**Loveland Living Planet Aquarium**  
Explore, Discover, Learn

## Education Program Sponsors and Partners:



Outreach Education Overview and Resource Materials

# Utah Waters Van Wetlands Teacher Packet



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**EXPLORE, DISCOVER, LEARN**

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&  
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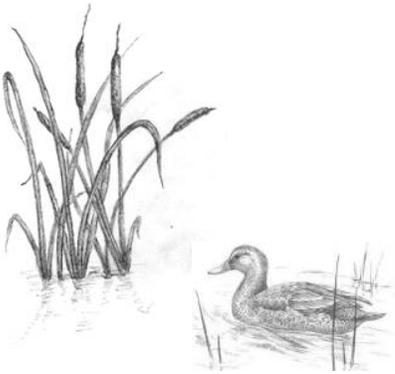
**Or visit our website**  
<http://www.thelivingplanet.com>



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## Why is there an aquarium in a desert?

Where else in the world is water so valued and respected? It's a precious resource that defines how we live in Utah. Because we're not surrounded by oceans and immense water habitats, we have fewer opportunities to experience, understand, and appreciate the water environments that cover more than 70 percent of our planet. Loveland Living Planet Aquarium brings animals to people who might not have the chance to see them or their water-based ecosystems in a natural setting.

Our children are the future custodians of the environment, yet the majority of today's young people don't have the opportunity to understand the ocean nor their own water-dependent environments. Loveland Living Planet Aquarium provides a "living classroom," educating us all about our interdependence on our living planet's fragile ecosystems.

Loveland Living Planet Aquarium is dedicated to celebrating life on Earth by fostering a greater awareness and knowledge of Earth's diverse ecosystems and creating a deeper understanding of our place in the global system of life.

Loveland Living Planet Aquarium is committed to providing opportunities for families to learn about our interdependence with the fragile ecosystems of our planet through entertaining, interactive, educational exhibits and programs. Having this aquarium provides us with countless opportunities to understand and respect this precious resource and the living habitats it supports, both in Utah and in our planet's oceans.



# Education Programs Overview

## Field Trips:

We currently offer field trips for grades PreK-12. Our field trips correlate with the Utah State Core Curriculum guidelines by grade level, as well as the National Science Standards, and Utah Environmental Education Guidelines. This integrated, purpose-driven approach provides for a rich and interesting field trip for students.

More information about our field trips can be found at our website:

<http://www.thelivingplanet.com/index.php/field-trips>

## Outreach Programs:

We currently offer our Rainforest Van Program to 2<sup>nd</sup> grade and our Utah Waters Van Programs to 4<sup>th</sup> grade. Our outreach programs correlate with the Utah State Core Curriculum by grade level. This integrated, purpose-driven approach provides for a rich and interesting educational opportunity for students.

More information about our outreach programs can be found at our website:

<http://www.thelivingplanet.com/index.php/outreach-programs>

## Professional Development:

Loveland Living Planet Aquarium offers free teacher resource programs to public and charter school teachers. The primary goal of these workshops is to support effective science instruction in the classroom by training teachers to engage students with important, relevant science content, equipment and resources, practical applications and classroom activities.

**Utah's Unique Environments:** The Utah's Unique Environments program is specifically for fourth grade teachers. This workshop explores Utah's three major environments: deserts, forests, and wetlands. Teachers – as students – and, as a result, fourth-grade school children will obtain a deeper understanding of what characteristics make up Utah's environments, learn the importance of each of these environments, and study the amazing animals and plants that live in these habitats. Students will observe their own environment up close, learn how to ask questions and employ scientific inquiry to help answer their questions. Classroom materials that each teacher receives will be helpful in transforming the classroom into a young naturalist's headquarters.

**Project WET:** We have collaborated with USEE to offer Project WET workshops for teachers of all grade levels. Project Wet is a FREE internationally recognized program that enhances participants' learning about water! Activities in the Project Wet Curriculum and Activity Guide are correlated with state and national formal education standards. Using interactive, hands-on, cross-curricular, and often inquiry-based methods of learning, participants increase their understanding about water in Utah.

***Interested in attending or hosting a teacher resource program workshop?***

Contact the Education Department at LLPA for more information:

(801) 355-FISH (3474)

# Investigating Utah's Wetlands Program Overview

Thank you for choosing to have Loveland Living Planet Aquarium's Utah Waters Van visit your 4<sup>th</sup> grade students. We look forward to visiting you!

So that our visit will run smoothly, your teacher packet provides an overview of the visit and a checklist of things to accomplish before, during, and after your experience with us.

Our core-based program is designed to be an exciting complement to what you are doing in the classroom. Loveland Living Planet Aquarium's education team examined the Utah State Office of Education's Core Curriculum for fourth grade and created our program and activities to reinforce those standards and objectives. Later in your teacher packet, we list which standards and objectives we cover in our visit.

We begin our fifty-five minute program with an introduction about the activities we will be doing. Then, students will have the opportunity to look closely at the different factors that make wetlands so unique. We break each factor down through inquiry-based, student-centered experiments and observations. Throughout the program, students will have the opportunity to observe live Utah animals up close and determine how their adaptations help them survive in Utah's environments. Students will see amphibians and reptiles such as a red-spotted toad, tiger salamander, banded gecko, and garter snake. The program ends with a class discussion about how they use water and look for ways to conserve this precious resource.

Since our start in 2002, the Utah Waters Van has reach thousands of students in all of Utah's school districts! Last year, we visited over 45,000 students in 558 different elementary schools. Thank you for helping us make our program a huge success!

# Utah Waters Van Program Checklist

## Pre-Visit:

You should have received via email:

\_\_\_\_\_ A confirmation sheet of our scheduled visit to your school. Please review it carefully and notify us if there are any discrepancies.

\_\_\_\_\_ Evaluation sheet for **each** teacher to fill out & return. We appreciate your help in critiquing our programs.

\_\_\_\_\_ Pre-visit and post-visit activities and lesson materials (this packet).

Remember to complete the pre-visit activities before our visit!

## Day of our visit, please provide the following:

\_\_\_\_\_ A wheelchair-accessible room of typical classroom size or larger where our educators can stay set up for the duration of the visit.

\_\_\_\_\_ Access to 1 electric outlet.

\_\_\_\_\_ Chalkboard or white board with writing instruments.

\_\_\_\_\_ Teacher presence, participation, and assistance with behavior management throughout the entire presentation.

\_\_\_\_\_ Nametags on all your students.

\_\_\_\_\_ ***All students MUST wash their hands with soap and water after touching live animals during the program! Hand sanitizer does NOT kill all germs!***

## Post-Visit:

\_\_\_\_\_ Each teacher should fill out and return the evaluation sheet to the presenters before they leave the school, or mail the evaluations sheets to us.

Remember to complete the post-visit activities after our visit!

# Investigating Utah's Wetlands Program

## Core Connections

Connecting  to the Core Standards

Here's where Loveland Living Planet Aquarium's Utah Waters Van Program connects with the Utah State Core for the fourth grade. The connections listed below are only for the Wonders of the Water Cycle program. It is important to note that each pre-visit and post-visit activity in this packet connects to the fourth grade core. Those connections are listed in each activity and the pre-visit page.

### Science Core Curriculum Correlation:

#### Intended Learning Outcomes for Fourth Grade Science

##### 1. Use Science Process and Thinking Skills

c. Make simple predictions and inferences based upon observations.

##### 4. Communicate Effectively Using Science Language and Reasoning

a. Record data accurately when given the appropriate form and format (e.g., table, graph, chart).

#### 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.**
  - a. Compare the physical characteristics (e.g., precipitation, temperature, and surface terrain) of Utah's wetlands, forests, and deserts.
  - b. 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).
- **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.**
  - a. Identify common plants and animals that inhabit Utah's forests, wetlands, and deserts.
  - 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 waxy coating).
  - c. Describe some of the interactions between animals and plants of a given environment (e.g., woodpecker eats insects that live on trees of a forest, brine shrimp of the Great Salt Lake eat algae and birds feed on brine shrimp).

- **Objective 4: Observe and record the behavior of Utah animals.**
  - d. Compare the structure and behavior of Utah amphibians and reptiles.

## Goals and Objectives of the Utah Waters Van Program

Loveland Living Planet Aquarium's education team assembled a set of measurable goals and objectives for the Utah Waters Van *Investigating Utah's Wetlands* program. These goals and objectives are used by our education presenters to assist your students in learning about water during our visit.

### **Goal 1: Students will be excited about and express interest in science.**

- Objective 1: Students will actively participate in one or all ways during the Wetlands program (i.e.: follow directions, discussion, ask or answer questions, nod in agreement, record observations, actively participate in group experiments).
- Objective 2: At least one student in each class will demonstrate a sense of curiosity about science by asking a question about a topic covered.
- Objective 3: At the end of each Wetlands program, most students will agree that they are excited to learn about science.

### **Goal 2: Students will understand the unique components of a wetland environment.**

- Objective 1: Students will compare and contrast components of a wetland with forests and deserts by accurately sorting props and pictures of plants, animals, and other descriptors.
- Objective 2: Given soils from different environments, students will observe and record the speed of water poured through each.
- Objective 3: Students will hypothesize and test the benefits of water moving slowly through wetlands.
- Objective 4: Students will simulate how plants in a wetland help to trap pollutants when provided proper materials.

### **Goal 3: Students will understand how plants and animals use wetlands and other environments in Utah.**

- Objective 1: Through observing a reptile and an amphibian, students will be able to compare and contrast how they utilize wetlands to survive.
- Objective 4: When shown plants and animals from Utah, students will hypothesize which environment they are found in.
- Objective 5: When shown plants and animals from Utah, students will record characteristics that help each organism to survive in its environment.

### **Goal 4: Students will understand the relationship between humans and water as a natural resource.**

- Objective 1: Students will discuss that Earth has a limited supply of water.

- Objective 2: Students will be able to explain how water impacts wetlands.
- Objective 3: Students will be able to hypothesize what would happen if we did not have any wetlands in Utah.
- Objective 5: Students will be able to state at least 3 ways humans can conserve water.

## Pre-visit Resources Summary

The following pages offer pre-visit resources that you can use in the classroom with your class before we visit with Loveland Living Planet Aquarium's Utah Waters Van. These resources correlate with material that will be covered during our visit or in post-visit resources.

The pre-visit resources are divided into the following sections:

**Background Information:** The background information contains conceptual ideas as well as basic vocabulary. It is a useful reference when using the pre-visit and post-visit lessons.

**Pre-visit Lessons:** There are two pre-visit lessons to prepare your students for Loveland Living Planet Aquarium's Utah Waters Van Program. Below is a summary of the lessons and cross-curricular connections. Science Core connections are listed within the lesson. Additionally, the lessons are formatted the same way as our Teacher Professional Development program lessons.

Lesson	Time Requirement	Cross-Curricular Connections
<p><b>Wetland Metaphors</b> Students will develop an appreciation and understanding of wetlands through the power of metaphor, linking the characteristics and natural functions of wetlands to the familiar realm of everyday life.</p>	<p>60 minute class period</p>	<p>Language Arts – Standard 1, Objective 1; Standard 6, Objective 1 Life Skills: Thinking and Reasoning, Personal Growth and Character Development, Communication, Systems Thinking, Employability</p>



# Background Information:

## Definition of a Wetland

Wetlands are ecosystems identified by the presence of water at some point during the year, which creates a unique environment with hydric soils and specially adapted plants and animals.

The four ingredients of a wetland are:

Hydric or saturated soils: Hydric soils are saturated long enough during the growing season to create an anaerobic state in the soil horizon. This lack of available oxygen limits the number of plant species that can survive there.

Hydrophytic or water loving plants: Hydrophytic plants have adapted to thrive in wetlands despite the stresses of an anaerobic and flooded environment.

Bacteria and animals: From bacteria to beavers, wetlands are both home and supermarket for myriad residents. Many animals are adapted to use wetlands for food, shelter, spawning, nesting, or predatory opportunities.

Water: Water must be present in a wetland for at least part of the growing season. Wetland plants and animals that have adapted to live in a wet environment require saturated soils or standing water to grow and survive.

Wetlands are often transition zones between dry land and open water. Some wetlands are consistently covered with water, while others are flooded only at certain times. Wetlands are sometimes formed when surface water collects or groundwater discharges to the surface. Wetlands can be found in all parts of the world and are classified into many types.

## Functions of Wetlands

Habitat: Wetlands are among the most productive ecosystems in the world. Nationwide over 5,000 species of plants, 190 species of amphibians and 270 species of birds depend on wetlands for food, shelter and space. Wetlands are important spawning and nursery areas for commercial and recreational fish and shellfish industries, as well as feeding, nesting and shelter zones for fish and migrant birds. Only 1% of Utah is wetland habitat, but 80% of the organisms in Utah use wetlands at some point in their life cycle.

Climate Control: Many wetlands return over two-thirds of their annual water input to the atmosphere through evapotranspiration, which act to moderate temperatures and humidity in adjacent uplands. Also, wetlands store carbon within dead plant matter and soil, reducing the release of carbon dioxide into the atmosphere. Carbon dioxide is a greenhouse gas that may contribute to global warming.

Decontamination: Wetland soils remove harmful phosphates, metals and agricultural runoff from surface and ground water. Wetland plants take up and use the nutrients and

chemicals carried in collected sediments, which would otherwise contaminate rivers, lakes and groundwater supplies.

Flood Control and Water Storage: Wetlands control flooding by slowing down and spreading out fast moving water. They also absorb water like giant sponges and slowly release it into downstream habitats and groundwater.

Nutrient Cycling: An abundance of decomposers in wetlands continuously break down materials into nutrients and make them available to plants, fish and invertebrates. Wetland processes play an important role in the cycling of carbon, nitrogen, phosphorus and sulfur, constantly transforming and releasing them into the atmosphere. The abundance of aquatic and terrestrial plants in the world's wetlands contributes significantly to oxygen in the atmosphere.

Soil Conservation: Water flowing into wetlands loses speed, causing material eroded from upstream to accumulate for use by plants and animals. Plants bind soil to help it stay in place. Wetlands capture sediments and debris that could otherwise threaten life downstream by filling in deep areas, covering eggs or clogging animals' gills. Some wetlands remove up to 90% of sediments passing through them.

Human Enrichment: Wetlands provide beauty, solitude and recreation, such as wildlife watching!

## Wetland Plants and Animals

Many animals, such as amphibians, reptiles, small mammals, and birds are well suited to survive in a wetland environment. Amphibians generally do well in a wetland environment because of close access to water which is necessary to reproduce. Amphibians can thrive in a wet environment, as it helps to maintain moist skin. Reptiles also do well in wetlands; food and water are usually abundant. Small mammals in the wetlands feast on plentiful insects and fish. Migratory bird populations depend on wetlands for temporary resting areas and warm weather living. In fact, the Rocky Mountain wetlands support approximately 81% of migratory bird populations.

Some examples of wetland animals include:

Invertebrates: Mosquito, Dragonfly, Water Boatman, Crayfish

Fish: Trout, Bluegill, Carp, Bass, Crappie, Catfish

Amphibians: Western (Boreal) Toad, Great Basin Spadefoot Toad, Woodhouse's Toad, Bullfrog, Canyon Tree Frog, Tiger Salamander

Reptiles: Garter Snake, Corn Snake, Snapping Turtle

Birds: Pelican, Ducks, Geese, Eagles, Gulls, Cranes, Avocets, Wilson's Phalarope

Mammals: Beaver, Moose, Muskrat

Some examples of wetland plants include:

Duckweed, Cattails, Bulrush, Cottonwood, Willows

## Wetland Vocabulary

**Adaptation:** A physical characteristic or behavior that assists an organism in survival in its environment.

**Aerobic:** A biological process that requires the presence of oxygen.

**Amphibian:** A cold-blooded vertebrate animal that spends part of its life on land and part in water.

**Anaerobic:** A biological process that does not require the presence of oxygen.

**Animal:** A multicellular heterotrophic organism that has free movement about its environment during one stage of its life.

**Autotrophic:** An organism that is able to produce its own food.

**Bird:** A vertebrate animal with feathers, hollow bones, and wings.

**Fish:** A vertebrate animal that lives and breathes in water.

**Habitat:** An area that provides an organism with adequate food, water, shelter and space.

**Heterotroph:** An organism that is not capable of making its own food.

**Horizon:** A distinct layer of soil approximately parallel to the surface of the earth.

**Hydric:** Characterized by abundant water.

**Hydrophytic:** Refers to plants whose habitat is water or very wet places.

**Insect:** An animal that usually has a hard outside shell, three body segments, 6 paired legs, two paired antennae, and compound eyes.

**Invertebrate:** An animal that does not have a backbone.

**Mammal:** An animal that usually has fur on its skin, warm blooded, and produces milk for its young.

**Migration:** The annual travel of an animal, specifically bird, between seasonally productive habitats. Some birds can travel up to 20,000 miles in one year.

**Plant:** An autotrophic organism that usually cannot move during the later stages of its life.

**Reptile:** A cold-blooded vertebrate with unique skin that is dry and covered with scales.

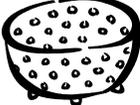
**Riparian Zone:** The area immediately surrounding a body of water such as a lake, river, or stream. Riparian zones are abundant with vegetation and plant life.

**Saturated:** A state of soil or land when unable to hold more liquid, the soil is soaked or filled to capacity.

**Vertebrate:** An organism that has a backbone.

**Wetland:** An ecosystem identified by the presence of water at some point during the year, which creates a unique environment with hydric soils and specially adapted plants and animals.





## Wetland Metaphors

### Pre-visit Activity 1

Wetland Metaphors is a *Project WILD Aquatic Guide* activity and reprinted with permission.

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### *Alignment to Utah Core Curriculum*

**Grade Level:** 4<sup>th</sup> Grade

**Intended Learning Outcomes (ILOs):**

1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles

**Utah Science Core Curriculum Standard:**

Standard V

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

**Utah Science Core Curriculum Objective:**

Objective 1

Describe the physical characteristics of Utah's wetlands, forests, and deserts

**Enduring Understanding:**

To use a metaphor is to apply a word or phrase to an object or concept which it does not literally denote, in order to suggest a comparison between the two. A metaphor represents a concept or idea through another concept or idea. Many of the major attributes of wetlands can be explored through the use of metaphors.

**Essential Questions:**

1. What are the characteristics of wetland soils?
2. How are wetlands important to wildlife and humans?

## Background:

OBJECT	METAPHORIC FUNCTION
Sponge	Absorbs excess water caused by runoff; retains moisture for a time even if standing waters dries up (e.g., sponge placed in a small puddle of water absorbs water until saturated, then stays wet after standing water has evaporated)
Pillow or bed	Is a resting place for migratory birds
Mixer or egg beater	Mixes nutrients and oxygen into the water
Cradle	Provides a nursery that shelters, protects, and feeds young wildlife
Sieve or strainer	Strains silt, debris, etc., from water
Filter	Filters impurities from water
Antacid	Neutralizes toxic substances
Cereal	Provides nutrient rich foods
Soap	Helps cleanse the environment

## Activity:

### Length of Activity:

60 minutes

### Materials Needed:

Large pillowcase or box  
Sponge  
Small pillow  
Soap  
Eggbeater or mixer

small doll cradle  
sieve or strainer  
paper coffee filter  
antacid tablets  
small box of cereal

3X5 cards with pictures that could be used to show other wetland metaphors (a zoo could represent the idea of wildlife diversity in a wetland, a lush vegetable garden could represent the idea of a productive wetland in which food is abundant, a vacation resort could represent the idea of a resting or wintering place for migrating waterfowl).

Note: A metaphoric approach such as this allows a variety of objects to suggest some appropriate linkage to the basic characteristics of wetlands.

### Procedure:

1. Prepare a "Mystery Metaphor Container" (pillowcase, bag, or box). It should be possible for the student to put his or her hand into the container and pull out an object. You may want to collect as many as one metaphoric object per student, but at least have enough for one per group of four students. Put the container aside to use later.

2. Discuss the variety of wetlands found in your local area, state, country, etc. Then invite the students to sit quietly and close their eyes. Ask them to imagine and visualize a wetland. Have them examine what it looks like. Have them look carefully at the plants and animals, including insects and small creatures. What does the air feel like? How does it smell?

OPTIONAL: Play a tape recording of natural sounds from wetlands. Some are available commercially in record and nature stores.

3. Invite the students to tell what they imagined. Compile a list of their offerings. Encourage discussion and mutual sharing.

4. With their list as a point of reference, help the students identify which plants and animals are actually most likely to be found in a wetland. If possible, have them classify the plants and animals according to the kind of wetland in which they would be found. State or federal wildlife officials and representatives of private conservation or nature-related organizations can be helpful. The series of Golden nature guides from Western Publishing Company, Inc. are also useful. "Wading into Wetlands" from the National Wildlife Federation's *Naturescope* series includes a variety of useful information as well.

5. Next provide the students with background information to serve as an overview of the basic ecological activities that characterize the wetland habitat. For example, you can include the following:

- Sponge effect – absorbs runoff
- Filter effect – takes out silt, toxins, wastes, etc.
- Nutrient control – absorbs nutrients from fertilizers and other sources that may cause contamination downstream
- Natural nursery – provides protection and nourishment for newborn wildlife

Suggest that these activities and many more that they could probably think of are taking place in wetlands all the time.

6. Now bring out the "Mystery Metaphor Container." Tell the students that everything in the container has something to do with a wetland. Have the students divide into groups of four. Announce that when it is their turn, you want a representative of each group to draw an object from the container. Then, as a group, they must figure out how the object could represent what a wetland is or does.

7. Have the designated student reach into the container and withdraw one object. When each group has an object, ask them to work as a team to describe the relationships between their metaphoric object and the wetland. Encourage the students to build on each other's ideas. You can also assist by strengthening their connections. NOTE: Allow the students time to discuss their ideas with each other before doing so in front of the entire class.

8. Ask each group to report their ideas to the class.

9. Following discussion and review of the functions represented by each metaphor, ask the students to summarize the major roles that wetlands perform in contributing to habitat for wildlife. List the ways in which wetlands are important to humans. Why do humans convert wetlands to other uses? Ask them if their own attitudes about wetlands are different now. If yes, how? If not, why not?

10. For the final part of this activity, encourage the students' understanding of how the wetlands' condition depends upon each of us. Many kinds of wildlife depend upon wetlands. Our own well-being requires wetland ecosystems. Strengthen the students' understanding of the connectedness that humans have to wetlands. Recreation,

aesthetics, utilitarian uses, environmental quality, and nature study are but a few of the connections we each have with wetlands.

### **Formative Assessment Strategies:**

As a class, answer the following questions: What is a wetland? Name three reasons wetlands are important. Name some animals that spend part of their lives in wetlands.

### *Learning Extensions:*

Ask your students to generate an additional list of wetland metaphors.

### **Booklist**

Environmental Concern. (2003). *WOW! The Wonders of Wetlands*. St. Michaels, Maryland.  
Western Regional Environmental Education Council. (2007). *Project Wild Aquatic*. Boulder, Colorado.

### **Agencies**

Utah State University Water Quality Extension: <http://extension.usu.edu/waterquality/index.cfm>

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### **Research:**

Krueger, A., & Sutton, J. (2001). *EDThoughts What We Know About Science Teaching and Learning*. Denver, Colorado: McREL.  
Hands on experiences help students make meaning about scientific phenomena and help students move from more concrete to abstract levels of thinking. Ongoing learning assessment with timely, focused feedback helps students attain deeper understanding.

# Post-visit Resources Summary

The following pages offer post-visit activities that you can use in the classroom after we visit with Loveland Living Planet Aquarium's Utah Waters Van. These resources correlate with material that will be covered during our visit or in pre-visit materials.

**Post-visit Lessons:** There are five post-visit lessons to assist your students in learning the information for Loveland Living Planet Aquarium's Utah Waters Van Program. Below is a summary of the lessons and cross-curricular connections. Science Core connections are listed within the lesson. Additionally, the lessons are formatted the same way as our Teacher Resource Pilot Program lessons.

Lesson	Time Consideration	Cross-Curricular Connections
<p><b>A World of Water</b> This activity is designed to introduce students to the locations where water is held.</p>	<p>60 minute class period</p>	<p>Language Arts – Standard 1, Objective 1 Mathematics – Standard 1, Objective 1; Standard 4, Objective 1 Life Skills: Thinking and Reasoning, Personal Growth and Character Development, Communication, Systems Thinking, Employability</p> <p>Learning Extension – Standard 5, Objective 1</p>
<p><b>The Shortest Shower</b> In this activity, students come to understand the importance of conserving water.</p>	<p>10 minutes each day to record students' times 30 minutes to calculate who had the shortest shower</p>	<p>Language Arts – Standard 1, Objective 1 Mathematics – Standard 1, Objective 2 Social Studies – Standard 1, Objective 2, 3; Standard 3, Objective 1 Life Skills: Thinking and Reasoning, Personal Growth and Character Development, Communication, Systems Thinking, Employability</p>

Lesson	Time Consideration	Cross-Curricular Connections
<p data-bbox="253 163 509 195"><b>What is a Wetland?</b></p> <p data-bbox="185 201 587 365">In this activity, students will build their own wetland model with sponges acting as land. They will observe what happens when it rains.</p>	<p data-bbox="667 163 954 195">60 minute class period</p>	<p data-bbox="1036 163 1412 264">Language Arts – Standard 1, Objective 1; Standard 6, Objective 1</p> <p data-bbox="1036 270 1399 371">Social Studies – Standard 1, Objective 3, Standard 3, Objective 1</p> <p data-bbox="1036 378 1406 537">Life Skills: Thinking and Reasoning, Personal Growth and Character Development, Communication, Systems Thinking, Employability</p>





# A World of Water

## Post-visit Lesson 1

### *Alignment to Utah Core Curriculum*

**Grade Level:** 4<sup>th</sup> Grade

**Intended Learning Outcomes (ILOs):**

1. Use Science Process and Thinking Skills.
2. Manifests Scientific Attitudes and Interests
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning.

**Utah Science Core Curriculum Standard:**

Standard I

Students will understand that water changes state as it moves through the water cycle.

**Utah Science Core Curriculum Objective:**

Objective 1

Describe the relationship between heat energy, evaporation and condensation of water on Earth.

Objective 2

Describe the water cycle.

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**Enduring Understanding:**

Earth is considered a blue planet due to the vast amounts of water on it. However, only a small portion of that water is available for human consumption.

**Essential Questions:**

1. How much water do we have on Earth compared to land?
2. Where is water located on Earth?
3. What percent of all the water on Earth is fresh usable water?

*Activity:*

**Length of Activity:**

60 minutes for activity

**Materials Needed:**

Globe/Map of the Earth  
Photocopies of "A World of Water" activity sheet  
2 containers for each group  
Markers and masking tape to label containers  
1 measured tablespoon of salt for each group

- 1 1/4 measured cups of water for each group
- 1 1/4 measured cups of vegetable oil for each group
- Blue food coloring
- 1 large clear container for each group
- 1 measured cup for each group
- 1 measured tablespoon for each group
- 1 measured teaspoon for each group
- 1 dropper for each group

**Materials Provided:**

Digital copy of “A World of Water” activity sheet

**Helpful Hints:**

- If a dropper is not available, consider dipping the end of a pencil into the liquid and using as it a dropper.

**Procedure:**

1. Photocopy enough “A World of Water” activity sheets for all students in your class.
2. As a class, examine a globe or map of the Earth. Ask the class to estimate how much of the Earth is covered with water and land. Is there more land or water covering the Earth’s surface? What percent of the Earth’s surface is covered by land? What percent of the Earth’s surface is covered by water?
3. After the class has had an opportunity to discuss how much of the Earth is covered by water, explain that approximately 75% of the Earth’s surface is covered by two kinds of water, salt water and fresh water.
4. Hand out “A World of Water” activity sheet to all students and divide them into small groups.
5. Ask your groups to generate a list of the locations where we can find water on Earth. Ask them to record their list on “A World of Water” activity sheet. For example, oceans, rivers, lakes, the atmosphere, plants, etc.
6. Ask each group to think about what they know about portions or percentages of water found in various locations on Earth.
7. Hand out the supplies to each group. Each group should receive:
  - a. 2 containers. One container should be filled with water, salt, and labeled salt water. The other bottle should be filled with blue food-colored vegetable oil and labeled fresh water.
  - b. 1 large clear container
  - c. 1 cup
  - d. 1 tablespoon
  - e. 1 teaspoon
  - f. 1 dropper
8. Tell your students that they are going to be combining portions of the salt water and the fresh water that represent water that is found in various locations on Earth into the large clear container. At the end of the activity, all the water in the clear container will represent all of the water on Earth.
9. Write on the board how much salt water and fresh water should be added to the large container. Note that the order listed below is the order that the water should be added to the large clear container:

### Salt water

a. Oceans: 1 cup

b. Salt Lakes: 1 drop

### Fresh water: blue food-colored vegetable oil

c. Glaciers: 1 tablespoon

d. Ground Water: 1 teaspoon

e. Fresh Water Lakes: 3 drops

f. Rivers: 1 drop

g. Atmosphere/Gas: 1 drop

10. Have students pour the amounts needed for each location into the clear container which will hold all of the water on Earth. Students should take turns so that they are all involved.

11. After all the portions of water are in the large container. Ask students to fill out the rest of "A World of Water" activity sheet.

### **Formative Assessment Strategies:**

Students will successfully answer the review questions following the initial activity.

### *Learning Extensions:*

Create a bar graph of the percentages of water found in various locations on Earth. This can be done as a class, small groups, or individually by the students.

Oceans : 97.6%

Salt Lakes: 0.007%

Glaciers: 2.07%

Ground Water: 0.29%

Fresh Lakes: 0.012%

Atmosphere/Gas: 0.001

Rivers: 0.0001%

*Data can vary due to environmental factors*

*Source: U.S. Geological Survey*

### **Booklist**

Reference Book:

Cunningham, W.P., Cunningham M.A., & Saigo, B.W. (2007). *Environmental science: A global concern*. Boston: McGraw Hill.

### **Websites**

United States Geological Survey: <http://ga.water.usgs.gov/edu/earthwherewater.html>

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### *Research:*

Krueger, A., & Sutton, J. (2001). *EDThoughts What We Know About Science Teaching and Learning*. Denver, Colorado: McREL.

Hands on experiences help students make meaning about scientific phenomena and help students move from more concrete to abstract levels of thinking. Ongoing learning assessment with timely, focused feedback helps students attain deeper understanding.

Michaels, S., Shouse, A., Scheingruber, H. (2007). *Ready, set, science!: Putting research to work in K-8 science classrooms*.

This book highlights practical application of current science education research into kindergarten through eight grade science classrooms.

# World of Water

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. List locations where water is found on Earth.
  
  
  
  
  
  
  
  
  
  
2. After the fresh water was added to the salt water in the large clear container, how did the mixture look?
  
  
  
  
  
  
  
  
  
  
3. Based on your observations of the mixture in the large clear container, is there more salt water or fresh water on Earth? \_\_\_\_\_
  
  
  
  
  
  
  
  
  
  
4. How would you confirm your answer to number 3?
  
  
  
  
  
  
  
  
  
  
5. How do humans use salt water?
  
  
  
  
  
  
  
  
  
  
6. How do humans use fresh water?
  
  
  
  
  
  
  
  
  
  
7. Would it be a good idea for humans to use all the fresh water on Earth? Why or why not?





# The Shortest Shower

## Post-visit Activity 2

### *Alignment to Utah Core Curriculum*

**Grade Level:** 4<sup>th</sup> Grade

**Intended Learning Outcomes (ILOs):**

1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests

**Utah Science Core Curriculum Standard:**

Standard 1

Students will understand that water changes state as it moves through the water cycle.

**Utah Science Core Curriculum Objective:**

Objective 2

Describe the water cycle.

---

**Enduring Understanding:**

Utah is the second driest state in the nation and yet we have the second highest per capita consumption of water. To live a more sustainable life, we must learn to conserve water in our everyday lives.

**Essential Questions:**

1. What are ways that humans can conserve water?
2. How much water is saved by taking a shorter shower?

*Activity:*

**Length of Activity:**

10 minutes each day to record students' times  
30 minutes to calculate who had the shortest shower

**Materials Needed:**

1 chart similar to the one below  
1 "Shortest Shower Award"

**Materials Provided:**

Digital copy of the chart similar to the one below  
Digital copy of the shortest shower award

**Procedure:**

1. Make a chart like the one shown below. Write the names of the students in your class in the left hand column.

Name of Student	Time spent showering on							Total Time Spent Showering	Average Time Spent Showering
	Sun	Mon	Tues	Wed	Thu	Fri	Sat		

2. For one week, have each student time his or her showers. Record the number of minutes and seconds each student's shower takes.

3. At the end of the week, total the minutes and seconds each student has spent showering. Divide this total by the number of showers taken by the student to determine the average shower length.

4. Fill in "Shortest Shower Award" and present to the student who has averaged the shortest shower time.

6. Compare the average time spent showering to the amount of water used in the average showers listed below.

- A ten-minute shower uses more than 100 gallons of water.
- A two-minute shower uses about 24 gallons of water.
- An average full bathtub uses more than 40 gallons of water.

5. Have a class discussion with your class about the reasons that they would want to or not want to conserve water. Possibly discuss ways that your students can conserve water.

**Formative Assessment Strategies:**

Students will discuss as a class reasons why they would want to conserve water and ways to conserve water.

*Learning Extensions:***Websites:**

Central Utah Water Conservancy District: <http://www.cuwcd.com/>

Division of Water Resources: <http://www.conservewater.utah.gov/>

Utah State University: <http://extension.usu.edu/drought/htm/home>

World Watch Institute: <http://www.worldwatch.org/>

# *The Shortest Shower Award*

is presented to

\_\_\_\_\_

for conserving water by averaging

only \_\_\_\_\_ minutes per shower

between \_\_\_\_\_ and \_\_\_\_\_

**GREAT JOB!!!!**

Signed \_\_\_\_\_





# What is a Wetland?

## Post-visit Activity 3

Wetland in a Pan from *Wow! The Wonders of Wetlands* is used with permission from Environmental Concern Inc. For further information contact Environmental Concern Inc. at 410-745-9620 or visit [www.wetland.org](http://www.wetland.org).

### *Alignment to Utah Core Curriculum*

**Grade Level:** 4<sup>th</sup> Grade

#### **Intended Learning Outcomes (ILOs):**

1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles

#### **Utah Science Core Curriculum Standard:**

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

#### **Utah Science Core Curriculum Objective:**

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

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#### **Enduring Understanding:**

Wetlands are areas covered with water during some part of the year, special soil, water loving plants and animals and bacteria. The soil in a wetland helps to filter pollutants and sediments from runoff, reduce flood damage, and prevent soil erosion.

#### **Essential Questions:**

1. What four things do I need to have a wetland?
2. What is special about the soil in a wetland, what does it do?
3. Why are wetlands around the Great Salt Lake so important?

#### *Activity:*

#### **Length of Activity:**

60 minutes

#### **Materials Needed:**

For each wetland model:

- Long shallow pan (such as a rolling paint pan)
- Scraps of sponges
- Watering can or similar device (such as ½ gallon plastic milk jug w/lid and holes, or water pitcher)
- Soil to make water dirty
- Modeling clay (optional – if you want to have the students create a more accurate model of a wetland)

### Helpful Hints:

- Make sure each group is given enough 'wetland' materials to completely fill in the space between the land and water. The model won't work if there are large spaces under the wetland or between it and the sides of the pan.
- The sponges should be slightly damp in order to stick properly in place on the pan.
- Instruct the students to pour their water slowly onto the model. If they pour too fast, their sponges will get washed away.

### Procedure:

1. Begin by asking the students what they have learned about wetlands already. Where are they located in Utah? How much of Utah is covered by wetlands? What special things do wetlands do? Instruct them to record a few facts they know about wetlands on their student worksheets.
2. Split the students up into groups of 3-4 students. Tell the students they will be making models of wetlands today. Give each group the materials to make their wetland.
3. Have the students make the wetland after giving these instructions: Approximately half the pan should be land, half should be water. The pans should be tilted so the land gently slopes to the water (they may have to use books to prop up the pans). Give each group a set of sponges. The sponges can be used to represent their wetlands. Have the students think about why you gave them sponges to represent wetlands. Let them decide as a group where to put the sponges and how many to include.
4. Once each group has finished constructing their wetland, gather them together and let them know it is time make it rain on their models. Ask them what will happen to the rainwater when it passes through the wetland. Show them the dirty water they will use. What will the sponges do? Have the students record their hypotheses on their datasheets.
5. Allow each group to make it rain on their wetland. Have the students write down their observations about what happened to their own wetland. Where did the dirt go? What did the sponges do with the dirt and water? Were there any wetlands that stopped all the water from entering the lake? Did some of the water get trapped in the sponges?
6. Have the students empty water from their pans back into the pitcher. Challenge them to make a model that will stop the most dirt from entering the lake and give them time to construct their new wetlands. Have them record on their datasheet what changes they made and why.
7. Test their new wetlands with the dirty water. It might be helpful to have an extra pan available that already contains the sponges fitting completely across the pan to have out as a test model for the second time around.
8. Clean-up: Remove sponges from each model. Squeeze excess water from all sponges into the containers and gather the water into a large bucket. The water can be poured on bushes/grass. Wipe down paint trays with paper towels.
9. Discuss with the students what they discovered with their wetland models. Through their experiences, they should have discovered that wetlands will absorb water as it flows down to a lake/reservoir. The process of slowing the water down will help to reduce flooding and prevent soil erosion. The soil in the wetland can also help trap sediment and other pollutants and prevent them from entering the lake. Discuss the importance of wetlands around the Great Salt Lake. As a terminal lake, pollutants and

sediments have nowhere else to go. The wetlands around the lake can help with water quality.

### **Formative Assessment Strategies:**

During the activity, students will have worked cooperatively in their groups to brainstorm ideas on how to address teacher challenge. Students will have successfully completed their student datasheet.

### *Learning Extensions:*

#### **Booklist**

Environmental Concern. (2003). *WOW! The Wonders of Wetlands*. St. Michaels, Maryland.

Western Regional Environmental Education Council. (1987). *Project Wild Aquatic*. Boulder, Colorado.

#### **Agencies**

Utah State University Water Quality Extension: <http://extension.usu.edu/waterquality/index.cfm>

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#### **Research:**

Anderson, K.L., Martin, D.M., & Faszewski, E.E. (2006). Unlocking the power of observation. *Science and Children*, 44, (1), 32-35.

This article discusses how observation is the cornerstone of the inquiry process, which lays the groundwork for future scientific learning. Suggestions are given on how to help students make good observations and how to help students communicate those observations. Also included is an assessment checklist and rubric for assessing students' observation abilities.

Krueger, A., & Sutton, J. (2001). *EDThoughts What We Know About Science Teaching and Learning*. Denver, Colorado: McREL.

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This book highlights practical application of current science education research into kindergarten through eighth grade science classrooms.

# Additional Water and Wetland Resources for Educators:

## **Division of Water Resources - Water Education**

Water information and ideas for educators

1594 W. North Temple

Salt Lake City, UT 84116

801-538-7230

<http://www.watereducation.utah.gov>

## **EPA Environmental Kids Club**

<http://www.epa.gov/kids/water.htm>

## **EPA Wetlands Information**

<http://www.epa.gov/owow/wetlands/>

## **Project Wet**

Water education for teachers

<http://www.projectwet.org>

## **Utah Wetland/Environmental Sites:**

Bear River Migratory Bird Refuge (<http://www.fws.gov/bearriver/>)

Utah Botanical Center (<http://utahbotanicalcenter.org/>)

Farmington Bay Waterfowl Management area

([http://wildlife.utah.gov/habitat/farmington\\_bay.php](http://wildlife.utah.gov/habitat/farmington_bay.php))

Great Salt Lake Shorelands Preserve

(<http://www.nature.org/wherewework/northamerica/states/utah/preserves/art5834.html>)

Provo River Restoration Project

(<http://www.mitigationcommission.gov/prrp/prrp.html>)

Utah Lake Wetlands Preserve

([http://www.mitigationcommission.gov/wetlands/wetlands\\_ulwp.html](http://www.mitigationcommission.gov/wetlands/wetlands_ulwp.html))

## **Utah Society for Environmental Education:**

A nonprofit umbrella organization that guides, informs, and represents Utah environmental education (EE) providers and links state and national efforts.

<http://www.usee.org>

## **USU Water Quality Extension**

<http://extension.usu.edu/cooperative/waterquality/>

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