

# Wings & Water Wetlands Education Program Fall POST-Tour Classroom Activities

The Nature Conservancy 



SHORELANDS  
PRESERVE

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## HOW TO USE THESE POST-TOUR ACTIVITY PAGES

You should review and implement these post-tour materials and activities in your classroom soon AFTER you take your students on their Fall *Wings & Water* preserve tour. The Discovery Guide pages and additional activities will help to effectively integrate the tour into your wetlands education plan.

Learning that has been built into these post-tour activities and materials includes:

1. The *Great Salt Lake Shorelands Preserve* is a wetlands sanctuary where people can see and learn about healthy *wetlands* and their residents.
2. Wetlands are linked to all parts of the *water cycle*.
3. Wetlands *soils* are special both in the way they capture runoff and sediments and how they develop over time to sustain wetland habitat.
4. *Plants and animals* in the Great Salt Lake wetlands have fascinating *adaptations* that allow them to thrive.
5. The health of a wetlands system is the result of countless *interactions* between plants, animals and various nonliving features.
6. Wetlands are modified by our *weather and climate*.
7. *Wetlands* are rare and valuable *habitats* that everyone has a role in protecting.

For each of these topics, we provide the following:

1. **Meeting the Standard**—explains which state core curriculum science standards correlate to each topic.
2. **Checkpoints for Teaching**—describes the concepts that should be incorporated into your lesson plan and that you should ensure students understand.
3. **Student Discovery Guide Activities**—in-class activities based on the Student Discovery Guide. Provided to you by The Nature Conservancy, the Discovery Guides serve as workbooks and field guides with specific pages that correlate to the five pre-tour topics listed above.
4. **Related Vocabulary**—a list of topical vocabulary that should be addressed in your lesson plan.
5. **Background Information**—topic-specific information designed to help teachers prepare their lesson plans.
6. **Options for Further Activity**—other concepts and ideas for activities.
7. **Other Resources**—references for more information.

**Please Remember:** These in-class materials and activities are designed to enhance your students' wetlands education and *Wings & Water* Tour experience. They have been constructed to help you meet the State Core Curriculum Standards for the study of wetlands and should work hand-in-hand with curriculum that you already have in place. As you plan your science curriculum for the year, please incorporate these topics and activities into your classroom studies with your class field trip in mind.



FALL

## POST-Tour Topic #1: Our Wetlands

**THEME:** *The Great Salt Lake Shorelands Preserve is a wetlands sanctuary where people can see and learn about healthy wetlands and their residents.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about wetlands after they take their FALL preserve tour.

### Student Reports from Their Tours

Your students should be able to:

- Discuss their experiences from their Naturalist Guided Tour.
- Share their Composite Poetry sentence from the tour, located on page 17 in their Discovery Guides.

### A Special Kind of Wetland

Your students should:

- Understand that the habitat surrounding them at the Preserve was a kind of wetland known as a *marsh*.

### Formation and Maintenance of Great Salt Lake Wetlands

Your students should understand:

- Conditions that form wetlands, and cause them to remain or disappear.
- Reasons for wetlands being concentrated along the southern and eastern shores of Great Salt Lake.

### Important and Unique Features and Services of Wetlands

Your students should:

- Be aware that more than half of all wetlands that existed in the lower 48 states two hundred years ago have been destroyed, mostly because of our own ignorance about their value.
- Know that, depending on climate conditions, Utah is the first or second driest state in the nation (Utah was drier than Nevada during part of our most recent draught cycle), and yet the wetlands found at Great Salt Lake are among the most important in the world.
- Be able to describe at least five unique benefits that wetlands provide to people and wildlife.

### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**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 animals have adapted to the environment in which they live.

## Student Discovery Guide Activities

Use the *Student Field Guide* and *Discovery Guide* to review and assess learning from the checkpoints listed above.

### STUDENT REPORTS FROM THEIR TOURS & COMPOSITE POETRY

**Facilitate a classroom discussion during which** students use their Discovery Guides or previously written reports to contribute highlights from their Preserve tours. (see the Teacher Background section for more details).

Collect the *Discovery Guides*. See the following Teacher Background section for suggestions about transcribing your students' Composite Poetry sentences into a finished Classroom Composite Poem.

### FIELD GUIDE PAGES 2–7 – FEATHERED STARS

During the Preserve tours, each student was assigned to a team that studied a one of six bird species in the activity called “Feathered Stars.” As part of that study, each team member took notes in his or her *Student Field Guide* to become an expert about one of four topics about their bird: *Adaptations*, *Food & Feeding*, *Reproduction* or *Highlights*. This activity describes how to facilitate *A Conference of Experts* in which team members combine their expertise about the species they studied.

1. GATHER THE SPECIES GROUPS. Assemble the students with their *Student Field Guides* according to which of the six bird species they studied during the Preserve tour. This should result in 6 groups. Distribute a *Feathered Stars Datasheet* to each student. (This worksheet can be found on the website [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under the SUPPORT MATERIALS section.) Instruct all to complete the information at the top.
2. TRANSFER EXPERT INFORMATION TO THE WORKSHEET. Everyone should quietly transfer their own *Student Field Guide* expert notes about their species to their own worksheet.
3. EXCHANGE INFORMATION. Members of each Species Group should take turns reporting to each other from their area of expertise, using the notes they just transferred to their worksheets. As they do so, the rest in the group should add this new information to their own worksheets.
4. By the end of this process, everyone should have a worksheet containing a summary of all information gathered about their bird species: *Adaptations*, *Food & Feeding*, *Reproduction* and *Highlights*.\*
5. This information can then be shared with other Species Groups, or posted in the classroom as part of a story about world famous birds at the Great Salt Lake's wetlands.

\*Depending on the size of your tour groups, the expert role for the “Highlights” category in the *Feathered Stars* Preserve tour activity may not have been assigned. In such cases, information from this category is optional.

## **DISCOVERY GUIDE PAGE 4- WETLANDS: What Good Are They?**

- Direct the students to page 4 to review what they learned about wetlands. Have them each complete the three questions on that page. (for more activities, see Options for Further Activity)
- Collect the *Discovery Guides* and store them for later use

### **Support Material**

*A full-page version of the wetlands illustration from Student Discovery Guide centerfold pages 18-19 and an assortment of Plant and Animal Fact Sheets are available for download at [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.*

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

___ <b>ADAPTATION</b>	___ gas	___ preserve ( <i>n</i> )
___ <b>ALGAE</b>	___ groundwater	___ <b>PRODUCER</b>
___ <b>AQUATIC</b>	___ habitat	___ salinity
___ <b>AVOCET</b>	___ hydric soil	___ sediments
___ camouflage	___ <b>IBIS</b>	___ shelter
___ climate	___ ignorance	___ shorebird
___ community	___ invertebrate	___ soil
___ condensation	___ liquid	___ solid
___ conservation	___ marsh	___ space
___ <b>CURLEW</b>	___ migration	___ trait
___ data	___ molt	___ transpiration
___ dirt	___ naturalist	___ uplands
___ ecology	___ <b>PHALAROPE</b>	___ vegetation
___ ecosystem	___ <b>PHOTOSYNTHESIS</b>	___ water cycle
___ elevation	___ <b>PLANT</b>	___ watershed
___ environment	___ playa	___ weather
___ evaporation	___ <b>PLOVER</b>	___ <b>WEED</b>
___ food chain	___ pond	___ <b>WETLAND</b>
	___ precipitation	



## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### Classroom Composite Poem

A culminating activity during your students' Preserve tours was a Composite Poetry activity. For this, the students quietly reflected upon their wetlands visit and wrote on page 17 of their Discovery Guides to complete the sentence, "Great Salt Lake wetlands are places where..."

Beginning your lesson with some volunteer readings from this activity will help your students recall their experience and increase motivation for classroom discussions. The "composite" part of this activity lies in its intent to also help you assemble a single classroom poem to be shared later on. This poem is composed of sentences from all participating students and adults. To construct this poem, proceed as follows.

1. Gather all Student Discovery Guides, plus any Composite Poem Cards completed by participating adults.
2. Transcribe all sentences into a word processing document on a computer. It is not necessary to begin each sentence with "Great Salt Lake wetlands are a place where" at this time. To easily distinguish one sentence from the next, you might find it useful to increase paragraph spacing.
3. Use "cut & paste" to arrange sentences with similar themes together, flowing smoothly from one theme into another.
4. To ensure an authentic product, editing should be kept to a minimum.
5. In preparing the finished poem, keep these suggestions in mind:
  - a. Consider editing any unusually long sentences by choosing the more unique portions.
  - b. Consider consolidating sentences that use exactly the same word or phrase into faithful expressions without the redundancy.
  - c. Try to group the poem in stanzas of 6–8 lines each, and only use the words "Great Salt Lake wetlands are a place where" to *begin* each stanza.
  - d. It can also be effective to occasionally begin a sentence with "Here," "Where," "And," or "This is where" to further enhance the flow.
  - e. Try to save some of the more global or poignant lines for the last stanza.
  - f. Give your poem a title, such as "Great Salt Lake Wetlands."
6. Share the finished poem as a reading and with a handout during a final lesson for this unit.

## **Student Reports from Their Tours**

Your students will likely have been divided into as many as four “Pods” for their Preserve tours. It might be helpful to reassemble the students into these same groupings in class so they can review what they saw and learned before reporting to the entire class.

In many cases, the students will have used the Field Guide section of their *Student Discovery Guides* during their guided tours to identify and learn about wetlands Producers (plants and algae), Invertebrates or Mammals. Take full advantage of these prior experiences by inviting students to refer to specific Field Guide pages as you construct the class species list.

## **Formation & Maintenance of Great Salt Lake Wetlands**

Principal conditions that form wetlands:

1. Climatic conditions that cause a reliable presence or reappearance of water at or near the surface.
2. An area sufficiently level for sediments to collect, soils to develop and plants to grow over time.

Conditions that cause wetlands to permanently or temporarily diminish or disappear can be natural or cultural (of human origin). Natural causes include climate change, catastrophic flooding and major earth movement (such as earthquakes or landslides). Cultural causes include water diversions or diking and the addition of fill materials for building projects. The loss of 51% of all wetlands in the continental US has been of human origin. Human changes are usually permanent.

Why do we find the Great Salt Lake wetlands where we do? Many of Great Salt Lake’s abundant wetlands are located on the southern and eastern shores of the lake due to three contributing circumstances (in order of importance):

1. Water from nearby mountains brings water and sediments in streams flowing down the slopes leading to the lake’s southern and eastern shores.
2. Prevailing winds and wave action from the north and west bring various minerals and nutrients to the lake’s southern and eastern shores.
3. Most industrial development and modifications of original wetlands has occurred in the more western portions of the lake, while most conservation efforts have focused on the southern and eastern shores.

These circumstances have been responsible for both the original formation and the continued maintenance of these wetlands.

## **Some Benefits From Wetlands (From Project SLICE, FRIENDS of Great Salt Lake.)**

WILDLIFE 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.
WILDLIFE PROTECTION	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.
HUMAN ENRICHMENT	Wetlands provide beauty, recreation and solitude to many.
CLIMATE CONTROL	Many wetlands return over two-thirds of their annual water input to the atmosphere through transpiration, which acts to moderate temperatures and humidity in adjacent uplands.
CO <sub>2</sub> COLLECTION	Wetlands store carbon within peat and soil, reducing the release of carbon dioxide into the atmosphere.
DECONTAMINATION	Wetlands clays and 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.
EROSION CONTROL	Water flowing into wetlands is spread out and slowed, making it less destructive. Plants also bind soil to help it stay in place.
FLOOD CONTROL	By causing waves and fast-moving water to slow down and spread out near large lakes and seacoasts, wetlands act as buffers to protect inland life and property.
GLOBAL CYCLING	Wetland processes play a planetary role in the cycling of carbon, nitrogen, phosphorus and sulfur, constantly transforming and releasing them into the atmosphere.
NUTRIENT RECYCLING	An abundance of decomposers continuously break down materials into nutrients used by plants, fish and invertebrates.
OXYGEN PRODUCTION	The abundance of aquatic and terrestrial plants in the world's wetlands contributes significantly to planetary oxygen.
RAIN MAKING	Dimethyl sulfide released from wetlands may act as a seed for cloud formation.
SILT REMOVAL	Wetlands capture sediments and debris that could otherwise threaten life downstream by filling in deep areas, covering eggs or clogging animals' gills. Studies show that some wetlands remove up to 90% of sediments passing through them.
SOIL CONSERVATION	Water flowing into the flat terrain and dense vegetation of wetlands loses speed, causing material eroded from upstream to accumulate for use by local plants and animals.
WATER STORAGE	Wetlands store precipitation and surface water like giant sponges, slowly releasing it into downstream habitats and groundwater. Researchers have discovered ground water recharge equal to 20% of a wetland's seasonal volume.

## **A Special Kind of Wetland**

The Great Salt Lake Shorelands Preserve contains a mixture of wetlands habitats, primarily marsh, mudflat, playa and pond. Most of the wetland habitat in the immediate vicinity of the Preserve Visitor Center is marsh.

A useful definition of a marsh is:

*A low wetland formed at the edge of a lake or mouth of a stream and with mostly nonwoody plants, such as bulrush, reeds and grasses.*

See below for a summary of common kinds of wetlands.

## **Major Kinds of Wetlands**

From the Utah Wetlands Interpretive Network (UWIN) document, "Definition of Wetlands & Supplemental Information." (<http://www.utahwetlands.org/education.htm>)

### ***Marsh***

Marshes are usually inundated with water—surface water levels generally vary from a few inches to two or three feet. Marshes may be adjacent to lake fringes, pond edges, river edges or they may end by feeding into the groundwater system (subsurface flow).

### ***Mudflat or Saltflat***

These wetlands are "flats" that may have outlets to other water bodies, and often will have no vegetation associated with them. They often occur on large, dry lake bottoms, such as Lake Bonneville. They are only fed by precipitation.

### ***Playa***

A playa is a depression with very little vegetation, no outlets to other water bodies, and a high salinity. A playa has distinct wet and dry seasons. The depressions that form playas are thought to be created either by wind or natural sinkholes in the ground. Playas are common around Great Salt Lake and in the Great Basin.

### ***Pond***

These wetlands are depressions in the ground where water collects. Ponds are not as deep as lakes – they must be less than 6 feet deep. Ponds can be found at any elevation, although they can be formed in many different ways.

### ***Riparian Wetland***

Not all riparian areas include wetlands. Those areas found along the edges of rivers or streams that include wetland vegetation and hydric soil are wetlands. Where there is little precipitation, such as in southern Utah, riparian wetlands are an oasis of life. Some riparian wetlands may be parts of a river that were cut off long ago from the rest of the river (cutoff meander, or old oxbow).

### ***Wet Lake Margin or Lake Fringe***

These wetlands are along the edges of lakes or man-made reservoirs. The water level in the fringe is maintained by the lake level. When the lake level is high, the fringe would be flooded and as the lake level goes down, the fringe is saturated but has no surface

water. In Utah, wet lake margins may include salt grass, bulrushes, and spikerush, in addition to reedgrass and cattails.

***Wet Meadow***

Wet meadows sometimes appear dry due to the heavy grassland associated with them. In fact, for most of the year they don't have standing water, but the soil is saturated due to the high water table. Surface water is usually present only during the spring growing season. Wet meadows can either be found on a slope (such as a slope angled toward a river), or on the outside edge of a depression. For example, a pond may have a marshy area associated with its edges, and outside of the marshy area may be a wet meadow.

## Options for Further Activity

- **Student Reports from Their Preserve Tours:** Your students will likely have been divided into as many as four “Pods” for their Preserve tours. It might be helpful to reassemble the students into these same groupings in class so they can review what they saw and learned before reporting to the entire class.

In many cases, the students will have used the Field Guide section of their *Student Discovery Guides* during their guided tours to identify and learn about wetlands Producers (plants and algae), Invertebrates or Mammals. Take full advantage of these prior experiences by inviting students to refer to specific Field Guide pages as you construct the class species list.

- **Explore the different kinds and locations of wetlands found in Utah.**
- **Compare and contrast physical characteristics of wetlands environments with those of forests and deserts.**
- **Assign word games on pages 8 and 9 in the *Student Discovery Guide*.** (Answer keys to these word games are available in the SUPPORT MATERIALS section of our website [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) .)

FALL

## POST-Tour Topic #2: Watersheds and Wetlands

**THEME:** *Wetlands are linked to all parts of the water cycle.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about watersheds and wetlands after they take their FALL preserve tour.

#### The Greater Salt Lake Watershed

Your students should be able to...

- Define a *watershed*.
- Identify the Great Salt Lake and the three main rivers in its watershed on a map.
- Explain how the Great Salt Lake Watershed links all three major Utah environments: forests, wetlands and deserts.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

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

*Objective 1:* Describe the relationship between heat energy, evaporation and condensation of water on Earth.

*Objective 2:* Describe the water cycle.

### Relationships between the Water Cycle, a Watershed and Wetlands

Your students should understand that...

- Water flowing through a watershed is being replaced by water from the water cycle.
- Great Salt Lake wetlands depend on the watershed for all of its water.

### Student Discovery Guide Activities

These activities correlate to the Student Discovery Guide. If you have already completed this activity during the Pre-Tour classroom learning portion of Wings & Water, you should use the Options for Further Activity that follow.

#### PAGE 5 – THE WATER CYCLE: A Never-ending Tour

- Direct the students to page 5. Have them each color, label and diagram according to the directions.
- Here are some notes regarding the correct answers, beginning with the leftmost arrow and moving clockwise around the graphic:
  1. *Evaporation* is shown on the left emerging as vapor waves from the lake.
  2. *Condensation* is shown in the form of a pair of clouds near the sun.
  3. *Precipitation* is shown as rainfall from the largest cloud.
  4. *Runoff* is depicted as snowmelt running down the hill at the top right.

5. *Infiltration* is indicated where runoff is percolating into the ground.
  6. A *Spring* is shown where streams of water emit from the ground.
  7. *Groundwater* is indicated by the arrow pointing to an underground aquifer.
  8. *Respiration* is represented by the deer standing near the small lake.
  9. *Transpiration* is represented by the trees at the lower left.
  10. A *River* is indicated near the center winding past some conifer trees.
- Collect the *Discovery Guides* and store them for later use.

## **Support Materials**

*A full-page version of the Water Cycle worksheet (page 5 of Discovery Guide) is available for download on the Conservancy's web site: [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.*



## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

___ adaptation	___ <b>GAS</b>	___ preserve ( <i>n</i> )
___ algae	___ groundwater	___ producer
___ aquatic	___ habitat	___ salinity
___ avocet	___ hydric soil	___ sediments
___ camouflage	___ ibis	___ shelter
___ climate	___ ignorance	___ shorebird
___ community	___ invertebrate	___ soil
___ <b>CONDENSATION</b>	___ <b>LIQUID</b>	___ <b>SOLID</b>
___ conservation	___ marsh	___ space
___ curlew	___ migration	___ trait
___ data	___ molt	___ <b>TRANSPIRATION</b>
___ dirt	___ naturalist	___ uplands
___ ecology	___ phalarope	___ vegetation
___ ecosystem	___ photosynthesis	___ <b>WATER CYCLE</b>
___ elevation	___ plant	___ <b>WATERSHED</b>
___ <b>ENVIRONMENT</b>	___ playa	___ weather
___ <b>EVAPORATION</b>	___ plover	___ weed
___ food chain	___ pond	___ wetland
	___ <b>PRECIPITATION</b>	

## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### Watersheds

A useful definition for a **watershed**:

*An area where all water drains to the same place.*

(That place could be a river that is itself part of a larger watershed, or it could be a final destination in the form of a lake or a sea.)

All major watersheds consist of three parts, from beginning to end: mountains (or high ground), one or more rivers, and a lake or ocean.

All water flowing on the earth's surface or underground is part of a watershed. You cannot stand anywhere on Earth and *not* be in part of a watershed.

Watersheds come in all *scales*. At one extreme, you might stand in your driveway or school parking lot and observe snowmelt or rainfall flowing to a drain or gutter—*that* is a watershed. At the other extreme, view the Salt Lake Valley from an airplane or on a physical map and you can observe a major regional watershed system. An example of a continental watershed system would be the entire drainage area of the Mississippi River, from Minnesota to Louisiana. All small watersheds are parts of larger ones. Put another way, all major watersheds are composed of tens, hundreds or thousands of lesser watersheds. Land managers and ecologists tend to focus on larger watershed systems because of the many plant and animal interrelationships they contain.

Any one place in a watershed is affected by what happens higher up.

Understanding watersheds helps make sense of how the land and its ecosystems are involved in the water cycle, and reveals how different parts of an ecosystem—the deserts, wetlands and forests of the Greater Salt Lake Ecosystem, for example—are all connected, despite their differences.

### Great Salt Lake Watershed

All water flowing into the Great Salt Lake and its wetlands is part of the *Great Salt Lake Watershed*.

The Great Salt Lake Watershed is unusual because it ends at a terminal lake rather than an ocean.

The Great Salt Lake Watershed links all *forest* environments in the Wasatch Mountains with all *desert* and *wetland* environments at the Great Salt Lake.

## Options for Further Activity

Incorporate teaching from other aspects of fourth grade science that complements these watershed and water cycle studies by...

- Arranging a visit to a water treatment plant.
- Comparing and contrasting relationships between the Greater Salt Lake Watershed and different habitats found in wetlands, forests and deserts. For example, where different environments are located in the watershed, the states of water in each environment, how much water is usually found, how long and during which season water remains.
- Introducing additional vocabulary words and their meanings from the list.
- Assigning word games on pages 8 and 9 in the *Student Discovery Guide*. (Answer keys to these word games are located at [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS)

## Other Resources

*Keep It Pure* Watershed Activity Guide, from Salt Lake City Department of Public Utilities [in publication, access TBA]



FALL

## POST-Tour Topic #3: Soils

**THEME:** *Wetlands soils are special both in the way they capture runoff and sediments and how they develop over time to sustain wetland habitat.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about soils after they take their FALL preserve tour.

#### Dirt or Soil?

Your students should understand:

- How soils are created, maintained and lost over time.
- The difference between “soil” and “dirt.”

#### Soil as Habitat Maker

Conduct a review discussion that confirms that your students can:

- Define “habitat.”
- Explain why habitats are important.
- Explain that *marshes, playas, ponds* and *uplands* are different kinds of habitat.
- Describe how wetlands soils are the foundation of wetland habitat.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**STANDARD III.** Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.

*Objective 1:* Explain how the processes of weather and erosion change and move materials that become soil.

*Objective 3:* Observe the basic components of soil and relate the components to plant growth.

### Student Discovery Guide Activities

Use the Student Discovery Guide to review and assess learning from the checkpoints listed above.

#### PAGE 10 – HABITATS: Havtahavahabitat

- Direct the students to page 10 for a review of soils and habitats. Have them each complete the page according to the directions given.
- Student Reports About Soils From The Preserve Tour: Facilitate a classroom discussion during which students use their Discovery Guides or previously written reports to contribute highlights specific to soils from their Preserve tours.

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

___ adaptation	___ gas	___ preserve ( <i>n</i> )
___ algae	___ groundwater	___ producer
___ aquatic	___ <b>HABITAT</b>	___ salinity
___ avocet	___ <b>HYDRIC SOIL</b>	___ <b>SEDIMENTS</b>
___ camouflage	___ ibis	___ shelter
___ climate	___ ignorance	___ shorebird
___ community	___ invertebrate	___ <b>SOIL</b>
___ condensation	___ liquid	___ solid
___ conservation	___ <b>MARSH</b>	___ space
___ curlew	___ migration	___ trait
___ data	___ molt	___ transpiration
___ <b>DIRT</b>	___ naturalist	___ <b>UPLANDS</b>
___ ecology	___ phalarope	___ vegetation
___ ecosystem	___ photosynthesis	___ water cycle
___ elevation	___ plant	___ watershed
___ environment	___ <b>PLAYA</b>	___ weather
___ evaporation	___ plover	___ weed
___ food chain	___ <b>POND</b>	___ <b>WETLAND</b>
	___ precipitation	

## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### Dirt or Soil?

Soil is made of broken down and mixed pieces of rock and minerals, decayed plants and animals, and decomposers. It is created by a combination of deposited sediment and nutrients recycled from previous life.

Soil can be lost from flooding, mudslides, avalanches, wind and the loss of soil-holding plants from fire, disease or a variety of human activities.

Soils are the source of food (nutrients) and shelter for most plants and many animals. Although it is only a few feet thick on the Earth's surface, it is directly or indirectly responsible for the survival of nearly all of Earth's land-based occupants. Even the oceans depend on soils to obtain the minerals delivered by rivers. The very salinity of the oceans—and of the Great Salt Lake, for that matter—is the result of minerals that have eroded from land.

“Dirt” is a word generally avoided by scientists, because it usually describes substances found in human habitats where we don't want them. Synonyms are grime, filth, dust, crud and muck, none of which do justice to the importance of soil in natural systems.

From the perspective of natural systems and as a general rule, the substance in which organisms live and plants grow is “soil” and *never* “dirt.” For convenience, we might say that soil only becomes *dirt* when we find it in places we don't think it belongs, such as on our clothes or in our homes.

### Soil as Habitat Maker

One convenient definition of *habitat* is:

*The area in which a plant or animal normally lives.*

This definition also implies the importance of habitats because, unlike people, most plants and animals are specialized with adaptations for acquiring food, water, shelter and space in particular places. When habitat is lost, many of the plants and animals that lived or would have lived there might be unable to find another place nearby that both meets their needs and is not already occupied by others.

Wetlands soils are the foundation for wetlands habitat because their moisture and content determine the kinds of plants that will grow, which in turn influences the kinds of animals that find food or shelter there. In fact, soils are the foundation of all land-based habitats.

## Options for Further Activity

To incorporate teaching from other aspects of fourth grade science that complements these soils studies:

- Conduct classroom experiments with soils and plants or plant seeds to examine germination success and growth rates. Explore such variables as soil moisture, soil texture, soil salinity and sunlight.
- Assign word game pages 8 and 9 in the *Student Discovery Guide*. (Answer keys to these word games are located online at [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.)



# FALL

## POST-Tour Topic #4: Plants and Animals

**THEME:** Plants and animals *have fascinating adaptations that allow them to thrive in Great Salt Lake wetlands.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about wetland plants and animals after they take their FALL preserve tour.

#### Plants or Weeds?

You students should be able to:

- Describe what a *plant* is.
- Define *photosynthesis*.
- Describe the difference between a *plant* and a *weed*.

### Student Discovery Guide Activities

Use the Student Discovery Guide to review and assess learning from the checkpoints listed above. These activities correlate to page 7, 11, 15 and 18-19 of the Student Discovery Guide.

#### PAGE 7 – ADAPTATIONS: Nature’s Problem-Solvers

- Unless you had already chosen to do so previously in Pre-Tour section #4, direct the students to complete page 7 in the *Student Discovery Guides*.

#### PAGE 11 – ADAPTATIONS: Secrets to Success

- Direct the students to page 11 and have them each complete the page according to the directions given.

#### PAGE 15 – WETLANDS SPECIES LIST

- Construct a class list of species seen, heard or discussed during their tours. Explain a similarity and a difference between *algae* and *plants*. Classify their list according to whether the species are Plant, Animal or Other. Discuss different ways that some of the species are adapted to live where and how they do (For more info, see the Teacher Background Section).

#### PAGES 18-19 (centerfold illustration) – I WAS THERE

- Direct the students to the centerfold illustration. Challenge them to identify, color and label up to ten producers, animals and other wetlands features in the drawing.
- Collect the *Discovery Guides* and store them for later use.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**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 animals have adapted to the environment in which they live.

## **Support Materials**

*A full-page version of the centerfold illustration and detailed Plant and Animal fact sheets are available for download on the Conservancy's web site:*

*[www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.*

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

<input type="checkbox"/> <b>ADAPTATION</b>	<input type="checkbox"/> gas	<input type="checkbox"/> preserve ( <i>n</i> )
<input type="checkbox"/> <b>ALGAE</b>	<input type="checkbox"/> groundwater	<input type="checkbox"/> <b>PRODUCER</b>
<input type="checkbox"/> <b>AQUATIC</b>	<input type="checkbox"/> habitat	<input type="checkbox"/> salinity
<input type="checkbox"/> avocet	<input type="checkbox"/> hydric soil	<input type="checkbox"/> sediments
<input type="checkbox"/> camouflage	<input type="checkbox"/> ibis	<input type="checkbox"/> shelter
<input type="checkbox"/> climate	<input type="checkbox"/> ignorance	<input type="checkbox"/> shorebird
<input type="checkbox"/> community	<input type="checkbox"/> invertebrate	<input type="checkbox"/> soil
<input type="checkbox"/> condensation	<input type="checkbox"/> liquid	<input type="checkbox"/> solid
<input type="checkbox"/> conservation	<input type="checkbox"/> marsh	<input type="checkbox"/> space
<input type="checkbox"/> curlew	<input type="checkbox"/> migration	<input type="checkbox"/> trait
<input type="checkbox"/> data	<input type="checkbox"/> molt	<input type="checkbox"/> transpiration
<input type="checkbox"/> dirt	<input type="checkbox"/> naturalist	<input type="checkbox"/> uplands
<input type="checkbox"/> ecology	<input type="checkbox"/> phalarope	<input type="checkbox"/> vegetation
<input type="checkbox"/> ecosystem	<input type="checkbox"/> <b>PHOTOSYNTHESIS</b>	<input type="checkbox"/> water cycle
<input type="checkbox"/> elevation	<input type="checkbox"/> <b>PLANT</b>	<input type="checkbox"/> watershed
<input type="checkbox"/> environment	<input type="checkbox"/> playa	<input type="checkbox"/> weather
<input type="checkbox"/> evaporation	<input type="checkbox"/> plover	<input type="checkbox"/> <b>WEED</b>
<input type="checkbox"/> food chain	<input type="checkbox"/> pond	<input type="checkbox"/> wetland
	<input type="checkbox"/> precipitation	

## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### Class Species Lists

“Producers” is the term used for the Field Guide section of the Discovery Guide pertaining to wetland plants and algae.

The various species of algae are most often classified by taxonomists as either Protists (one-cell organisms possessing a nucleus) or Monerans (more ancient one-cell organisms, such as bacteria, lacking a nucleus).

For this study unit, our main interest in algae is that they are very important residents of wetlands, similar to plants in their ability to manufacture their own food from the sun. It is inaccurate, however, to refer to algae as plants, since algae lack the roots, stems and leaves of plants.

### Plants or Weeds?

A *plant* is classified as a large group of living things, each of which is made up of many cells and able to make its own food through the process of *photosynthesis*. Plants are unable to move on their own and have no nervous system. The cells of plants have hard cell walls made mostly of cellulose, which the digestive systems of herbivores are adapted to break down during digestion.

A short definition of *plant*:

*A living thing made of many cells and able to manufacture its own food by photosynthesis.*

“Photosynthesis” literally means “creating from light.” A short definition of *photosynthesis* :

*The process that allows some living things to make their own food from a combination of water, carbon dioxide and sunlight.*

The oxygen we breathe is the waste product of photosynthesis. Carbon dioxide is a waste product from animals when they breathe. The cycling of carbon dioxide and oxygen between the Earth’s plants and animals is a classic example of the many “balances of nature.”

“Weed” is a word often used to describe plants growing where we don’t want them, such as in our lawns or gardens.

Scientists usually reserve the term “weed” or “noxious weed” to describe non-native plants that have been intentionally or accidentally introduced from other continents. Such plants become problems in natural systems for one or more of these reasons:

- They crowd out native plants.

- They have no natural predators to control their growth.
- Their leaves, stems, flowers, seeds or roots are rarely useful to native animals.

### **Options for Further Activity**

To incorporate teaching from other aspects of fourth grade science that complements these plants and animals studies:

- Instruct the students to develop individual or group reports of different plants or animals, seen at the Great Salt Lake Shorelands Preserve, including the different ways each species is adapted to its environment(see the Field Guide pages in the *Student Discovery Guide*.)
- Have the students compare and contrast the adaptive strategies between the plants and animals of wetlands, deserts and forests.
- Assign word game pages 8 and 9 in the *Student Discovery Guide* (answer keys for the puzzles can be found on the *Wings and Water* website at [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under *SUPPORT MATERIALS*.)



FALL

## POST-Tour Topic #5: Interrelationships

**THEME:** *The health of a wetlands system is the result of countless interactions between plants, animals and various nonliving features.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about interrelationships after they take their FALL preserve tour.

#### Relationships Between Plants & Animals

Your students should be able to:

- Describe three different examples of how animals benefit from plants.
- Describe three different examples of how plants benefit from animals.
- Explain *a food chain*.
- Describe a food chain found in wetlands.
- Describe a relationship found in wetlands between a plant and an animal that is not a food chain.

#### Relationships with Nonliving Things

- Your students should be able to describe two relationships that involve a non-living feature in a wetland, one with a plant and another with an animal.

#### The Science of Relationships

Your students should be able to define:

- *Ecology*.
- An ecological *community*.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**STANDARD V.** Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.

*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 animals have adapted to the environment in which they live.

## Student Discovery Guide Activities

Use the Student Discovery Guide to review and assess learning from the checkpoints listed above. These activities correlate to pages 12 and 13 of the Student Discovery Guide.

### PAGE 12 – INTERRELATIONSHIPS: Nothing Stands Alone

- Direct the students to page 12 for a review of wetlands relationships between plants, animals and nonliving features. Have them each complete the page according to the directions given.

### PAGE 13 – LIFE LINKS

- Direct the students to page 13 for a review of relationships in the form of food chains. Have them each complete the two diagrams shown.
- Be advised that these are *not* food chain diagrams, since the flow of energy from food does *not* cycle, only matter does. Energy flows but one way. These diagrams are meant to show *relationships*, which could exist in various forms, including as nutrients (food), cover (shelter or protection), or transportation (such as for seeds).
- Some guidelines for introducing or discussing the diagrams on page 13:
  1. Introduce the activity by reviewing with the students various ways that living and nonliving things depend on each other, such as for food, cover, escape, protection, building material, seed dispersal, etc.
  2. Two partially completed diagrams are provided for the students to describe two different series of relationships between living and nonliving things.
  3. Both the upper and lower diagram start and end with soil and water, signifying how all materials are in a continuous cycle from the Earth, through living things and back again.
  4. The sun appears central to each diagram to remind us that this endless cycling of materials is driven mostly by the sun's energy.
  5. Soil, nutrients and water can provide living things with food, shelter and/or other benefits. Therefore, the name of a plant, algae or an animal that receives some benefit from soil or water should go into the first oval spaces shown by the arrows moving from soil and water.

(Some examples are voles that use the Earth for shelter, algae that uses the water for shelter and nutrients, or cattails that use soil and water for nutrients.)
  6. The second oval space in each diagram is for the name of a plant or animal that depends in some way on the lifeform named in the first space.



7. The third oval space in each diagram is for the name of a plant or animal that depends in some way on the lifeform named in the second space.
  8. The bottom diagram provides a fourth space to allow students to include yet another stage of dependency by naming a plant or animal that depends on the lifeform named in the third blank space.
- Collect the *Discovery Guides* and store them for later use.

## **Support Materials**

*A full-page version of the centerfold illustration and detailed Plant and Animal fact sheets are available for download on the Conservancy's web site: [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.*

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

___ adaptation	___ gas	___ preserve ( <i>n</i> )
___ algae	___ groundwater	___ producer
___ aquatic	___ habitat	___ salinity
___ avocet	___ hydric soil	___ sediments
___ camouflage	___ ibis	___ shelter
___ climate	___ ignorance	___ shorebird
___ <b>COMMUNITY</b>	___ invertebrate	___ soil
___ condensation	___ liquid	___ solid
___ conservation	___ marsh	___ space
___ curlew	___ migration	___ trait
___ data	___ molt	___ transpiration
___ dirt	___ naturalist	___ uplands
___ <b>ECOLOGY</b>	___ phalarope	___ vegetation
___ ecosystem	___ photosynthesis	___ water cycle
___ elevation	___ playa	___ watershed
___ environment	___ plover	___ weather
___ evaporation	___ plant	___ weed
___ <b>FOOD CHAIN</b>	___ pond	___ wetland
	___ precipitation	

## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### Relationships between Plants & Animals

Some ways in which insects, reptiles, fish, birds and mammals benefit from plants:

- For food in the form of seeds, roots, fruits, bark, sap and greens.
- For shelter in the form of deadfall, snags, bark, roots, tree cavities, leaves, shade, and concealment.
- For building materials in the form of leaves, branches, bark and seed down.

Some ways in which plants benefit from animals:

- From seed dispersal in storage caches, on fur and feathers or in droppings.
- From nutrients cycled through urine, droppings and decomposed bodies.
- From soil maintenance provided by tunnels and digging.

A simple definition of a *food chain*:

*Two or more living things linked by one being eaten by another.*

Some examples of wetlands food chains:

- Bulrush seeds eaten by a marsh wren.
- Duckweed eaten by a fish, eaten by a pelican.
- Bulrush seed eaten by a vole, eaten by a fox.
- Algae eaten by brine shrimp, eaten by an eared grebe.
- Grass eaten by a caterpillar, eaten by a preying mantis, eaten by a shrew.
- Algae eaten by a midge larva, eaten by a shrew, eaten by a weasel, eaten by an owl.

Some examples of wetlands relationships that are not food chains:

- Red-winged blackbirds using cattail down for nesting material.
- Muskrats using reeds to build a lodge.
- Fish using duckweed for shade and cooling.
- American avocets using water to protect their nests from predators.

### Relationships with Nonliving Things

Some examples of wetlands plant and animal relationships with nonliving things:

- A plant absorbing sunlight, carbon dioxide and water for photosynthesis.
- A plant using wind to disperse pollen or seeds.
- A plant using day length to signal sprouting or dormancy.
- Algae using water for habitat and dispersal.
- Mammals using the air to carry scent.

- A fox using the ground for a den.
- A duck or beaver using water for escape or protection.
- A bird using the air for flight.

### **The Science of Relationships**

A useful definition of *ecology*:

*The scientific study of relationships between living things and their environment.*

An ecological *community* is all of the plants and animals that share a common habitat and depend on each other for survival. The marshes along the eastern shores of the Great Salt Lake form a wetlands community. An assemblage of interconnected communities in a region forms an *ecosystem*.

A simple definition of an ecological *community*:

*All of the interacting plants and animals sharing a habitat.*

### **Options for Further Activity**

To incorporate teaching from other aspects of 4th grade science that complements these ecology studies:

- Organize student groups in a culminating project to create a large wetlands mural. Assign different specialties to groups, such as wetlands scenery and captions, wetlands plants, wetlands animals, plant and animal adaptations, food webs and other interrelationships.
- Assign word game pages 8 and 9 in the *Student Discovery Guide*. (Answer keys for these puzzles are available on the *Wings and Water* website [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater) under SUPPORT MATERIALS.)

### **Other Resources**

- Useful Encarta Encyclopedia articles about *ecosystems* and *how ecosystems work* can be found at:  
[http://encarta.msn.com/encyclopedia\\_761582459/Ecosystem.html#p12](http://encarta.msn.com/encyclopedia_761582459/Ecosystem.html#p12)
- Planet Pals Ecology Dictionary: <http://www.planetpals.com/ecodictionary.html>
- Recycle4Schools Ecology Dictionary:  
<http://www.recycle4schools.org.uk/main.php/page/ecology.htm>

FALL

## POST-Tour Topic #6: Weather and Climate Data

**THEME:** *Wetlands are modified by our weather and climate.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about weather and climate after they take their FALL preserve tour.

#### Weather Variations Based On Elevation

- Your students should be able to explain how weather conditions are affected by elevation.

#### Weather Data

- Your students should be able to use graphed weather data to make correlations between precipitation and conditions such as stream flow, Great Salt Lake surface elevation and wetlands habitat.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**STANDARD II.** Students will understand that the elements of weather can be observed, measured and recorded to make predictions and determine simple weather patterns.

*Objective2:* Interpret recorded weather data for simple patterns.

### Student Discovery Guide Activities

Use the Student Discovery Guide to review and assess learning from the checkpoints listed above. These activities correlate to page 6 of the Discovery Guide.

#### PAGE 6 – WEATHER AND CLIMATE: Patterns of Change

- Direct the students to page 6 for a review of some of what they have learned about weather and climate. Have them each complete the graphing assignment and write answers to the questions given.
- Correct answers for the Discovery Guide page 6 worksheet:
  1. 1986.
  2. 1963.
  3. The best answers are Precipitation and Evaporation. Other answers could be: rainfall, snowfall, temperature, cloud cover.
  4. Several connections exist between Great Salt Lake and its wetlands:
    - The level of the lake helps determine where and how much water is in its wetlands.
    - The level of the lake alters or shifts the locations of shoreline, playa and nesting habitat.

- The lake level changes the amount and distribution of salinity in wetlands, which benefits some species of birds and plants, and hinders others.
    - All such changes tend to impact various plant and animals differently.
  - 5. The level of the lake helps determine where and how much water is in its. When migratory birds return to a nesting or feeding location that has changed from the year before, they must seek a new location elsewhere along the lake that fills their needs.
  - 6. Fortunately, Great Salt Lake is a large and dynamic system. So, while what had been an ideal spot one year may become unsatisfactory the next, it is also true that what had been unsatisfactory one year can become an oasis the next. You will be able to find another spot within the Lake Ecosystem to take care of your needs!
- Collect the *Discovery Guides* and store them for later use.

### **Support Materials**

*A full-page version of the graph shown on page 6 of the Discovery Guide is provided for use in the classroom as overhead transparency or handout on The Nature Conservancy website [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater).*

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS. Your students should be familiar with them before their visit to the Preserve.

___ adaptation	___ gas	___ preserve ( <i>n</i> )
___ algae	___ groundwater	___ producer
___ aquatic	___ habitat	___ salinity
___ avocet	___ hydric soil	___ sediments
___ camouflage	___ ibis	___ shelter
___ <b>CLIMATE</b>	___ ignorance	___ shorebird
___ community	___ invertebrate	___ soil
___ condensation	___ liquid	___ solid
___ conservation	___ marsh	___ space
___ curlew	___ migration	___ trait
___ <b>DATA</b>	___ molt	___ transpiration
___ dirt	___ naturalist	___ uplands
___ ecology	___ phalarope	___ vegetation
___ ecosystem	___ photosynthesis	___ water cycle
___ <b>ELEVATION</b>	___ plant	___ watershed
___ environment	___ playa	___ <b>WEATHER</b>
___ evaporation	___ plover	___ weed
___ food chain	___ pond	___ wetland
	___ <b>PRECIPITATION</b>	

## **Teacher Background Information**

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### **Weather Variations Based on Elevation**

It is generally true that at any given time the higher the elevation, the lower the temperature and the greater the likelihood of precipitation.

Temperature usually lowers with increased elevation because the density of air decreases (fewer air molecules), which results in the loss of heat energy from radiational cooling. Convection cooling also occurs as a result of more frequent wind and higher wind speeds at elevation. Winter inversions are an exception to this rule when high air pressure and our ring of mountains trap cold air in the lower valleys.

The relationship between temperature and elevation can often be observed in the form of a snow line along the gradient of the Oquirrh and Wasatch Ranges.

Precipitation tends to be higher with increased elevation because cooler air can hold less moisture than warmer air, and air is cooled as it is forced by winds and weather systems to rise up a mountainside.

The relationship between precipitation and elevation can be observed indirectly in (1) the transition of plant species between the lower valleys and the alpine regions, and (2) the greater frequency of clouds over the mountaintops.

Understanding the relationships between weather and elevation can also promote a greater understanding of why different plants and animals reside where they do, and how each plant and animal possesses a suite of adaptations specific to making a living where they do.

### **Weather Data**

A direct correlation exists between regional precipitation and the surface elevation of the Great Salt Lake. This correlation exists seasonally and annually. Seasonally, the Great Salt Lake reveals a springtime high, usually at some time between April and June, and an autumn low, usually at some time between September and November. The Lake's average surface elevation varies from year to year, based on climate trends.

There is a subsequent correlation between the surface elevation of the Great Salt Lake and the conditions and locations of Great Salt Lake wetlands.



## Options for Further Activity

Incorporate teaching from other aspects of 4th grade science that complements these weather and climate studies with...

- The use of a physical map to show and explain how the uplift of California's Sierra Nevada Mountains has resulted in westward moving Pacific Ocean moisture being captured as precipitation before it can reach Nevada and Utah. The dry climate of our two states is largely the result of this "cloud-wringing" effect.
- Additional graphing activities.
- Extended weather studies and recordkeeping.
- The introduction of additional vocabulary words and meanings from the list.
- Assign word game pages 8 and 9 in the *Student Discovery Guide*. Answer keys to these word games are located in the SUPPORT MATERIALS Section of [www.nature.org/wingsandwater](http://www.nature.org/wingsandwater).



FALL

## POST-Tour Topic #7: Wetlands and You

**THEME:** *Wetlands are rare and valuable habitats that everyone has a role in protecting.*

### Checkpoints for Teaching

Below are the concepts your students should learn or review about wetlands conservation after they take their FALL preserve tour.

#### The Great Salt Lake Shorelands Preserve

- Your students should be able to explain the purpose of the Great Salt Lake Shorelands Preserve.

#### Wetlands Preservation

Your students should be able to:

- Define *conservation*.
- Describe three reasons to protect wetlands.
- Describe two threats to wetlands health.
- Suggest something that organizations and individuals can do to protect Utah wetlands.

#### Meeting the Standard:

This topic correlates to the following Utah state core curriculum standard for science:

**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, forest and deserts.

### Student Discovery Guide Activities

Use the Student Discovery Guide to review and assess learning from the checkpoints listed above.

#### PAGE 14 – CAREFUL CONSERVATION

- Direct the students to page 14 for a review of wetlands conservation. Have them each complete the page according to the directions given.
- Collect the *Discovery Guides* for assessment purposes.

### Support Materials

*A Great Salt Lake Shorelands Preserve poster available from The Nature Conservancy by request.*

## Related Vocabulary

Below is a list of important words and phrases associated with the entire *Wings & Water* study unit. Some are included only for purposes of pronunciation (such as the bird names), while others are more specific to 4<sup>th</sup> grade core topics. Words most relevant to *this* thematic section are shown in ALL CAPS.

___ adaptation	___ gas	___ preserve ( <i>n</i> )
___ algae	___ groundwater	___ producer
___ aquatic	___ <b>HABITAT</b>	___ salinity
___ avocet	___ hydric soil	___ sediments
___ camouflage	___ ibis	___ shelter
___ climate	___ <b>IGNORANCE</b>	___ <b>SHOREBIRD</b>
___ community	___ invertebrate	___ soil
___ condensation	___ liquid	___ solid
___ <b>CONSERVATION</b>	___ marsh	___ space
___ curlew	___ migration	___ trait
___ data	___ molt	___ transpiration
___ dirt	___ naturalist	___ uplands
___ ecology	___ phalarope	___ vegetation
___ ecosystem	___ photosynthesis	___ water cycle
___ elevation	___ playa	___ watershed
___ environment	___ plover	___ weather
___ evaporation	___ plant	___ weed
___ food chain	___ pond	___ wetland
	___ precipitation	

## Teacher Background Information

The background information below is designed to help you prepare your lesson plans on this topic. What we have provided is a starting point but it is not intended to dictate the extent of your lesson plans. Feel free to supplement this information to meet your educational goals.

### The Great Salt Lake Shorelands Preserve

Your students were first introduced to the purpose for the Preserve as part of Pre-Tour Topic #5: The Preserve Tour. Background information about the Preserve and its Visitor Center is located online at [www.nature.org/utah](http://www.nature.org/utah) under Places We Protect, as well as on the inside front cover of the *Student Discovery Guide*.

### Wetlands Preservation

“Conservation,” for our purposes, is the sustainable use and protection of natural resources including plants, animals, mineral deposits, soils, clean water and clean air.

With regard to natural systems, a simple definition for *conservation* is:

*Using and protecting natural resources to make sure they will last.*

The many reasons to protect wetlands can be derived from the chart, “Some Benefits From Wetlands,” located in the Teacher Background Information section of Pre-Tour Topic #1: Wetlands.

Some factors that are or could become threats to wetlands health:

- Exotic (nonnative) species of plants, insects, fish, wild mammals or livestock.
- Pollution from highway runoff, sewage treatment or industry.
- Overuse of water from streams, groundwater or other sources.
- Real estate development for housing or business.
- Water diversions, dikes, canals, and other changes to water flow.
- Public ignorance.

Things that people can do to protect Utah wetlands:

Organizations can:

- Help to provide information to the public about wetlands.
- Create opportunities for people to visit wetlands.
- Protect and restore at-risk wetlands.
- Distribute educational materials about wetlands.
- Sponsor wetlands information events and projects.
- Help to inform and educate public leaders.

Individuals can:

- Avoid discarding hazardous substances into drains or onto streets.
- Reduce their use of household water.

- Use less water outside their homes.
- Share their knowledge about wetlands with others.
- Continue to learn about wetlands through books, events and visits.
- Write letters to newspapers or public officials to express their concern.

### **Options for Further Activity**

- **Student Naturalist Guides:** Encourage students to share what they have learned about wetlands and conservation by acting as Naturalist Guides for their families during a self-guided tour of the Great Salt Lake Shorelands Preserve. Assign extra credit points for those who use their Discovery Guides to lead their very own “tour group” at the Visitor Center and have them report to the class what it was like to be a Naturalist Guide.
- **Write A Letter:** Have your students write a letter to The Nature Conservancy addressed to their tour guide expressing key concepts that they learned about the importance of wetlands during their tour. Questions you might use to prompt your students letter writing could include:
  - What do you remember most from your tour of the Great Salt Lake Shorelands Preserve?
  - What did you learn about WHY it is important to protect wetlands?
  - What are some ways that you and your classmates can help protect wetlands?

## **Other Resources**

- Water-related Science Fair Topics and Project Ideas:  
<http://www.sciencefaircenter.com/>
- Materials and supplies for water demonstrations and activities:  
<http://www.watercenter.net/>
- Water information and resources: [www.watercenter.org](http://www.watercenter.org)