



SCIENCE

Wetlands

ESSENTIAL UNDERSTANDINGS

- Since Time Immemorial
- Tribal Government
- Lifeways

LEARNING OUTCOMES

By the end of the lesson, students will be able to:

- Describe what wetlands are.
- Explain human uses of and impact on wetlands.
- Explain the importance of wetlands to the past and present life and culture of the Cow Creek Band of Umpqua Tribe of Indians.
- Evaluate and refine a solution for reducing human impact on wetlands.

ESSENTIAL QUESTIONS

What are wetlands?

How have wetlands supported human life and society in past and present times?

What are ways in which individuals and groups can take action to protect wetlands?

(Continued on next page)

Overview

Wetlands are areas in which water covers the soil all or part of the time. In this lesson, students will learn about wetlands ecosystems and the human uses of and impact upon wetlands. They will also learn the importance of wetlands to the historical and current culture and lifeways of the Cow Creek Band of Umpqua Tribe of Indians, including efforts by the Tribe to protect and restore wetland ecosystems in their traditional homelands in Southwest Oregon. They will also participate in an activity that helps them explore the issues, approaches, and tools related to the conservation and stewardship of land and water resources.

Background for teachers

Wetlands are broadly defined as any area in which water covers the soil all or part of the time. Wetlands can be found on every continent except Antarctica. They vary widely due to regional and local differences in soil, topography, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Wetlands can be broadly classified as either coastal or tidal (*marine, estuarine*) wetlands or inland or non-tidal (*riverine, lacustrine, palustrine*) wetlands.



LOGISTICS

- Where does the activity take place?
Classroom (virtual/distance learning option available)
- How are the students organized?
 - Whole class Teams: 2 – 4
 - Pairs Individually

TIME REQUIRED

Three to four hours of classroom time.

Wetlands are important landscape features that provide numerous benefits for people and for fish and wildlife, including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods. Wetlands are among the most fertile and productive ecosystems in the world, along with rain forests and coral reefs. They are host to an immense variety of microbes, plants, and animals integrated into unique and complex food webs.

Wetlands have supported many essential functions and values important to members of the Cow Creek Band of Umpqua Tribe of Indians for thousands of years. Historically, the Tribe migrated seasonally to a variety of habitats, including wetlands, within the watersheds of the Umpqua and Rogue Rivers in what is now Southwest Oregon. In the spring, the Tribe would hunt deer; fish for salmon and lamprey; and gather camas, wild onion, and cat's ear bulbs in the wet meadows. During late summer and early fall, the Tribe would migrate to

STANDARDS

Oregon science standards

HS-LS2 Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-7 – Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Oregon social studies standards

HS.46 – Assess how changes in the environmental and cultural characteristics of a place or region influence spatial patterns of trade, land use, and issues of sustainability. (*Geography*)

HS.60 – Analyze the history, culture, tribal sovereignty, and historical and current issues of the American Indian/Alaska Native/Native Hawaiian in Oregon and the United States. (*History*)

HS.66 – Examine and analyze the multiple perspectives and contributions of ethnic and religious groups, as well as traditionally marginalized groups within a dominant society and how different values and views shape Oregon, the United States, and the world.

Oregon language arts standards

11-12.SL.1 – Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

11-12.SL.4 – Present information, findings, and supporting evidence, conveying a clear and distinct perspective; ensure that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

the uplands to gather huckleberries and blackcaps. The uplands also provided access to isolated lakes and swamps where cattails would be harvested along with waterfowl to prepare for the winter months to come. Other traditional foods and medicines that were gathered included tarweed seeds, hazel and chinquapin nuts, Indian lettuce, acorns, mushrooms, and lamb's quarters.

Euro-American settlers forcibly removed the Cow Creek people from their ancestral lands in the late 1800s and forever altered the land and waterways. They often saw wetlands as either a nuisance to be avoided or as a raw resource to be “developed” or made more productive. Preventing “wet land” was a constant battle for many settlers and leaders of growing settler cities. Tidal and non-tidal wetlands once covered 2.3 million acres in Oregon, but over the years nearly a million acres have been lost to agricultural and urban development. These developments were devastating to the Cow Creek and other Oregon tribes, although they found ways to persist and adapt.

Wetlands are now recognized as essential for biodiversity, water reclamation, soil conservation, and flood control and worthy of study and protection from further degradation and loss. A multitude of state, federal, and tribal agencies, as well as nonprofit groups, businesses, and private landowners, are working to protect Oregon's waters and wetlands.

Since the restoration of its federal recognition in 1982, the Cow Creek Tribe has contributed to projects that promote sustainable stewardship of land and water resources within its ancestral territory.

MATERIALS

What will be needed for students to engage in this activity?

- **PowerPoint presentation** (available in lesson materials; load the slides prior to the lesson to ensure they are displaying properly)
- **Classroom writing surface** (i.e., blackboard, whiteboard, chalkboard, chart paper and markers)
- **Classroom audiovisual technology** to display PowerPoint slides and videos (see next items)
- **CCBUTI Wetland Program Plan** (two copies)
- **Jordan-Alder Watershed Assessment** (two copies)
- **Creekside Development: Jordan Creek** (two copies)
- **Bringing Beavers Back to the Beaver State** (two copies)
- **CCBUTI Position Description-Natural Resources Technician** (two copies)
- **CCBUTI Position Description-Geographic Information System (GIS) Technician** (two copies)
- **Action for Wetlands Activity Packet** (one copy per student)

Online materials

- **“Types of Ecosystems-Wetlands-Marshes, Swamps, Bogs, and Fens”** video (running time: 2:04) by MooMooMath and Science, available on YouTube at <https://www.youtube.com/watch?v=1WImGyN9VXs>
- **“Wondrous Wetlands | Whiteboard”** video (running time: 2:25) by Texas Parks and Wildlife, available on YouTube at <https://www.youtube.com/watch?v=V-aQLwnJKWc>

For example, in 2014 the Tribe published a Wetland Program Plan to guide the study and protection of wetland habitats and resources on current and future Tribal trust lands and on federal lands in its traditional homelands for which it has retained hunting, gathering, and fishing rights. The Tribe recognizes that the protection, conservation, and restoration of water and land resources is vital to all life forms and to the well-being of Tribal members.

To prepare for this lesson teachers should:

1. Review all materials for this lesson.
2. Ensure students have access to all materials (printed and/or electronic) needed to participate in this lesson (see the “Materials” and “Online Materials” sections above).
3. Prepare classroom audiovisual technology to display the PowerPoint slides and videos listed in the “Online Materials” section above.
4. Write the lesson objectives and key vocabulary on a classroom writing surface.

Resources

Curriculum resources

Kesselheim, A. S., Slattery, B. E., Higgins, S., & Schilling, M. R. (1995). *WOW!: The wonders of wetlands: An educator's guide*. Environmental Concern.

Knapp, T. (2019). *6th Grade wetlands ecology curriculum*. Prepared by the Institute for Applied Ecology for the Confederated Tribes of Siletz Indians. <https://appliedeco.org/wp-content/uploads/Siletz-Wetlands-Book.pdf>

KEY VOCABULARY

Bog – Freshwater wetlands featuring spongy soils of peat (decayed plant matter). Less common in the Pacific Northwest than other parts of the United States.

Cow Creek Band of Umpqua Tribe of Indians (CCBUTI) – A federally recognized Tribal Nation representing descendants of Indigenous peoples living in the South Umpqua and Rogue River watersheds of what is now Southwestern Oregon.

Disturbance – A temporary shift in environmental conditions that results in changes in an ecosystem.

Estuaries – Bodies of water and related wetlands where freshwater rivers meet the ocean.

Fen – Freshwater wetlands covered mostly by grasses. Less common in the Pacific Northwest than in other parts of the United States.

First foods – Foods that were traditionally harvested by Indigenous peoples of North America. First foods provide sustenance and promote health. They continue to be harvested by many Tribes, including the Cow Creek Band of Umpqua Tribe of Indians.

Floodplains – Low-lying ground that is adjacent to a river and is subject to flooding.

Hydric soil – Soil that is permanently or seasonally saturated by water, resulting in anaerobic conditions.

Hydrology – The properties of water, especially its movement in relation to land.

Hydrophyte – Plants that only grow in or on water.

Invasive species – A non-native plant or animal species that spreads rapidly and harmfully, often crowding out or destroying native species.

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Places

Klamath Marsh National Wildlife Refuge
Silver Lake Road
Chiloquin, OR 97624

Organizations

Cow Creek Band of Umpqua Tribe of Indians
2371 NE Stephens Street
Roseburg, OR 97470
541-672-9405
<https://www.cowcreek-nsn.gov/>

Native Plant Society of Oregon-Umpqua Valley
Chapter | (541) 643-0364
<https://www.facebook.com/UmpquaValleyNPSO/>

Partnership for the Umpqua Rivers
3012 W. Harvard Ave.
Roseburg, OR, 97471
541-673-5756
<https://www.umpquarivers.org/>

References

- Baumann, J., & Wheeler, C. (April 2021). *Tribe launches ArcGIS software-based cultural resource system*.
<https://www.esri.com/about/newsroom/arcwatch/tribe-launches-arcgis-software-based-cultural-resource-system/>
- Cow Creek Band of Umpqua Tribe of Indians. (2014, March). *Five-year wetland program plan*. <https://www.epa.gov/sites/production/files/2015-10/documents/cow-creek-wpp.pdf>

KEY VOCABULARY (Continued)

Marsh – Land or habitat with soil that is periodically saturated or flooded with water and that features mostly non-woody plants.

Monitoring – Observing and checking the progress or quality of something over time.

Mudflats – A stretch of muddy land left uncovered at low tide or when floodwaters recede.

Non-native – Not indigenous or native to a particular place or habitat.

Outreach – An organization or project's involvement with or activity in the community.

Quantitative data – Data that can be counted or measured and given a numerical value.

Qualitative data – Data, often consisting of words and text, that is descriptive and often unstructured.

Reintroduction – Bringing a plant or animal species back into its natural habitat.

Restoration – Returning something to a former condition.

Stakeholder – A person or organization with an interest or concern in something.

Riparian – Things that exist alongside a river, such as riparian wetlands, habitats, and trees.

Swamp – Land or habitat with trees and woody plants and soil that is very wet and occasionally covered with standing water.

Takelma – A language spoken by the Cow Creek people and other Indigenous people groups in Southwest Oregon.

Topography – The arrangement of the natural and artificial physical features of an area.

Wetland – An area of land that is saturated with water.



Geyer, N. (2003, November). *Lower Cow Creek watershed assessment and action plan*. Umpqua Basin Watershed Council. <https://ir.library.oregonstate.edu/concern/defaults/b5644x34z?locale=en>

Interagency Workgroup on Wetland Restoration. (2003). *An introduction and user's guide to wetland restoration, creation, and enhancement*. National Oceanic and Atmospheric Administration, Environmental Protection Agency, Army Corps of Engineers, Fish and Wildlife Service, and Natural Resources Conservation Service. <https://www.csu.edu/cerc/documents/AnIntroductionandUsersGuidetoWetlandsRestoration.pdf>

Loew, T. (April 22, 2019). Developers eye wetlands as Oregon cities run out of buildable land. *Statesman Journal*. <https://www.statesmanjournal.com/story/news/2019/04/22/oregon-wetlands-eyed-developers-cities-run-out-buildable-land/3508376002/>

Oregon Department of Fish and Wildlife. (2018, December). *ODFW and tribal partnerships in 2018*. [https://www.oregonlegislature.gov/cis/GovToGovReports/2018%20\(Fish%20and%20Wildlife\).pdf](https://www.oregonlegislature.gov/cis/GovToGovReports/2018%20(Fish%20and%20Wildlife).pdf)

Oregon Department of State Lands. (2017, January). *Oregon wetland program plan*. https://www.epa.gov/sites/production/files/2017-02/documents/oregon_wpp_2017_.pdf

ADAPTATIONS FOR DISTANCE LEARNING



The lesson is primarily structured around group discussion and exploration, but several pieces can be pulled out and used as standalone content and activities for distance- or independent-learning purposes. Following is a suggested sequence. Be sure all students have either print or electronic access to the materials described.

1. Hold a class meeting online and, using the PowerPoint slides provided and the steps in Activity 1 (“What Do You Know About Wetlands?”), have students brainstorm and share (verbally or in a chat box, whiteboard, or online document) what they already know about wetlands. Alternatively, you can have students brainstorm what they know about wetlands asynchronously and provide written responses (in the comments or whiteboard section of your school’s online classroom platform or in an online document you provide a link to).
2. Using the PowerPoint slides and the steps in Activity 2 (“Wetlands in Science and Society”), provide instruction on the science of wetlands and how human societies have benefited from and impacted wetlands. Alternatively, you can have students review the PowerPoint slides on their own. Make sure you play the two online videos (see “Online materials” above) for students or ensure that students know how to access the videos if they are working independently or asynchronously.

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Oregon Department of State Lands. (n.d.). *Local wetlands inventories*. <https://www.oregon.gov/dsl/www/Pages/Inventories.aspx>

Oregon Department of State Lands. (n.d.). *Wetland planning and conservation*. <https://www.oregon.gov/dsl/WW/Pages/WetlandConservation.aspx>

Oregon State University Extension Service. (n.d.). *Recommended native plants for home gardens in Western Oregon*. <https://extension.oregonstate.edu/sites/default/files/documents/1/native-plantreclist.pdf>

Partnership for the Umpqua Rivers. (2016, December). *West Fork Cow Creek watershed action plan*. <https://static1.squarespace.com/static/5a0d-cc9bbce17698a0425591/t/5a34190d085229e-36dae1c93/1513363730934/West+Fork+Cow+Creek+Watershed+Action+Plan.pdf>

Rempel, M., Adamus, P., & Kagan, J. (2018). *Oregon Explorer-ORWAP and SFAM map viewer: An internet tool for ORWAP wetland assessment and SFAM stream assessment support*. Oregon State University Library and Institute for Natural Resources, Oregon State University. https://tools.oregonexplorer.info/OE_HTMLViewer/Index.html?viewer=orwap_sfam

United States Bureau of Land Management. (2005, June). *Upper Cow Creek: Bureau of Land Management watershed analysis*. https://www.blm.gov/or/districts/medford/plans/files/upper_cow_wa_acc.pdf

ADAPTATIONS FOR DISTANCE LEARNING



(Continued)

3. Have students complete one or both of the “Action for Wetlands” application activities in small groups working synchronously (e.g., via web-conference breakout groups) or asynchronously, or as independent-study work for individual students. Ensure students have access to any information, documents, or links they need to complete the work. This may mean providing print or electronic copies of lesson materials and/or reformatting documents and activity sheets so students can work with them virtually.
4. Convene one or more follow-up class meetings to review together and debrief student group (or individual) work on the application activities, review and reflect on the lesson together, and answer any remaining questions students have.

United States Environmental Protection Agency. (n.d.). *Wetlands*. <https://www.epa.gov/wetlands>

United States Geologic Survey. (n.d.). *Wetland and aquatic research center*. <https://www.usgs.gov/centers/wetland-and-aquatic-research-center-war>

Considerations for teachers

Assessment

The activities in this lesson are primarily built around student discussion and engagement with reading material. Teachers can assess student learning by monitoring student pair and small-group discussions. In addition, the activity packet accompanying this lesson for use in small-group work and discussions can be used as a formal or informal summative assessment. You can review it for accuracy, level of effort, and completion.

Practices

- *Small group activities/discussions* – Small-group activities allow students to share and analyze ideas with one, two, or three other people. This practice can be good for students who do not want to share their ideas with the whole class and/or who may be afraid of others' reactions. The teacher should monitor group discussions to determine the degree to which students are understanding the concepts.
- *Classroom discussion* – Large-group, whole-class discussion allows students to express their thoughts and hear the thoughts of others. For the instructor, this practice is a good way to take the pulse of the group and see what general themes are emerging. For students, large-group discussion can be a way to express themselves or to hear differing perspectives from others.
- *Student group reporting and presentation* – When groups report out what they have discussed or provide a brief presentation, it is important to have clear norms and expectations they can use to ensure their success. The teacher should be prepared to explain to the class how to listen respectfully when a classmate is reporting on group work. The teacher should

also be prepared to help students gather their thoughts and explain main ideas if they are struggling to do so.

Learning targets

- I can describe what wetlands are.
- I can explain human uses of and impacts on wetlands.
- I can explain the importance of wetlands to the past and present life and culture of the Cow Creek Band of Umpqua Tribe of Indians.
- I can evaluate and refine a solution for reducing human impacts on wetlands.

Options/extensions

- Organize a field trip to a wetlands area near your school. Larger wetlands reserves or protected areas may have staff or published materials with visitor information and student learning materials. Refer to the curriculum resources in the “Resources” section for information and tips for a self-directed visit to a wetlands area.
- Have students use an online tool such as Google Maps or the Oregon Explorer’s Oregon Rapid Wetland Assessment Protocol (ORWAP) Map Viewer (citation and link provided in “References” section) to locate and explore local wetland areas virtually. Ask students to take notes on natural and human-built features they notice, such as river and stream drainages, irrigation and flood control structures, and land use patterns around wetland areas (e.g., farmland, residential or commercial buildings).
- Have students access and review local inventories for wetlands located in Douglas County, available on the Oregon Department of State Lands website (citation and link provided in “References” section).
- Locate and share with students a link to an online news article describing a local or statewide issue related to wetlands, ideally one that involves multiple stakeholders. Have students read the article and engage in a discussion or “town hall” debate about the key issues and competing



scientific, political, and economic interests at play. An article from the April 22, 2019, *Statesman Journal* concerning proposed legislation to loosen Oregon’s wetlands regulations (linked to in the “References”) is an example or option for this activity.

Appendix

Materials included in the electronic folder that support this lesson are:

- Slides.pptx
- Materials_Action for Wetlands Activity Packet.doc
- Materials_Cow Creek Band of Umpqua Tribe of Indians Wetland Program Plan.pdf
- Materials_Jordan-Alder Watershed Assessment.pdf
- Materials_Creepside Development_ Jordan Creek.pdf
- Materials_OPB_Bringing Beavers Back to the Beaver State.pdf
- Materials_CCBUTI Position Description-Natural Resources Technician.pdf
- Materials_CCBUTI Position Description-Geographic Information System (GIS) Technician.pdf

Activity 1

What Do You Know About Wetlands?

Time: 10 minutes

Students will discuss what they know about wetlands based on their previous experiences with them so as to activate their interest and prepare them for the lesson.

Step 1

Display slide 2 (“What is a wetland?”). Ask students to ponder and discuss the question in pairs, and then click to display the hidden text providing the definition of a wetland.

Step 2

Ask students to think of a wetland they are familiar with. If they are struggling, offer suggestions such as the estuaries around the mouth of the Umpqua River and Coos Bay, Klamath Marsh National Wildlife Refuge, and nearby wetland areas students may be familiar with.

Step 3

Ask students to discuss with a partner or in small groups the following questions about the wetland areas they identified:

- *How would you describe the wetland?*
- *What (do you think) is the water source for the wetland?*
- *What did it feel like to be there?*
- *What types of animals and plants did you see?*
- *What sights, sounds, and smells did you notice?*

Step 4

Review the learning targets and key vocabulary on slide 2, then ask students if they have any questions before proceeding.

Activity 2

Wetlands in Science and Society

Time: 40 minutes

Students will explore materials summarizing essential scientific knowledge and discuss the importance of wetlands to human people groups, including the Cow Creek people of Southwestern Oregon.

Step 1

Display slide 3 (“What are the characteristics of wetlands?”) and review key vocabulary with students.

Step 2

Display slide 4 (“Types of wetlands”) and play the “Types of Ecosystems- Wetlands-Marshes, Swamps, Bogs, and Fens video from MooMooMath and Science on YouTube (see link in “Online Materials” section or click video image on slide to play).

Step 3

Display slide 5 (“Wetland plants and animals”) and review the text and images with students. Point out to students that the plants and animals are listed with their names in both English and Takelma, the traditional language of the Cow Creek people.

Step 4

Ask students to think about and discuss in pairs in small groups the ways in which wetlands support human life, using the following questions to prompt their thinking:

- *What are ways in which people benefit from wetlands?*
- *What are some useful things people can find in wetlands?*
- *What are some foods we eat that come from wetlands?*
- *What are some jobs people have that depend on wetlands?*

Activity 2 (Continued)

Step 5

Display slide 6 (“Humans and wetlands”) and review with students.

Say:

Throughout history and around the world people groups have benefitted from wetlands and used the resources they offer. Wetlands have provided humans with shelter, food, medicine, fuels, transportation routes, trade goods, and supplies for building homes and making clothing, tools, and arts and crafts. Great river systems and their deltas such as the Nile, the Amazon, the Mississippi, the Columbia, and the Tigris and Euphrates have hosted and nurtured complex societies for millennia.

Step 6

Display slide 7 (“Cow Creek people and wetlands”) and review with students.

Say:

Wetlands have supported many essential functions and values important to the Cow Creek people for thousands of years. Historically, they migrated seasonally to various habitats, including wetlands, within the watersheds of the Umpqua and Rogue Rivers in what is now Southwest Oregon. In the spring, the Tribe would hunt deer; fish for salmon and lamprey; and gather camas, wild onion, and cat’s ear bulbs in the wet meadows. During late summer and early fall, the Tribe would migrate to the uplands to gather huckleberries and blackcaps. The uplands also provided access to isolated lakes and swamps where cattails would be harvested along with waterfowl to prepare for the winter months to come. Other traditional foods and medicines that were gathered included tarweed seeds, hazel and chinquapin nuts, Indian lettuce, acorns, mushrooms and lamb’s quarters.

Activity 2 (Continued)

Step 7

Ask students to think about and discuss in pairs in small groups the ways in which people make changes to wetlands and the positive and negative outcomes for humans and wetlands these changes can bring. Use the following prompts if helpful:

- *Why might people want to make changes to wetlands?*
- *What are the good things that could come from these changes?*
- *What might be some negative consequences of these changes for humans and for wetlands?*

Step 8

After students have discussed for several minutes, share the following notes.

Say:

All animal species modify their surroundings to meet their needs. For example, beavers build dams to create wetland ponds and marshes. Humans are no exception, altering the environment to improve our ability to secure materials essential for survival as well as increasing our comfort and enjoyment. Different people groups and cultures across time have had different ideas and values about how the environment should be used and altered to support human life.

The Cow Creek people, for example, built fish weirs across rivers and streams to more easily catch fish; harvested cattails and other fibrous plant materials to make mats and baskets; and practiced controlled burning to clear meadows and upland areas of brush to facilitate their hunting of deer and other prey animals. These practices were moderated by cultural values that emphasized living in balance with the natural world and sustaining its riches for future generations. Based on these values, the Tribe was careful not overuse a certain resource or area.

Activity 2 (Continued)

Step 9

Display slide 8 (“Big changes”) and review with students. Ask a handful of students to briefly share if and how they have experienced, witnessed, or worked to address any of the threats to wetlands listed on the slide.

Say:

Even without human intervention, wetlands are constantly changing. River channels move, ponds fill up with peat, periods of drought can dry up wetlands, and ocean tides are constantly reshaping shorelines and estuaries. However, human intervention has increased the rate of environmental change over the last few centuries.

Euro-American settlers forced Cow Creek people off their lands in the late 1800s and altered the land and waterways to suit their needs. They often saw wetlands as a nuisance to be avoided or as a resource that could be made more “productive” by draining and filling them. Preventing “wet land” was a constant battle for many settlers and for the cities that were growing rapidly in the 19th and early 20th centuries. In addition, the settlers also brought different ideas about how natural resources in wetlands and other environments should be owned and used, and they brought industrial technologies that facilitated the overexploitation of these resources.

Combined with population growth, these changes over time have contributed to widespread loss and degradation of wetland areas. Tidal and non-tidal wetlands once covered 2.3 million acres in Oregon, but over the years nearly a million acres have been lost to agricultural and urban development.

Step 10

Display slide 9 (“Surviving and thriving”) and review with students.

Say:

Even without human intervention, wetlands are constantly changing. River channels move, ponds fill up with peat, periods of drought can dry up wetlands,

Activity 2 (Continued)

and ocean tides are constantly reshaping shorelines and estuaries. However, human intervention has increased the rate of environmental change over the last few centuries.

Step 11

Display slide 10 (“Stewarding resources for the future”) and review with students.

Say:

On its own and in partnership with state, federal, and Tribal agencies, as well as nonprofit groups, businesses, and private landowners, the Tribe is also working to protect land and water resources, including wetlands, to benefit future generations of its members and other Oregonians. The Tribe can apply both Cow Creek traditional ecological knowledge and current scientific practices to provide a unique and innovative approach to environmental conservation.



Activity 3

Action for Wetlands

Time: 120 – 180 minutes

Students will engage with materials and two structured activities to understand how the Cow Creek Tribe and others are providing stewardship of Oregon wetlands.

Step 1

Provide a brief transition to set up the activities.

Say:

Scientists and government agencies now recognize wetlands as special places worthy of study and protection from further damage and loss. The Cow Creek Tribe has always known this and is working with several groups to help protect and restore wetlands areas within their traditional homelands.

Step 2

Sort students into six small groups using your preferred method and have students rearrange themselves into new table groups.

Step 3

Display slide 11 (“Why wetlands are special places”) and play the “Wondrous Wetlands | Whiteboard” video from Texas Parks and Wildlife on YouTube (see link in “Online Materials” section or click video image on slide to play).

Step 4

Ask students to think about and discuss in their small groups the following questions:

- *What are ways in which people benefit from wetlands?*
- *What are some useful things people can find in wetlands?*

Activity 3 *(Continued)***Step 5**

Distribute copies of the “Action for Wetlands Activity Packet” (one per student) and give them a few minutes to familiarize themselves with it.

Step 6

Depending on time available and your sense of the interest and capabilities of your students, assign the student groups one or both of the following application activities, reviewing the provided instructions with them and distributing any additional supplemental materials they will need.



Activity 3 | Part 1**Wetland Restoration Examples—Plans, Projects, and People***Time: 45 minutes*

Step 1

Review the instructions in the activity packet and the materials and note-taking sheets that follow.

Say:

Once a person or group decides to protect or restore a wetland area, it is important to approach the work in a thoughtful way so that any activity improves the wetland as planned and does not cause it further harm. There is much information online about wetlands restoration, including much that is highly technical. For the purposes of our class, we will keep things somewhat simplified so that we understand the key activities and tools that are used to protect and restore wetlands. We will focus on a four-step process—Plan-Implement-Monitor-Maintain—that helps us explore sample activities and tools that are used to restore wetlands.

Step 2

Review key vocabulary words related to this activity and check for understanding before proceeding.

Say:

The Cow Creek Tribe leads and contributes to land and water conservation projects within its traditional homelands. These include projects to restore, enhance, and create wetland areas. In this section, you will have a chance to learn about some of these restoration activities by reviewing several documents the Tribe has created, including one that describes a restoration activity they are conducting in collaboration with other Tribes.



Activity 3 | Part 1 *(Continued)*

Step 3

Assign the sample documents (list follows) to the student groups to review. Depending on the number of student groups and available time, assign documents in any combination you think best. For example, you could have each of the six student groups review and take notes on one document, assign the documents in sets of twos or threes among the six student groups, and so on. You could also have the six documents at six (or three) different “workstations” and have student groups move to each of the six or three workstations and take notes, rotating at intervals sufficient for them to review and take notes on all the documents supplied.

- Planning documents (two sample documents of this type are provided)
 - Cow Creek Band of Umpqua Tribe of Indians Wetland Program Plan
 - Jordan-Alder Watershed Assessment.pdf
 - Project descriptions (two samples provided)
 - Creekside Development-Jordan Creek
 - “Bringing Beavers Back to the Beaver State”
- Natural resources personnel staff position descriptions (two samples provided)
 - CCBUTI Position Description-Natural Resources Technician
 - CCBUTI Position Description-Geographic Information System (GIS) Technician

Step 4

Allow time for student groups to read through the supplied document(s) and fill out their note-taking form(s) together. Walk around the classroom and monitor students as they work, ensuring they are on task and redirecting or answering questions if they are stuck or off task.

Activity 3 | Part 1 *(Continued)*

Step 5

When groups are finished, have them select a reporter to debrief the whole class about the document(s) they reviewed.

Step 6

Answer any questions students have before proceeding.

Activity 3 | Part 2

Design a Wetland Restoration Plan

Time: 75 – 135 minutes

Step 1

Review the instructions in the activity packet and the activity worksheets that follow.

Say:

As we saw in the document review activity, the Cow Creek Tribe is actively involved in wetlands restoration and other conservation projects. Let's put together some of the things we've learned in this lesson and put on our engineering and ecologist hats and design a habitat restoration plan.

Step 2

Review any key vocabulary students will need to understand to complete the activity.

Step 3

Review the activity scenario, as found in the activity packet. Point out that a couple of helpful resources for the activity—a list of native western Oregon plants from Oregon State University Extension and a table of sample wetlands-restoration costs provided in a wetlands curriculum from the Confederated Tribes of Siletz Indians—are linked to in the “Sources” section on the last page of the packet.

Step 4

Allow time for student groups to work on the activity and fill out their project worksheets. Walk around the classroom and monitor students as they work, ensuring they are on task and redirecting or answering questions if they are stuck or off task. Depending on available time and student progress, you may decide to omit certain parts of the activity or assign them as work to be completed by groups or individual students outside of class.

Activity 3 | Part 2 (Continued)

Step 5

When groups are finished, have them select a reporter to debrief the whole class about the project they designed.

Step 6

Answer any questions students have before proceeding.

Step 7

Provide a brief summary for this segment.

Say:

Wetlands remain special places for the Cow Creek people. The animals and plants found in wetland areas helped the Cow Creek people survive and thrive for thousands of years, and the Tribe is now doing everything it can to restore those areas to health so they can be enjoyed for generations to come.

Reflection/closure

Time: 10 minutes

Step 1

Review the learning targets for the lesson.

Step 2

Hold an informal debrief of what stood out to students in the lesson and why. This can be done as a pair-share or group discussion with a report out or as a whole-class discussion.

Step 3

Take and answer any final questions students may have.

Step 4

Collect activity packets from student groups (if using them for assessment purposes).