
Wet Webs



Purpose:

For students to understand the importance of wetlands for wildlife (especially migratory birds in Southern Oregon) and for humans, and to explore different ecosystem connections in a wetland food web.

Objectives:

1. The learner will identify the connections between sun, plants, invertebrates and birds in a wetland food web.
2. The learner will explore natural and human caused effects of wetlands as habitat for migratory birds in Southern Oregon.

Materials:

- Provided
 - Wetland Poster Cards
 - Felt Board with envelope of food web pieces (sun, earth, water, duck, two plants, invertebrates, magnifying glass with inverts, 4 arrows)
 - Duckling in plastic box
 - Nest with eggs in plastic box
 - Wetland bird cards (6 of each species: Snow Goose, Northern Shoveler, Cinnamon Teal, American Wigeon, Pied-Billed Grebe, and American Coot)
- Not Provided
 - Green paper plates (one plate for every 3 students)
 - Markers to write on paper plates

Time Required: 1.5 hours

Appropriate grades: 4th-6th

NGSS and Common Core Standards:

4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Activity:



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<p>Introduction</p>	<ol style="list-style-type: none"> 1. Hand out cards of the wetland diagram around the room and point out key features needed in a wetland such as land, water, and vegetation. 2. Ask students what they think a wetland is? What key factors make a wetland? Write these suggestions on the board, allowing students to call out ideas and talk about them as a class. 3. Introduce students to keywords such as “migrate” when passing around the duckling in the box and “invertebrates” when passing around the box of invertebrates. 4. The sun gives off energy which wetland plants use to grow. These plants and their decaying material attract invertebrates, which provide high-energy foods for migrating birds. Once plants and animals are present, birds are attracted to the site. Some birds fly from nearby places, while others stop to refuel before continuing on long journeys between wintering and nesting grounds. 5. Use the felt board to construct your wetland (see images on following pages). Prompt students by asking them questions and allowing them to discover the answers. Describe a suitable habitat, one with unpolluted soil and access to sunlight.
<p>Body</p>	<p>PART 1: FELT BOARD ACTIVITY</p> <ol style="list-style-type: none"> 6. Place the earth/soil and the sun on the felt board. Ask the students “What is missing?” Hopefully someone will call out, “water!” Place the water on the earth/soil. 7. Now that there is sun and water what might happen? What uses sunlight to grow? When someone shouts out “plants!” put up the plants, one on the right and left. 8. Now what eats the plants? When someone calls out “bugs” or “snails” or “worms” or maybe even “invertebrates,” put up the invertebrates. 9. Explain what invertebrates are and about how they do not have a backbone. Point out that some are so tiny you can barely see them. Act this out using the magnifying glass to see them and put the magnifying glass on the felt board. 10. Now what eats invertebrates? Some may say “other invertebrates” or some may say “birds!” Put up the bird. 11. Where do the arrows go? The arrows represent the flow on energy or who is eating whom? Go back to the plants. Where do plants get their energy? “From the sun!” Have a student put the arrow labeled #1 pointing from the sun to the plants on the left (counter clockwise). 12. Where do the invertebrates get their energy from? From plants or other invertebrates. Have a student put up the arrow labeled #2 between the plants on the left and the invertebrates. 13. Where do the birds get their energy? From invertebrates and plants. Have a student put the arrow labeled #3 between the invertebrates and the bird. Have yet another student put arrow #4 between the plant on the left and the bird. 14. Explain that the plants get energy from the sun and when an animal eats the plants, this energy is transferred to the animal. When a bird eats the animal, that



energy is transferred to the bird.

15. Now the bird can use that energy to migrate further or to nest and raise young. Birds that continue migrating move this energy out of that wetland system, allowing the energy to transfer from Southern Oregon to as far away as South America or Alaska!

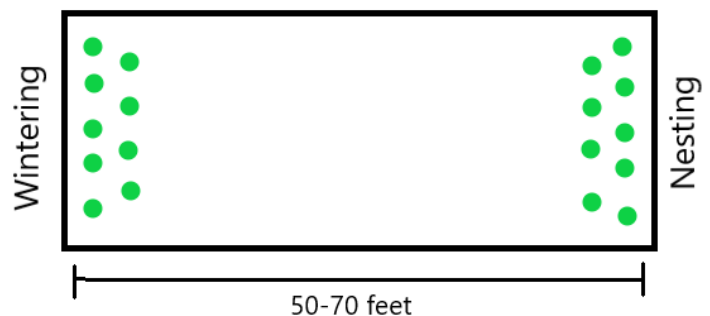
16. **What alters the Food Web?**

- a. Now that the students have talked about the connections in a wetland food web, let's talk about things that could negatively alter this food web.
- b. In groups of three, have students write some of these ideas on the back (non-colored) side of the plates. Use one plate for every 3 students. Be specific.
- c. **Examples of Negative Effects to Wetland Habitat:** drought, pollution, oil spill, building development (residential, industrial, commercial, agricultural), filling in the area for farmland, dumping trash on the wetland, wetland drainage, invasive species, disease.
- d. In the next part of the lesson, they will use the plates as markers for nesting sites for migrating birds. Later in that activity, students will need to brainstorm positive effects on wetland habitat. You can prompt them to start thinking about ways to help or restore an unhealthy wetland.
- e. **Examples of Positive Effects to Wetland Habitat:** preservation and restoration of habitat (including land management, removal of pollutants, trash clean-up, replanting of native plants, redirecting water to wetlands from industrial, agricultural or residential areas, education of the importance of wetlands) and high rainfall.

PART 2: MIGRATION GAME

17. Introduction: Be sure to go over the background information for this activity found in the "Wetlands Background Information, Activity #1: Wet Webs Migration Game" section of this binder, especially about migrating birds.
18. Go outside or into a large room with space and without obstacles. Give each student a wetland bird card with yarn attached (6 different species: Snow Goose, Northern Shoveler, Cinnamon Teal, American Wigeon, Pied-Billed Grebe, and American Coot). Students can read about their bird on the card.

19. Divide the green paper plates written on earlier into two groups (1 plate for 3 students) placing half the plates on one side of the 50-70 foot playing field and half on the other. Place the plates color side up (with writing facing down). One side will be a wintering area and the other will



	<p>be a nesting area.</p> <ol style="list-style-type: none"> 20. Each plate represents a wetland habitat. Have all the students start in the wintering area, with three students around each plate (each student places a foot on the plate). 21. Explain that the students are now wetland birds in their wintering area getting ready for a long journey: it is now time to migrate to their nesting area. 22. On your signal, the students will migrate across the area flapping their wings and displaying the effort of the long journey (maybe getting tired or showing determination). Students land at their nesting area by putting one foot on a wetland habitat plate. Remember, each habitat can only support three birds (3 students per plate). 23. After students (birds) have arrived at a habitat, explain that it was a good year, the wetland was healthy and able to support that many birds and all the birds had a safe migration. Then, remind them that things aren't always this good; some years are harder than others. 24. Go to the Wintering Side of the field and flip over one plate, explaining the idea on the plate (for example, it was a drought year and some wetlands have dried up). Take the plate off the field. 25. Tell the birds that they are done nesting and ready to migrate to their wintering area. Three students will not make it (because there is one less plate on the wintering side). These three students will stand on the sidelines for now (they are portraying dead birds). 26. Go to the nesting area and flip over four plates (Huge loss! Maybe something catastrophic happened like an extreme storm). Have students migrate to their nesting area. The birds that don't make it, stand on the side with the others as dead birds. 27. Once on the Nesting Side, have the students brainstorm some ways to restore some habitat and increase the health of the wetland (native plant restoration, redirecting water to the wetland, education for people about the importance of wetlands, etc). For every idea they come up with, a plate returns to the field and habitat is restored for the birds. As habitat is restored, new baby chicks are born (the "dead bird" students return to the game) when birds migrate to nesting areas that can support more birds (3 students per plate). Continue both positively and negatively affecting wetland habitats for a few rounds. Keep a tally chart recording the number of birds that survive and also the corresponding conditions at both wintering and nesting habitats (e.g. good year, drought, oil spill, restoration, drainage, etc).
Closure	<p>Back in the Classroom</p> <ol style="list-style-type: none"> 28. Discuss the game and put the results on the white board. Have students graph these results on graph paper. Allow students to come up with ideas as to why birds died some years and survived others. Brainstorm ways that they can help to preserve and restore wetland habitats so more birds will survive! 29. Pass around the pictures of the different migrating birds, talking about the long



	journeys that each bird must take. Use a map or globe to show the distance that each bird travels between their nesting and wintering habitats.
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Additional Information:

- Here are some wetlands in the Southern Oregon area that you can visit:
 - Denman Wildlife Area
 - Upper Klamath National Wildlife Refuge
 - Willow Witt Ranch
 - Siskiyou Field Institute
 - Ashland Ponds
 - Lyn Newbry Park on Bear Creek, downstream from parking area.

Modifications:

- Elementary:
 - GRADE 3
 - **NGSS 3-ESS3-1: Earth and Human Activity - Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.**
 - Using one of the suggested restoration solutions from the Migration Game, have students investigate the pros and cons of that specific solution.
 - Who does the solution help? Does it help anyone else? How costly would it be? How would you go about enacting the restoration project?
 - GRADE 4
 - **NGSS 4-ESS3-2: Earth and Human Activity - Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.**
 - When students come up with the ideas to gain back green spaces (habitat), record all the different restoration solutions.
 - Evaluate and compare solutions by taking into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
 - GRADE 5
 - **NGSS 5-ESS3-1: Earth and Human Activity - Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**
 - Using the suggested restoration solutions from the Migration Game, ask students how these ideas help to protect natural resources and the environment.
 - What kind of resources do wetlands provide to humans? Research at the library or online about how local communities in Oregon have restored the health of local wetlands.
 - What were the specifics of these restoration projects and how do they consider social, cultural and environmental impacts?



- **Middle School:**
 - **NGSS MS-ESS3-3: Earth and Human Activity -- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.**
 - Using the suggested restoration solutions from the Migration Game, have students form small groups to design a restoration project for a local wetland.
 - Use research techniques from the library or online resources to determine the feasibility of the design.
 - Make sure to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

- **High School:**
 - **NGSS HS-LS2-7: Ecosystems: Interactions, Energy, and Dynamics - Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.***
 - Using the suggested restoration solutions from the Migration Game, have students form small groups to design a restoration project for a local wetland.
 - Use research techniques from the library or online resources to determine the feasibility of the design.
 - Make sure to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
 - After creating the design, as a class, give pros, cons and suggestions for improvements to each proposed design. After feedback, have students refine their design and vote on one design to implement as a group.

Migration Game adapted from: "Migration Headache" [Project Wild: Aquatic Education Activity Guide](#). 1987. Western Regional Environmental Council. Pages 87-91.

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