Water We Have Here? Local Watersheds

Material adapted from:
"Over Hill and Dale", "Runoff Races", "Soak it Up" and "Wetland Habitats" from Wow! The Wonders of Wetlands, Project Wet, 2006.

Introduction:

Water in wetlands is connected to the landscape around it. All of the land that feeds water into aquifers, lakes, and streams between ridges is called a watershed. Human activities in the watershed ultimately affect the water, particularly through runoff. Wetlands filter out and absorb many pollutants from runoff as it travels across the land. These pollutants include soil (sediments), fertilizer, chemicals, trash, gasoline and oil. Our survival depends upon a clean water supply, and the protection of wetlands is vital to sustaining good water quality as well as abundant habitats.

In this activity, students will be introduced to watersheds and their component wetlands, paying particular attention to their local community. Students will also gain insight into wetlands as a "natural filter" and the processes by which wetlands are fed water.

Objectives:

Students will be able to:

- Interpret a topographic map of their area.
- Recognize human-influenced features and activities that affect water quality.
- Understand the role wetlands have in maintaining water quality.
- Describe how some wetlands are fed by water.
- Classify different wetland habitats by their characteristics and identify these types in their local watershed.

Ocean Literacy Principles

These activities support:

- Essential Principle # 5 – The ocean supports a great diversity of life and organisms.
- Essential Principle # 6 – The ocean and humans are inextricably interconnected.

Materials:

(Materials in **bold** are provided by SMILE)

Part A
Shallow baking pans
Dixie cups
Aluminum foil
Kool-aid powdered drink mix
Sponges
Water
Dry erase markers

Part B
Quart jar with lid
Pebbles, sand, dirt, clay, crushed leaves, etc.
Piece of artificial turf (doormat)
Flat sheet of plastic (Approx same size as the doormat)
2 Flat sheets of wood or stiff cardboard (to support turf/plastic sheet)
2 Aluminum pans
2 Containers of water (equal amounts)
Something to prop up models so they tilt

Part C
Jug of water
Blue food coloring
Shovel or hand trowel
Oasis foam (for flower arranging)
Spoons or scissors
Cardboard strips
5" x 8" pieces of cardboard covered with foil
Paper cups

Part D
Pictures of Wetlands (e.g. cut from magazines)
Paper and Pencils

Materials provided are enough to support **20** students

Handouts/Transparencies:

Laminated Topographic Maps of the Local Area
Wetland Habitats Flow Chart
Habitat Cards

Set-Up

1. Prepare the demonstration model for part B: Mix together the different sediments in the quart jar, filling it ½ to ¾ full. Top off the jar with water and secure the lid. Shake the jar until the contents are thoroughly mixed and set the jar on a table in the front of the class.

2. Also for this demonstration in part B, set up the two aluminum pans and two containers of water. Staple, glue or pin the turf to one of the supporting flat sheets and the plastic to the other. The turf and the plastic should be roughly the same size and will be used to model two different wetlands in each pan. Set these materials aside by the jar of sediment.

Part A: Watershed Maps

1. Introduce the concept of watersheds and wetlands. Note that gravity causes precipitation to run downhill and eventually into waterways, the heart of a

watershed. Ask the students how they think activities in land could potentially affect wetland regions.

2. Divide students into groups. Provide each group with a laminated topographic map of their area and dry erase markers.

3. Have each group study the map and mark the following on their map:
   - Location of the school
   - Location of the nearest body water to the school
   - The potential source of this body of water
   - Particular areas of interest in managing this watershed, e.g. Factories, malls, wastewater treatment plants, highways
   - Different zones of land use, i.e. industrial, commercial, residential, natural areas and parks

   Different colors could be used to decipher each marking.

4. Discuss the following questions with the students:
   - What is our nearest body of water?
   - Where does this water originate?
   - What human activities may potentially harm this water body? How and why?

5. Provide each group with the pans, dixie cups, aluminum foil, kool-aid and sponges. Have each group construct a model of their watershed by propping the pan up on a book, and arranging and covering the cups with foil to create high hills and a valley basin. In this model watershed, the high end represents mountains, while the creases in the foil are streams and rivers that are bordered by wetlands.

6. Have each group soak their sponges with water and pour “rain” over their watershed to watch where it runs. They can adjust the model to make it more realistic to the local setting if they wish.

7. Now have each group sprinkle the kool-aid (“pollutants”) on various locations around their model, discussing how this might correspond with land use in each location. Let them make it “rain” again and watch what happens. Where do these pollutants go? What kinds of pollutants might this kool-aid represent?

Part B: Wetland Modeling

1. Begin this section with a class demonstration. Explain that runoff water not only may carry pollutants, but also sediments of different sizes. The fast the flow, the larger the sediment particles can be transported in suspension. As the water slows, the larger sediment particles settle out first and in still water, the finer particles will settle to the bottom.

2. Show the class the jar of sediments, drawing their attention to how the sediment settles by particle size (heaviest first), and explain how muddy water can be potentially harmful to wildlife.

3. Begin the demonstration. Explain that the turf sheet and the plastic sheet are each a wetland model. The turf represents a healthy wetland, one that is filled with plants. The plastic sheet represents an unhealthy wetland, where many of the plants have died or have been removed. Ask the students to imagine that in each wetland, water enters through a stream, flows through the wetland, and eventually into a lake or ocean (the pan).

4. Add sediment from the jar into each of the two containers of water. Ask two volunteers to hold the "wetlands" above each of the pans to collect the water. Ask another two volunteers to simultaneously pour the water onto the high end of each model. Questions to ask:
    - Which wetland produced the fastest water flow? (the bare, unhealthy one)
    - In which wetland would more sediment settle out? (The healthy one with plants)
    - Which water would therefore have clearer water flowing from it? (Healthy)
    - How would digging a ditch through a wetland affect water quality downstream? (It would create a channel where water would flow quickly, without passing through the wetland plants, diminishing their filtering action).
    - Why is this relevant to wetland management? If so, what impacts may result?

Part C: Wetland Formation

1. Review local wetland areas with the students. Ask them to picture these places and make suggestions to where the water originates. Inform students that wetlands may form in areas where:

    - Rainwater and/or groundwater collect
    - The ground is concave and water collects on top of an impervious layer (e.g. a pond)
    - Waterways overflow their borders

2. Divide the class into small groups, and provide each group with 2 pieces of oasis foam, 2 cardboard strips and a piece of foil-covered cardboard. Have each group create a depression (a "pond") in the center of one piece of foam with a spoon or scissors, and a long strip (a "river") in the other piece. *Make sure they do not cut*

all the way through. Have students place a cardboard strip under each cutaway section of the foam, to represent the waterway's bed.

3. When all of the models are ready, give each group a cup of blue-colored water to pour into the waterways. Have groups tilt the stream foam to allow water to flow and describe what happens.

4. To illustrate that wetlands are also fed by surface water, describe how rainwater that lands on a slope produces runoff. Have each group use the foil-covered cardboard to represent a hillside. The bottom of each piece should rest on a sponge and the end should be held up. Have groups pour water onto the foil near the top of the slope and describe what happens. Water should collect in the foam at the base of the hill; some water may seep out away from the hill.

5. Now that the foam pieces are saturated, repeat step 2. The waterways should overflow, demonstrating floodplain wetlands. This is also surface water.

Part D: Wetland Habitats

1. Explain that students will be using a flow chart to identify ten different wetland types by the habitats they provide. Review the use of a flow chart and practice as group with some of the wetland pictures.

2. In pairs, have the students use the wetlands flow chart to identify wetlands from habitat cards and/or pictures. If using pictures, students will have to infer the salinity of the wetland from the types of plants shown. Habitat card answers:

    1) Sandy beach
    2) Shrub swamp
    3) Aquatic plant bed
    4) Wet meadow
    5) Mud flat
    6) Tidal freshwater marsh
    7) Forested wetland
    8) Seagrass bed
    9) Bog
    10) Salt marsh

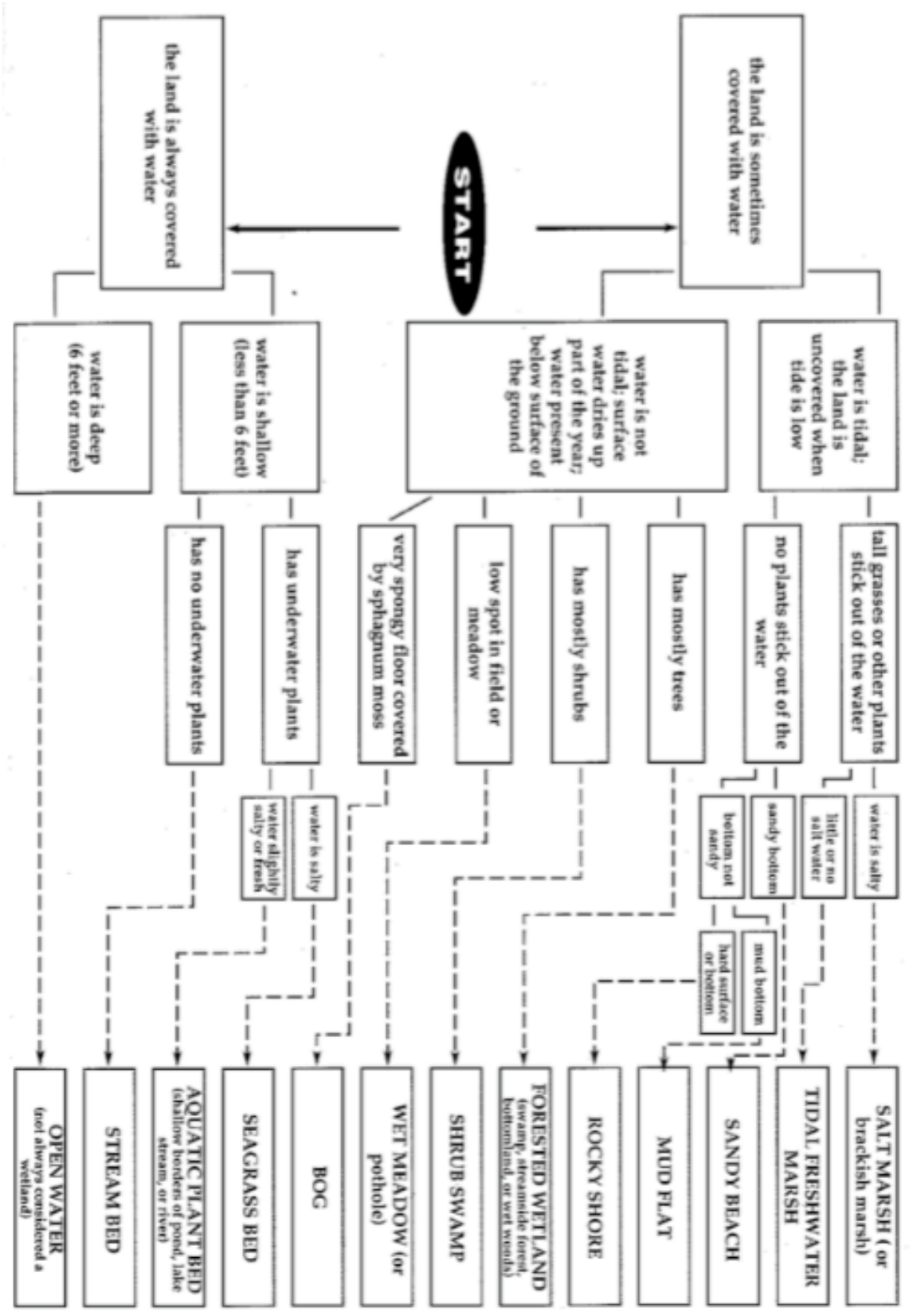
Extensions:

1. Have students test their wetland habitat knowledge by taking a field trip to a mystery wetland.

2. Using a map of the United States, have students discuss where the different wetland types might appear.

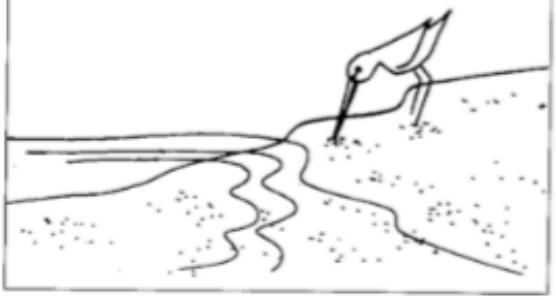
3. Have students construct a "Wetland Wheel" – a tool for plant identification in wetlands (see attached lesson plan).

Wetland Habitats Flow Chart



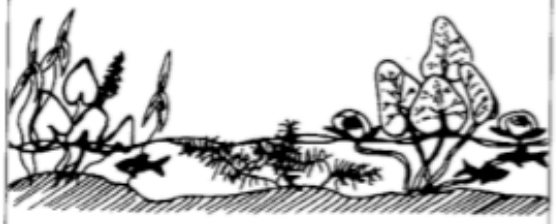
Habitat Cards 1

1. During storms, the waves push grains of sand into ever-changing patterns. During low tide the animals that live among the sand grains feel the summer heat or the winter cold. Shore birds search along the water's edge for these animals and for bits of food that wash in from the water. No plants grow here.



2. Scrubby, low-growing thickets of shrubs grow here, in places that may have started out as wet meadows. You might find these places near the coast, or where lakes, streams, rivers, marshes, and forested swamps overflow. They are not always covered with water. This type of wetland offers good habitat for fish, reptiles, amphibians, and many other animals.

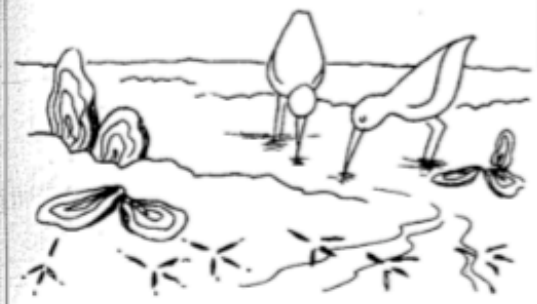
3. In the shallow borders of ponds, lakes, rivers, and streams, where there is good light and the water has little salt, underwater plants and plants with floating leaves grow. Some of these plants are valuable food for many kinds of waterfowl including ducks, geese, and swans. All make places for little fish and other animals to live and feed. These plants slow water movement and protect the soil on shores and banks from erosion.



4. Depressions in the ground may fill with rain and ground water and stay wet for several days or weeks. Landowners often mow or plow around these spots to avoid getting tractor wheels stuck in the soft ground. On spring evenings, these puddles seem alive with the high-pitched calls of spring peepers (tiny frogs) looking for mates among the rushes and sedges that grow here. In the heat of the summer, these places usually dry up.

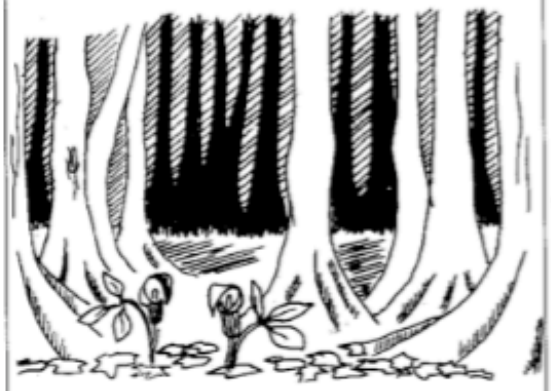
Habitat Cards 2

5. Fine particles of dirt make mud when they settle out of the water. Where the water is very shallow, the muddy bottom is uncovered at low tide. While this area may not look like home to many animals, and few or no plants grow here, lots of creatures live down in the mud. Watch for hungry shore birds searching for them in the mud.



6. Tall grasses and other kinds of plants grow up out of the water. The water contains little or no salt, but the push of incoming tides is strong enough to raise the water level in the river. The ground is sometimes flooded and sometimes dry or exposed. The plants provide food and places to hide for many kinds of animals including fish, invertebrates, muskrats, and lots of birds.

7. Where trees grow in low-lying areas, the ground may hold water for part of the year. In the spring, many beautiful wildflowers grow here, and frogs and salamanders find wet places to lay their eggs.



8. In salty bays or at the ocean's edge, two kinds of plants may grow under the shallow water. They can only live where it is shallow because they are rooted on the bottom and need light to make food. The plants are eaten by many animals, and many of them find safe places to live among the plants. These plants protect the shore and reduce the muddiness of the water by slowing the waves.

Habitat Cards 3

9. Old lakebeds and other low areas that fill with rainwater sometimes accumulate layers of partially decayed plants called peat. At first glance these places might look dry, but their moss-covered floors actually hold a good deal of fresh water just below the surface. The ground here feels very spongy. Some shrubs and evergreen trees also grow above the sphagnum moss. In these unusual conditions, many unique, beautiful, and rare plants and animals can be found.

10. Along the shore where the water is salty, tall grasses grow up out of the water. Tides move in and out, but some places are flooded only during storms and very high tides. When the tough plants here die, they break down in the water to form little particles called detritus. Many animals eat detritus by filtering it out of the water.