

Wetland Webs After an Oil Spill

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Subject area	Science
Grade	2, 4, 5, 7
Lesson Length	45 minutes

Focus/Overview This activity will introduce the concept of wetland food webs and potential impact of oil in the environment. It can also be used to review the concepts learned.

Student Learning Objective(s):

The students will....

- ... create a physical representation of a wetland food web and identify the importance of each component of the web.
- ... relate changes in the food web when an oil spill is introduced.

Louisiana SCIENCE Grade Level Expectations

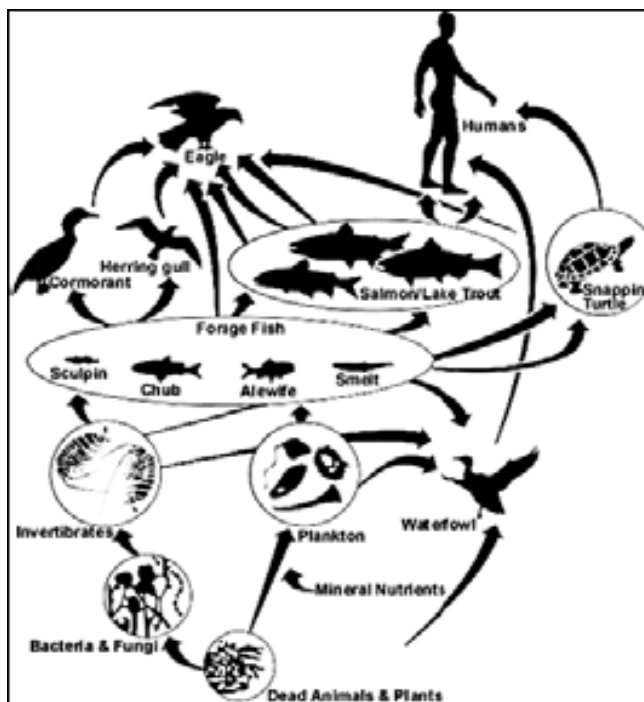
GRADE LEVEL	TARGET GLEs
Gr 2: GLE 46	Illustrate and describe a simple food chain located within an ecosystem (SE-E-A2).
Gr 2: GLE 50	Describe ways in which habitat loss or change can occur as a result of natural events or human impact (SE-E-A5)
Gr 4: GLE 71	Describe and explain food chains/webs and the directional flow of energy in various ecosystems (e.g. construct a model, drawing, diagram, graphic organizer) (SE-E-A2).
Gr 5: GLE 23	Construct food chains that could be found in ponds, marshes, oceans, forests, or meadows (LS-M-C2).
Gr 5: GLE 50	Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing nonnative species) (SE-M-A4)
Gr 7: GLE 24	Analyze food webs to determine energy transfer among organisms (LS-M-C2)
Gr 7: GLE 32	Describe changes that can occur in various ecosystems and relate the changes to the ability of an organism to survive (LS-M-D2)
Gr 7: GLE 39	Analyze the consequences of human activities on ecosystems (SE-M-A4)
Gr 7: GLE 40	Construct or draw food webs for various ecosystems (SE-M-A5)
Gr 7: GLE 43	Identify and analyze the environmental impact of humans' use of technology (e.g., energy production, agriculture, transportation, human habitation) (SE-M-A8)

Materials Needed

- Large index cards
- Hole punch
- Markers
- Four to six balls of different colored yarn for each group
- List of wetland organisms
- Books about wetland wildlife
- A collection of photographs of wetland wildlife from magazines, internet, etc.
- Four to six pictures of oil spill sources (point and nonpoint source): oil tanker, pipeline, automobile, and oil rig
- Cast net, trotline (see [Advanced Preparation](#) for instructions), and fishing pole

Background Information

Food webs introduce students to scientific terms like producers, herbivores, omnivores, carnivores, detritivores and scavengers. Using wetland organisms to create food webs, helps students understand their own habitat and how the biotic, or living, factors in an ecosystem are dependent upon one another. **Food webs can be altered in several ways by natural and human disturbance oil spills are one way the system can be stressed and changes can occur at different levels of the food chain.**



Barataria Terrebonne National Estuary Program

Advance Preparation

1. Prepare 4-6 oil spill source cards (oil tanker, oil rig, oil pipeline, and automobile) with yarn attached to hang on student's neck and put aside.. See **Blackline Master #1**.
2. Obtain a cast net. They are available for purchase at places like Academy Sports and Wal-Mart, but can be expensive. Practice throwing a cast net. Videos on how to successfully throw a cast net can be found on YouTube: <http://www.youtube.com/watch?v=IOUkj2h2Ljl>.
3. Make and hang a trotline in the classroom. Instructions on how to make this simple item can be found at Marshbunny Notes website: <http://www.marshbunny.com/stjohns/trotline/trotline.html> Rather than use real fishing hooks; you can substitute paper fish hooks or paperclips bent into the shape of a fish hook.
4. Prepare organism cards if you skip the research component.

Procedure

Engage (Introduction)

1. Throw a cast net (fishing net) for your students and discuss how it works. Ask students What would you expect to catch in a cast net? Let students try throwing the cast net.
2. Hang a trotline (or use a fishing pole) across your classroom and discuss what you might catch with this type of gear.
3. Ask, "Which would catch a wider variety of organisms?"

Possible answers: *Answers will vary but you would expect a cast net to collect anything that comes into its path that is not fast enough to swim away, therefore there could be a variety of fishes, some invertebrates and floating plants. You would expect the trot line to catch a wide variety of organisms and the trotline only a few different organisms because the depth of the line and the size of the hooks targets a specific size range of fish.*

Explore/Explain (Activity)

1. Explore why a cast net may yield a more representative sample of a food web than a trotline..

2. One value of wetlands is providing a rich habitat for wildlife. Wetlands are one of the most productive habitats on Earth in terms of the variety and amount of organisms they can support. Only the rain forest is more productive than a marsh!

Wetlands have a great many organisms that live within their boundaries. As a class brainstorm organisms that are found in wetlands and write them on the board. You can focus on one type of wetland, a salt marsh or a swamp or wetlands in general.

A list of some of the organisms that live in the wetlands in south Louisiana is found on the wetland webs organisms list (**Blackline Master #2**). Display the list. The list is divided into six groups. Look at the first group, the **producers**. What do they all have in common? (*They are all plants.*) How do plants get their food? (*They make their own food using sunlight, water and carbon dioxide, by the process of photosynthesis.*) What about the next group, the **herbivores** or **primary consumers**? Do they have anything in common? (*All are animals that eat plants.*) What about the **carnivore** group? What do they have in common? (*They all eat animals.*) What do **omnivores** eat? (*They eat both plants and animals.*) What do scavengers eat? (*They eat dead animals.*) What do **detritivores** eat? (*They eat decaying plant material.*) Detritivores often get overlooked, but in the marsh and swamp ecosystems, they are very important. They live on dead and decaying plant material called **detritus**. In the marsh dead and decaying marsh grass make up a large part of the food supply at the beginning of the food chain. Energy is locked up in the dead material and detritivore break the materials down by converting the energy to a form that can be used further along the food chain.” Determine what category each of the organisms from the brainstorming session and add to the list displayed. Ask if students if they can think of any others to add to the list.

3. Evenly divide the class into six groups of six or more students and assign each group to one of the six wetland web organism groups (producers, herbivores, omnivores, carnivores, scavengers, and detritivores). Each person in the group should choose their favorite organism from their list to create one organism card. Pass out large index cards and markers. On the card, write the name of the organism and what that particular organism eats. Then students should draw a picture of the animal or plant on the card – or students can glue a picture of the animal or plant on the card.

When students finished creating the organism card, punch two holes in the top edge and thread a piece of yarn through it so it can be hung around the neck. Have students line up in parallel rows in the following order (from front to back) producers, herbivores, omnivores, carnivores, scavengers, detritivores. (Have the oil spill source cards with yarn handy).

4. The teacher begins the activity as the sun – the source of all energy on Earth and explains that the sun will pass a ball of yarn to each of the producers. (Pass out the five balls of different colored yarn to your producers – a different color yard for each one.) Each producer in turn must then choose an herbivore or omnivore in the line across from them who would feed on it. The producer will hold the end of the yarn loosely and pass the ball of yarn to their meal. This activity represents the passing the energy along the food chain. Now each herbivore and omnivore must find a carnivore and pass them the ball of yarn, while continuing to hold onto the thread. If one of the organisms cannot find someone to feed on them, then hand the ball of yarn to a scavenger or the detritivore.

5. Once the food web has been constructed review what they did and then ask your students these questions.
 - a) Can some organisms eat more than one kind of organisms in the web? (Yes.)
 - b) Can some organisms be eaten by more than one organism in the web? (Yes.)
 - c) What about the scavengers and the detritivores? (*The scavengers and detritivores can actually feed at any level, but for the sake of simplicity they can come last in the food chains. Discuss with the students how the producers can directly feed the detritivores. Also, you can choose to bring in the decomposers, which have the job of breaking down the dead plant material and making it more accessible to the detritivores.*)
 - d) What would happen to the food web if there were fewer plants? (*There would not be as many animals, since there would be less available food.*) What would happen if there were no scavengers? (*We'd have no way of getting rid of dead animals and plants.*)
 - e) What would happen if this wetland was drained? Which organisms would disappear from the food web? Could this affect people? What might happen if there was an oil or chemical spill" (or use of dispersants)? "What does this activity tell us about the value of wetland food webs to people?"
 - f) Review what they did by having the students holding the ball of string and start winding it up as the yarn leaves each student's hand they will say out loud their organism and their function and what it is consumed by (where it goes next).

6. Check for understanding. Have the class regroup in a large circle. Repeat the flow of energy through the food chain using a single ball of yarn. After everyone is holding the yarn, and introduce the oil spill source cards (**Blackline Master #1**). Discuss ways an oil spill can occur and each differs in severity under the specific circumstances. Randomly select four to six students and hang the pictures of the oil spill sources (oil tanker, oil rig, oil pipeline, and automobile) around the selected students' necks. These students are eliminated from the food web and must drop the yarn. Ask the class. Why are these students eliminated from the food web? What will happen to the organisms directly attached to the eliminated organisms? What will happen to the other organisms in the food web? How will this affect humans in Louisiana? How will this affect humans in the United States?

Expand (Apply or Practice)

Have students write a short summary of the pathway that energy might follow in a wetland food chain and draw a diagram or a concept map illustrating the pathway. Ask them to explain how an oil spill in the wetlands might disrupt the food chain or how their organism might be impaired from contact with oil (either physically or by ingestion or respiration).

Evaluate

1. Observe student understanding by where the ball is passed to next.
2. Monitor their answers to the questions in Steps 5 and 6.
3. Grade written work, diagram, and concept map for accuracy.

References

Tradebooks:

Kalman, Bobbie D. 1998. *What are Food Chains and Webs?* Crabtree Publishing Company. 32pp.

A simple introduction to food chains and webs, featuring both herbivores and carnivores and discussing energy, food production, and decomposition in various ecosystems. Age Range: 7 to 8.

Lauber, Patricia. 1994. *Who Eats What? Food Chains and Food Webs.* HarperCollins Publishers. 32 pp.

An award-winning author and artist explain how every link in a food chain is important because each living thing depends on others for survival. Age Range: 5 to 9. Outstanding Science Trade Books for Children 1996.

CDs:

Louisiana Wetland Functions and Values CD developed by LSU AgCenter's Extension Service, the U.S. Geological Survey's National Wetlands Research Center and the Louisiana Department of Natural Resources. To receive a copy, contact DNR (800/ 267-4019) or visit <http://www.lacoast.gov>.

Web:

Living Resources: Wetland Webs Section 2 Activity 4 – page 3;
<http://educators.btneq.org/default.asp?id=64> ”

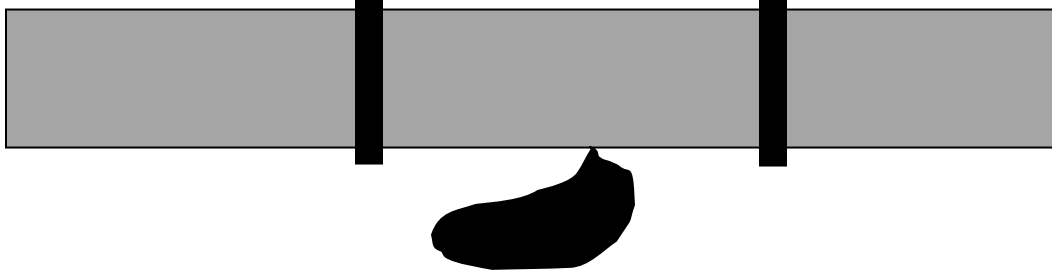
Five E Lesson plan: <http://www.miamisci.org/ph/lpintro5e.html> and
www.siue.edu/~eabusha/FIVEELessonPlanLongLesson.doc

This lesson was adapted with permission from *Wetland Webs* Activity 2-4 in Educator's Guide to the Barataria-Terrebonne Estuary

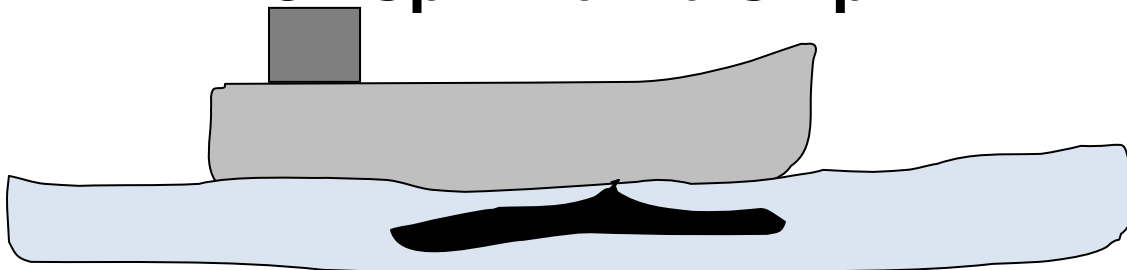
http://www.ccschost.com/btneq_educators/client_files/editor_files/ACTIVITY%20-04%20Wetland%20Webs.pdf

This lesson was developed in response to the BP Horizon Blowout, in partnership with Louisiana teachers, Louisiana Sea Grant College Program, Audubon Aquarium of the Americas, Louisiana Wildlife and Fisheries, LSU Department of Education Theory, Policy and Practice, UNO Pontchartrain Institute for Environmental Studies, LSU Agriculture Center, SELU Department of Teaching and Learning, Barataria -Terrebonne National Estuary Program and Louisiana Universities Marine Consortium.

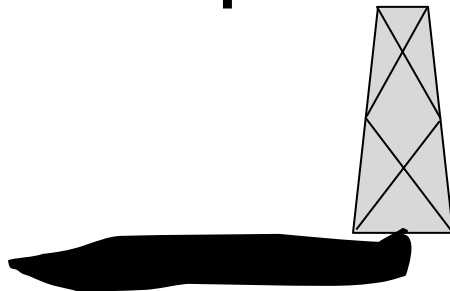
Oil Spill from a Broken Pipeline



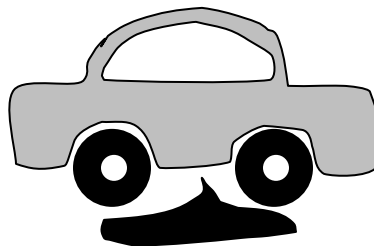
Oil Spill from a Ship



Oil Spill from an Oil Rig



Oil Spill from an Automobile



Wetland Webs Organism Lists Fresh Water

PRODUCERS	CARNIVORES
bull tongue giant cutgrass cattail duck potato phytoplankton alligator weed (invasive) duck weed (invasive) water hyacinth (invasive)	golden silk spider alligator leopard frog water moccasin great egret ibis snapping turtle bullfrog mosquitoes crayfish
HERBIVORES	SCAVENGERS
lubber grasshoppers nutria (invasive) swamp rabbit deer pond snail beaver zooplankton insects birds?	turkey vulture crawfish shrimp blue crab house fly snapping turtle crayfish
OMNIVORES	DETRITIVORES
opossum raccoon humans coot (Poule d'eau) black bear turtles red fox striped skunk red-winged blackbird	amphipods fungi crabs earthworms bacteria slugs

Wetland Webs Organism Lists Salt Water

PRODUCERS	CARNIVORES
smooth cord grass wire grass giant cutgrass three cornered grass phytoplankton black needle rush salt marsh hay	Redfish brown pelican great egret ibis bullfrog mosquitoes speckled trout dolphin killifish, terns, roseate spoonbill
HERBIVORES	SCAVENGERS
mullet zooplankton fish larvae? birds? Insects Littorina?	shrimp blue crab sea gulls amphipods
OMNIVORES	DETRITIVORES
fiddler crab fish larvae zooplankton red-winged blackbird humans blue crab	amphipods shrimp crabs bacteria fiddler crab marine worms (polychaetes)

