

Title: Food Web Fallout

Adapted from a lesson by Mary Heimes

Theme: Local organisms are connected in larger food webs. The impacts of oil spills can ripple through a food web.

Objectives:

- Students will understand and design a local food web
- Students will identify the consequences of an oil spill on the food web

Supports NGS Standards:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.

Crosscutting Concepts:

Energy & Matter: Tracking energy and matter flows into, out of, and within systems helps one understand their system's behavior.

Systems & System Models: A system is an organized group of related objects or components. Models can be used for understanding and predicting the behavior of systems.

Duration: 60-120 minutes (some research or reflection time could take place outside of class)

Age Range: 3rd – 6th Grade

Rural Ready: Yes

Homeschool Friendly: Yes, with modifications

Location: Classroom and School Hallway or Playground

Materials:

- Notecards
- Laptops/tablets or access to computer lab
- Written account of Exxon Valdez oil spill timeline
- Post-it notes
- Black yarn
- Markers
- Aluminum foil

- Masking Tape
- Markers, colored pencils, or crayons
- Construction paper
- Any other craft supplies or recycled materials that can be used
- Paper Clips
- Science notebooks or paper

Background:

This activity is designed to introduce the concepts of food webs and how the impacts of an oil spill can spread through an ecosystem. The impacts of pollution are often difficult to see. A major oil spill, though, provides dramatic evidence of effects on wildlife. Examples of potential effects include damage to feathers, killing of embryos if oil seeps into eggs, suffocation of fish if gills are clogged, and death to marine and terrestrial animals if they ingest food or water contaminated by the oil.

Procedure:

Introduction:

Begin by asking students to think about their favorite local organism. Make a list of these plants, animals, and other living things on the board.

Have students use computers, natural history books, and identification guides to research at least 4 animals that live in the Prince William Sound ecosystem. Instruct them to write each organism on a post-it note.

Educator Tip: If possible and you are in the Prince William Sound or similar region, bring in a guest speaker who can share about a number of local organisms. This person could be a hunter, fisherman, biologist, naturalist, artist, or wildlife/fisheries manager or anyone else in the community that has expertise about local ecosystems. If you are working on this project over the course of multiple days, encourage students to ask their families, neighbors, and other local community members about their organisms. This helps students to draw on different types of knowledge and expertise, and make connections within their communities.

Explain that food webs are **models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers** as the three groups interact within an ecosystem. Ask students to make hypotheses about where their post-its should go in the web and which organisms are linked to it.

Make groups of two or three students and assign each group one or more organisms from the food web. For example, one group will be the salmon, another group the herring, another group the pigeon guillemots. Make sure to include producers (algae, phytoplankton, beach plants) and decomposers (bacteria, detritivores like many marine worms) as well as more well-known animals.

Educator Tip: Choosing mixed-ability groups will better support all students to participate in the activity. Provide guidance or specific roles within groups to encourage all students to contribute to the group.

Provide them with 3x5 notecard(s) and markers., etc. Provide time with books, id guides, and laptops/tablets to research and correct the hypothesis about the food web. Instruct students to write the name of the organism on the card and list the predators (what eats the organism) and prey (what the organism eats). For producers, instruct students to explain that these organisms create their own sugars using water, carbon dioxide, and nutrients in the soil/water and powered by energy from the sun. Use this information to correct the post-it food web, placing the 3x5 cards in the appropriate places. Place energy from the sun, as well as water, carbon dioxide, and nutrients (from soil/water) at the beginning of the food web.

Craft a three-dimensional ecosystem reflecting Prince William Sound in the classroom. Encourage students to use aluminum foil, tape, markers, construction paper, other craft supplies, and reused materials to create a model of the habitat and organisms that live there.

Educator Tip: You can help students to suspend these parts of the ecosystem from the ceiling, imagining that the ceiling is the ocean surface. Or you can designate a portion of the classroom for the ecosystem. Otherwise – the whole classroom could get taken over!

Step into the hallway or outside. Read a chronological account of the *Exxon Valdez* oil tanker hitting Bligh Reef, the subsequent spill, and the rate of the oil spread.

As you read, have each group take turns charting the movement of the oil by unrolling black yarn down the hallway. Students will measure the yarn and use a scale of 1 foot=1 mile. Use 3x5 note cards and paper clips to create labels along the yarn that list:

- Date oil reached this distance
- Miles from the initial sight of the spill
- Amount of oil that had spilled by that day

Return to the classroom. As a group, discuss what parts of our ecosystem are affected first by the oil. Choose one or two organisms that the class believes were affected first by the *Exxon Valdez* oil spill (there are many correct answers to this question, and scientists do not know for shore). Then work as a class to identify what eats these organisms. Connect these organisms with their predators with the black yarn, showing how the oil quickly spreads through the ecosystem. Continue through different levels of the food web, and choose different starting organisms until the whole food web is affected by the oil.

Wrap-up:

Have students use computers, natural history books, and identification guides to do further research about how their assigned species were affected by the *Exxon Valdez* oil spill. Post these facts out in the hallway alongside the yarn that represents the oil spill.

Assessment:

In their science notebooks or a piece of paper, ask students to create a simplified food web for a different ecosystem they are familiar with. Ecosystems are very complicated, so let students know that it is okay to simplify their example ecosystem and include 4-5 species of organisms as well as 2-3 abiotic (nonliving) factors. Ask students to label or draw how **energy** flows in a different ecosystem. Students who successfully meet the performance expectation will clearly show energy flowing from the sun to producers to consumers, as well as decomposers at various points along the food web. Using a different color, ask students to create a representation of how **matter** flows in the ecosystem. Students will demonstrate understanding by illustrating matter flowing from soil nutrients/carbon to producers and then on to consumers (as well as decomposers at various points, and from decomposers back into soil) and/or matter flowing from water sources directly to producers, consumers, and decomposers and back to water sources.