

Title: *Food Webs: The Interdependence of Oiled Spindles*
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Background Information

Phytoplankton are free-floating, microscopic plants found in water, transported by currents and tides. These microscopic plants are so important to our ecosystem because they are responsible for photosynthesis, the consumption of carbon dioxide to create oxygen, and they are the base of oceanic and freshwater food chains. Sometimes, incidents like oil spills can negatively affect phytoplankton due to the toxicity of the foreign material. In April 2010, the Deepwater Horizon explosion dumped millions of barrels of crude oil into the Gulf of Mexico. Some studies predict that the oil will decrease certain forms of phytoplankton biomass. There is also a prediction that weathered oil, oil less soluble due to natural processes, will intensify the toxic effects of the polluted oil for certain species of phytoplankton. This may alter the regional phytoplankton community and the basis of food webs.

Louisiana State Standards (Grade-Level Expectations)

LS GLE: Describe the differences between plants and animals (LS-E-A1).

Describe the processes of photosynthesis and respiration in green plants (LS-M-A4).
 Construct food chains that can be found in ponds, marshes, oceans, forests, or meadows (LS-M-C2).

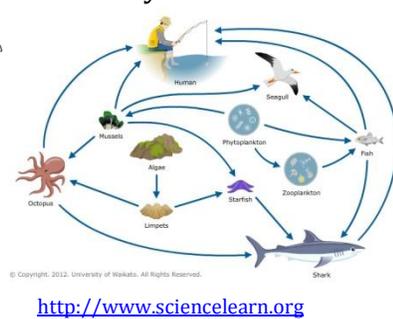
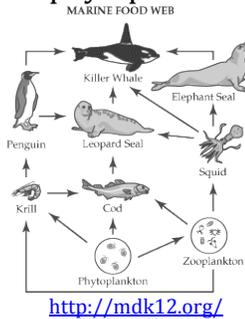
Analyze food webs by predicting the impact of the loss or gain of an organism (LS-H-D2).

SE GLE: Analyze positive and negative effects of human actions on ecosystems (SE-H-A7).
 Give examples and describe the effect of pollutants on selected populations (SE-H-A11).

SE GLE: Determine the interrelationships of clean water, land, and air to the success of organisms in a given population (SE-H-C1).
 Describe how accountability towards the environment affects sustainability (SE-H-D5).

ES GLE: Explain how species in an ecosystem interact and link in a complex web (SE-H-A7 and A10)
 Explain why biodiversity is essential to the survival of organisms (SE-H-A9).
 Give examples and describe the effects of pollutants on selected populations (SE-H-A11).

ES GLE: Determine the interrelationships of clean air, land, and water to the success of organisms in a given population (SE-H-C1).



Ocean Literacy Principles

Principle 2c: Erosion, the wearing away of rock, soil and other biotic and abiotic earth materials, occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.

Principle 4a: Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean.

Principle 5a: Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.

Principle 5b: Most life in the ocean exists as microbes. Microbes are the most important primary producers in the ocean. Not only are they the most abundant life form in the ocean, they have extremely fast growth rates and life cycles.

Principle 5h: Tides, waves and predation cause vertical zonation patterns along the shore, influencing the distribution and diversity of organisms.

Principle 6b: From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.

Principle 6e: Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

Principle 6g: Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

Time Requirement

The teachers are required to create the "animal cards" and 6 sided dice. Using the illustrations below, the cards should be cut and laminated which should take 10 minutes. Making the 6 sided dice should take 2 minutes because it is just a matter of using scissors and tape. The class, as a whole, should take 5 minutes to read and discuss the text on the front side of the worksheet. Once finished, give the students 15 minutes to complete the activity, which includes drawing illustrations. The final part of this activity includes a 5 minute discussion on how humans are ultimately impacted.



Materials

Printouts of 'Oil & Food Web Worksheets' (front & back)
Printouts of Illustrated cards
Printouts of 6 sided dice
Scissors
Tape or glue stick
Laminate
Colored pencils or crayons
Index or stock cards

Lesson Description

Creating the Oil & Food Web Project

1. Cut out the marine animal illustrations and paste, with laminate on index or stock cards. The larger, top predator goes on the front side and the smaller, marine animals go on the back.
2. Cut out the 6 sided dice and tape or glue the sides together to create a square prism.

Methodology

Each person in the class should read the front side of the 'Oil & Food Web Worksheet' to familiarize with the information. Divide the class into 5 groups and have them choose 1 of the laminated cards with illustrations. Instruct the students to roll the 6 sided dice to be assigned their "fate" for their particular top predator. Once the students have rolled the dice, allow them to draw on the back side of the 'Oil & Food Web Worksheet' how each of the 5 animals are impacted (the 5 animals are on back of the laminated index or stock card; animals should be in order going from inferior [i.e., phytoplankton] to superior [e.g., duck]). The students' illustrations should show a chain reaction of what should happen to each subsequent animal, depending on how the phytoplankton were affected. After all the students are finished, discuss how the chain reaction to each group's top predator impacts humans.

Importance to humans

Shark: ecotourism & regulate ocean diversity

Sea Turtles: food for humans, good for coral reefs (regulates eats algae)

Squid: food for humans, food for aquaculture, used in scientific (intelligence) studies

Dolphins: aesthetic value, naval operations, alternative medicine treatment

Seals: food for humans & regulate ocean diversity



Oil & Food Web Worksheet (front side)

Phytoplankton are free-floating, microscopic plants found in water, transported by currents and tides. Diatoms, algae, and dinoflagellates are the dominant forms of phytoplankton. These microscopic plants are so important to our ecosystem because they are responsible for photosynthesis, the consumption of carbon dioxide to create oxygen, and they are the base of oceanic and freshwater food chains.

Human population has a direct association with the amount of nutrient runoff or the quantity of nutrients discharged into surrounding waters. Phytoplankton use these nutrients and sunlight to grow and photosynthesize. Sometimes, too much nutrient runoff or discharge can cause phytoplankton to overgrow. With overgrowth, many will eventually die which allows microbial decomposition and a reduction in oxygen simultaneously. This can create problems for nearby marine life that need oxygen for survival.

Key Words

Phytoplankton: oceanic or freshwater microscopic plants that perform photosynthesis

Zooplankton: microscopic or small invertebrate animals that swim or free float in the water

Photosynthesis: a plant process that converts sunlight, nutrients, water, and carbon dioxide into sugar and oxygen

Weathering: the breakdown of material through contact with earth's atmosphere, animals, and water

Nutrient runoff: nutrients (e.g., from fertilizers, animal feces) are washed off the sides of roads or farms by precipitation

Nutrient discharge: nutrients from sewers or wastewater plants that are released into rivers and oceans

Pictures source: <http://ian.umces.edu>



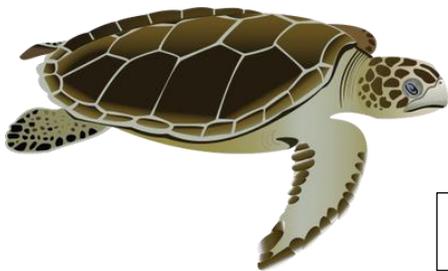
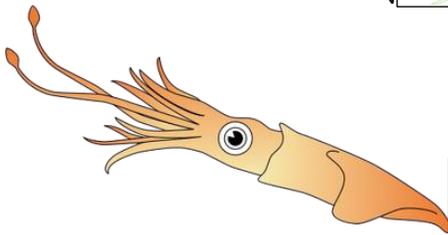
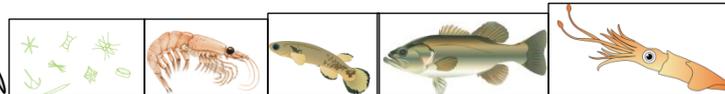
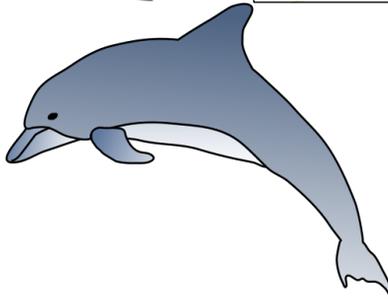
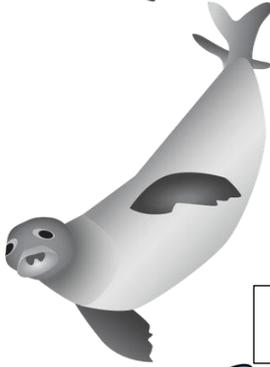
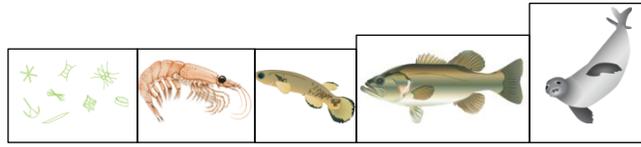
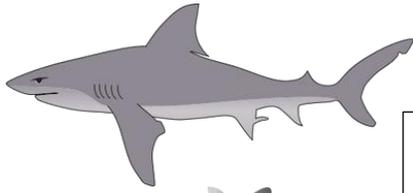
Oil & Food Web Worksheet (back side)

Phytoplankton	Zooplankton
3 rd Animal Chain	4 th Animal Chain
5 th Animal Chain	Top Predator



Front Card

Back Card



Create 6 sided dice:

