

Do You Know the Fish You're Eating?

“Third fisherman: ...Master, I marvel how the fishes live in the sea.

First fisherman: Why, as men do a-land; the great ones eat up the little ones.”

— Shakespeare

OVERVIEW

Students design and conduct research to discover firsthand what type of fish is being sold in their community, where this fish comes from, and whether that fish is an overfished species. This lesson gives students a chance to do their own market research and discover first-hand what type of fish is being sold to the public. It also provides an introduction to fish as an important food source and as an industry controlled partly by supply and demand. The results that emerge from this lesson will likely lead your students to question the role of public education in seafood choices for sustainable fisheries.

OBJECTIVES

Design a research project.

Conduct market research regarding the types and sources of fish sold in the local community.

GRADE LEVEL

8-12

SUBJECTS

Language Arts

Science

Social Studies

VOCABULARY

capacity, commodity, depletion, fishery, overfishing, populations, stocks, sustainability

MATERIALS

Handout #1: List of overfished and near-overfished fish species

Handout #2: Overview of world's ocean fisheries

Handout #3: Sample graphs and charts

NATIONAL SCIENCE STANDARDS:

This activity supports the following National Academy of Sciences science education standards.

Grades 5-8:

Unifying Concepts and Processes—Evidence, models, and explanation

Standard A: Science as Inquiry—Abilities necessary to do scientific inquiry

Standard A: Science as Inquiry—Understandings about scientific inquiry

Standard F: Science in Personal and Social Perspectives—Populations, resources and environments

Standard F: Science in Personal and Social Perspectives—Natural hazards
Standard F: Science in Personal and Social Perspectives—Risks and benefits

Grades 9-12:

Unifying Concepts and Processes—Evidence, models, and explanation
Standard A: Science as Inquiry—Abilities necessary to do scientific inquiry
Standard A: Science as Inquiry—Understandings about scientific inquiry
Standard F: Science in Personal and Social Perspectives—Natural resources
Standard F: Science in Personal and Social Perspectives—Environmental quality
Standard F: Science in Personal and Social Perspectives—Science and
technology in local, national, and global challenges

NATIONAL SOCIAL STUDIES STANDARDS:

This activity supports the following National Council for the Social Studies standards.

Middle Grades:

Standard I: Culture—a
Standard IV: Individual Development and Identity—h
Standard VII: Production, Distribution, & Consumption—a, b, f
Standard IX: Global Connections—d

High School:

Standard I: Culture—a
Standard IV: Individual Development and Identity—h
Standard VII: Production, Distribution, & Consumption—b, f
Standard IX: Global Connections—d

BACKGROUND

Do your students know what type of fish they may be eating or whether that fish is an overfished species? How important is education in a supply and demand economy?

In recent years, humans have become more and more removed from the process of food production. This is especially true for the younger generation, as production methods have been altered dramatically in the last several decades. Small-scale food production has been replaced by larger-scale industry, and modern technology results in fewer people being employed or connected to the production process.

Consumers make choices regarding fish purchases in stores and restaurants that affect fish populations and environmental quality. This activity helps build understanding of the implications of those choices.

BEFORE YOU BEGIN

Make copies of **Handout #1**, **Handout #2**, and **Handout #3** for each student.

WHAT TO DO

1. Ask students what they know about the fish they buy at the store or order in a restaurant. Where does it come from? Is there an abundance of that species?
2. As an in-class introduction, students can brainstorm about the different human relationships with fish (recreational, food source, etc.). Introduce the current issues surrounding fisheries and the concepts of overfishing and sustainability. Also introduce fish farming and review the environmental and health issues associated with many farming practices.
3. Provide copies of handouts #1, #2, and #3 to students. Within groups of 3-5, ask students to develop a research project with detailed fieldwork to answer the following questions:
 - Where is fish sold in your community? (i.e. all supermarkets, seafood restaurants, fish markets, farmers' markets, fast food restaurants, etc.)
 - What type of fish is sold at each type of market?
 - Where does the fish come from? How are they caught? Are they farmed or from the wild?
 - What are the prices of fish—compare both species and locations.
 - What is the most popular fish species?
 - What is the frequency of different fish species in the markets?
 - Which of these species are facing overfishing pressures?

Design and conduct a survey of fish being sold at markets and restaurants.

Students can also design a survey and questionnaire to interview customers and sellers in different markets or to interview students in your school. This could yield information about consumer understanding of fish

4. Have groups analyze their collected data and prepare charts and graphs to present their findings to the rest of the class. What conclusions can be drawn from this study, using such factors as pricing, availability, demand, and overfishing threats?
5. Ask students to put themselves in the position of the fisher. Using their conclusions, what choices would they make in order to create the greatest profit?
6. As a group, reflect on these questions:
 - Will knowing more about overfished species change your eating and purchasing habits?
 - Can consumers really have an impact on what is sold?
 - What about the many species for which there is not enough data to judge whether they are overfished or not?

- Did the students have difficulty getting the information they needed, if so, what does this mean for consumer education?
7. Introduce your students to existing sustainable seafood choices programs. These programs maintain and make accessible information about fish species and the status of their populations. Why are different fish species placed in the different categories? Discuss how these programs can assist with making consumer choices regarding fish purchases in stores and restaurants.
- Seafood Choices Alliance's Smart Choices program (www.seafoodchoices.com/smartchoices.php)
 - Monterey Bay Aquarium's Seafood Watch (www.mbayaq.org/cr/seafoodwatch.asp).
 - Environmental Defense (<http://www.oceansalive.org/home.cfm>)
 - Blue Ocean Institute (<http://www.blueocean.org/#>)

ASSESSMENT

Use the group reports to assess students' research design, their use of statistical evidence, and the conclusions they draw to demonstrate mastery of key concepts, including overfishing, fish farming, supply and demand, and consumer choices.

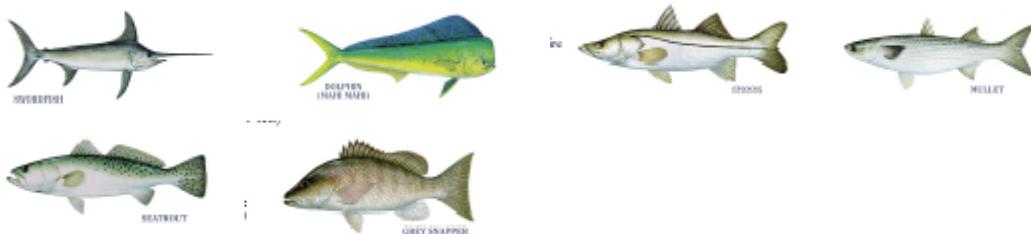
EXTENSIONS

- Develop a consumer education campaign regarding sustainable fisheries.
- Investigate the impacts of different methods of fish farming and ocean fisheries and conduct a debate on managing these practices for sustainability.

USEFUL RESOURCES

National Marine Fisheries Service Regional Councils (www.nmfs.noaa.gov)

United Nations Food and Agricultural Organization (www.unfao.org)



HANDOUT #1 - Overfished Marine Species in the United States

Albacore—North Atlantic
American Plaice—North Atlantic
Atlantic Halibut—North Atlantic
Atlantic Salmon—North Atlantic
Barndoor Skate—North Atlantic
Bigeye Tuna--Atlantic
Black Grouper—South Atlantic
Black Sea Bass—South Atlantic
Bluefin Tuna—West Atlantic
Bluefish—Mid Atlantic except Gulf of Mexico
Blue King Crab—Pribilof Islands, Saint Matthew Island
Blue Marlin--Atlantic
Bocaccio--Pacific
Butterfish—Mid Atlantic
Canary Rockfish--Pacific
Cod—Gulf of Maine
Cod—Georges Bank
Cowcod--Pacific
Darkblotched Rockfish--Pacific
Golden Tilefish—Mid Atlantic
Goliath Grouper (Jewfish)—South Atlantic, Gulf of Mexico, Caribbean
Greater Amberjack—Gulf of Mexico
Haddock—Gulf of Maine
Haddock—Georges Bank
Nassau Grouper—South Atlantic, Gulf of Mexico, Caribbean
Ocean Pout—North Atlantic
Queen Conch--Caribbean
Red Drum—South Atlantic, Gulf of Mexico
Red Grouper—South Atlantic
Red Porgy—South Atlantic
Red Snapper—South Atlantic, Gulf of Mexico
Sailfish—West Atlantic
Shark Complex*
Snow Crab—Bering Sea
Snowy Grouper—South Atlantic
Speckled Hind—South Atlantic
Tanner Crab—Eastern Bering Sea
Thorny Skate—North Atlantic
Vermillion Snapper—Gulf of Mexico
Widow Rockfish—Pacific
Warsaw Grouper—South Atlantic
White Hake—North Atlantic
White Marling00Atlantic

Windowpane Flounder—Mid Atlantic
Winter Flounder—North, Mid Atlantic
Yelloweye Rockfish—Pacific
Yellowtail flounder—Mid Atlantic
Yellowtail flounder—Cape Cod/Gulf of Maine

*The Large Coastal Shark Complex is listed by its management complex rather than individual stocks. The complex includes Spinner Shark, Silky Shark, Bull Shark, Tiger Shark, Lemon Shark, Nurse Shark, Scalloped Hammerhead Shark, Great Hammerhead Shark, Smooth Hammerhead Shark, Dusky Shark, Bignose Shark, Galapagos Shark, Night Shark, Caribbean Reef Shark, Narrowtooth Shark, Sand Tiger Shark, Bigeye Sand Tiger Shark, Whale Shark, Basking Shark, and White Shark.

Overall Fishing Stock Status, 2004
Total stocks or stock complexes in the U.S.: 688
Number of stocks overfished: 56
Number of stocks not overfished: 144
Number of stocks approaching overfished status: 1
Number of stocks for which status is not known, not defined, or not applicable:
487

Source: NOAA's National Marine Fisheries Service, "Report to Congress: Status of the U.S. Fisheries for 2004,"
http://www.nmfs.noaa.gov/sfa/domes_fish/StatusoFisheries/SOS8%20-05.htm

HANDOUT #2 - An Overview of the World's Fisheries

What is a commercial fishery?

A commercial fishery is the industry of catching a particular fish species or other marine species for profit. Commercial fisheries exist throughout the world.

What is the status of our fisheries?

Although humans have exploited marine species for millennia, advances in technology over the last few decades have greatly altered the way humans exploit fisheries. Overfishing—fishing faster than the fish can replenish—is now the greatest threat to marine biodiversity. Today, thirteen of the planet's fifteen major oceanic fishing areas are now fished at or beyond capacity. The problem has grown to such proportions that the populations of some fished species, such as haddock and bluefin tuna, have been decimated.

Is fish farming a better alternative?

With a growing world population and marine fisheries in decline, fisheries experts have long hoped that aquaculture might one day take up the slack. In some ways it already is, but a growing number of marine scientists believe that parts of the industry may instead contribute to the further decline of marine resources. The intense controversy pertains to which species are being farmed and how they are being farmed. Salmon, shrimp and tuna are examples of carnivorous animals that must be fed other fish. Most farms raising these species ultimately consume more fish than they produce. The profit motive also inclines many farms to implement large-scale, industrial practices that can result in pollution, the destruction of marine habitat, and a tendency to generate diseases that pose a risk to both wild fish and consumers.

In order to be truly sustainable, aquaculture operations need to operate in ways that do not harm marine ecosystems or coastal communities; that neither consume more resources than they produce. In China, millions of people depend on farms that raise carp, an herbivorous fish that requires no fishmeal. Carp are omnivorous species like catfish and tilapia that can be farmed with very little need of fishmeal or fish oil. Farms that raise shellfish like abalone, clams, oysters and mussels also produce a net gain in protein for a hungry world. These kinds of aquaculture are best suited for truly taking pressure off our over-exploited oceans.

What's the big deal?

For human populations, fishing has long been a way of life, a source of food and income. It is the livelihood for some 200 million people worldwide. Approximately 20 percent of the animal protein consumed by humans is derived from fish. Since living marine resources continue to be overexploited by an industry too large for the resources available, many fisheries are collapsing.

This means species are declining, a major world food source is being put at risk, jobs are being lost, and ecosystems are inalterably changing.

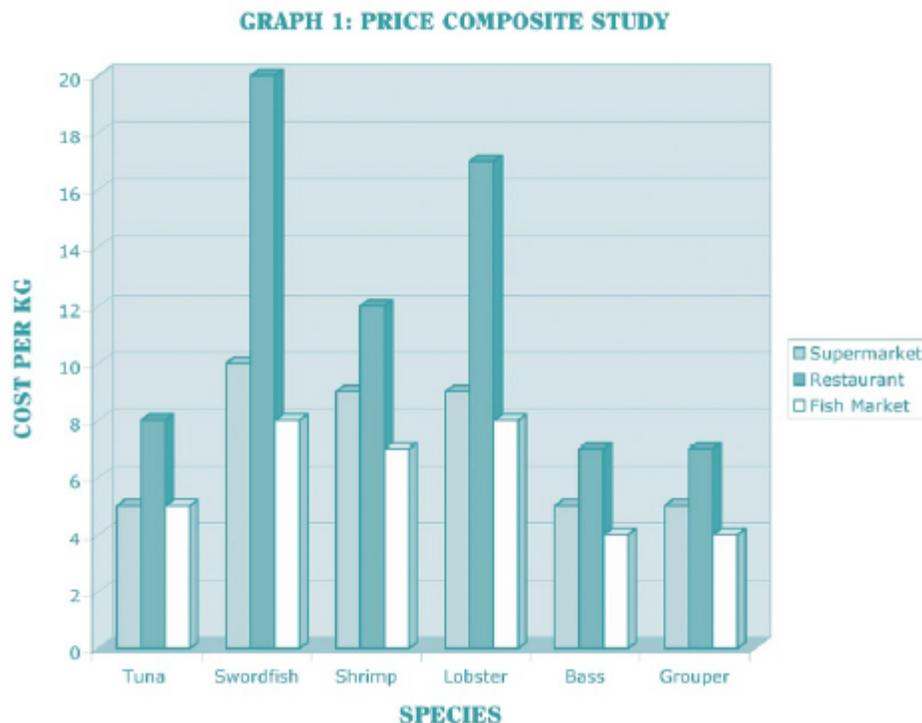
Handout #3: Sample Charts and Graphs

Example Fish Availability Study

This table selects six species as below, and compares the frequency of their availability within three categories (supermarkets, restaurants, and fish markets). This graph selects six separate fish species to use in a price study. The three categories used include supermarkets, restaurants, and fish markets.

| Fished Species | Supermarket | Restaurant | Fish Market |
|----------------|-------------|------------|-------------|
| Tuna | Always | Always | Sometimes |
| Swordfish | Never | Sometimes | Never |
| Shrimp | Always | Always | Always |
| Lobster | Never | Sometimes | Sometimes |
| Bass | Sometimes | Sometimes | Sometimes |
| Grouper | Always | Sometimes | Never |

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