Seafood Smorgasbord

Below are suggested adaptations to the Seafood Smorgasbord (Lawrence Hall of Science GEMS: Only One Ocean 2001) to incorporate information learned from Dr. Jensen's presentation and subsequent discussion.

Procedure

Instead of eating different types of seafood, consider providing your students with images of different types of seafood, the fish before it is prepared to eat, and fishing gear. You can include information about some of the common New Jersey fisheries that we have listed below. The Mid-Atlantic Fishery Management Council (MAFMC) manages fisheries that occur in federal waters (3-200 miles from the shore) and additional information can be found at http://www.mafmc.org/species/species.htm. The New Jersey Department of Fish & Wildlife (NJDFW) manages fisheries that occur in state waters (0-3 miles from the shore) and additional information can be found at http://www.state.nj.us/dep/fgw/fishing.htm.

Species	Commercial	Recreational	Who manages it?
American Eel	X	X	NJDFW
Atlantic Mackerel	X		MAFMC
Black Drum	X	X	NJDFW
Black Sea Bass	X	X	MAFMC and NJDFW
Blue Crab	X	X	NJDFW
Bluefish	X	X	MAFMC and NJDFW
Butterfish	X		MAFMC
Cobia	X	X	NJDFW
Cod	X	X	NJDFW
Conch	X		NJDFW
Goosefish	X		NJDFW
Haddock	X	X	NJDFW
King Mackerel	X	X	NJDFW
Kingfish	X		NJDFW
Lobster	X	X	NJDFW
Monkfish	X		MAFMC
Ocean Quahog	X		MAFMC
Oyster	X		NJDFW
Pollock	X	X	NJDFW
Red Drum	X	X	NJDFW
Scup	X	X	MAFMC and NJDFW
Shad	X	X	NJDFW

Shark	X	X	NJDFW
Spanish Mackerel	X	X	NJDFW
Spiny Dogfish	X		MAFMC
Squid (long-finned and short-finned)	X		MAFMC
Striped Bass	X	X	NJDFW
Summer Flounder	X	X	MAFMC and NJDFW
Surfclam	X		MAFMC
Tautog	X	X	NJDFW
Tilefish	X		MAFMC
Weakfish	X	X	NJDFW
Winter Flounder	X	X	NJDFW

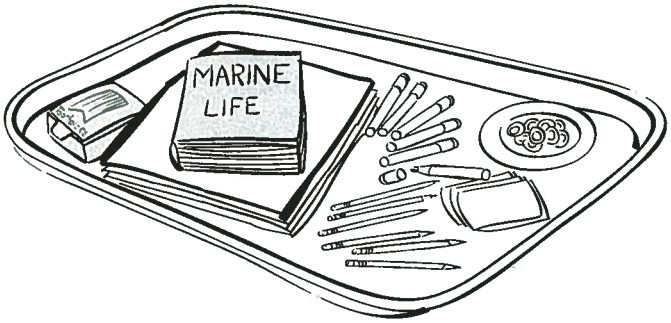
Thought Swap

Here are some additional questions that you could use in the Thought Swap activity:

- Pick a type of seafood you just looked at and describe how you think it was caught.
- Where have you been fishing or do you know people go fishing?
- Do the same species of fish live in every part of the United States?
- Describe similarities and differences between fish and shellfish.
- Describe similarities and differences between fish that live in the ocean and fish that live in fresh water (ponds, lakes, rivers, streams, etc.).

You might also have samples of any of the following: tinned anchovies or sardines; real crab or scallops; canned or jarred oysters; octopus; herring (pickled or other); jellyfish; any cooked fresh or frozen ocean fish; mussels; and dried, smoked, or fresh salmon.

8. Prepare trays for each table with the following "Smorgasbord" elements, so the tasting can be set up quickly in the middle of Session 1: one ready-to-serve **unlabeled** seafood sample; toothpicks; napkins; sheets of paper for the students to draw their guesses on; pencils and colored markers; and one of the five marine-life reference books, if available.



Session 1: Seafood Smorgasbord

1. Have students work in small groups to brainstorm and record lists of ocean animals that people eat. Lead a class discussion, posting their ideas on the chalkboard or chart paper.

2. Tell them they're going to have a seafood smorgasbord right here in the classroom, to sample some food from the ocean. As they sample, students will try to guess what each organism looked like while it was alive. Explain that each of them will be starting a piece of paper with drawings of his guesses, and taking that paper from table to table for each new seafood.

A smorgasbord is a buffet consisting of a variety of small hot and cold offerings. The word comes from the Swedish smörgås, *meaning "open sandwich," and* bord, *meaning "table." The traditional Scandinavian smorgasbord consists of smoked and pickled fish, relishes, cheese, salads, etc., but the term is now used more liberally, for any collection of varied foodstuffs.*

3. Set up the smorgasbord around the classroom.

4. Divide the students into groups and have each start at a different table. Letting them know you'll be setting a time limit (about five minutes per table), have them taste the food item on their table, then take a piece of paper from the stack and on it draw a picture of what they think the animal looked like when it was alive. They can flip through the marine reference book to try to figure it out. Rotate the groups after each "time's-up" (reminding students to take their drawings with them to the next table, to add to), until all students have sampled from each table and illustrated their guesses.

A small percentage of people are allergic to shellfish, and you may have vegetarians in your class who prefer not to try the samples. We encourage you to respect the needs of your students and not force students to try things they feel they shouldn't eat. At the same time, some students may just need some healthy encouragement to try something they THINK they won't like.

5. After the smorgasbord, go back to each item, one at a time, and hold it up. Have students share their guesses and briefly discuss their detective work. Why did they guess the animals they did? If no one guessed the animal correctly, show the class a picture of it and tell them its name.

Introducing Thought Swap

Note: This activity structure helps students talk and write about their related prior knowledge. It emphasizes cooperation and social skills development, and creates opportunities for students to use language in a non-threatening, highly relevant setting. Students also build on their active-listening skills by learning how to hold short, interesting discussions with a variety of partners.

1. Tell students that in Thought Swap, they'll take turns talking with different classmates. They'll need to cooperate, follow directions, and talk quietly with each of their partners.

2. Have students stand shoulder to shoulder in two parallel lines, so that each person is facing a partner.

You may want to pass out ocean-related pictures to encourage discussion.

3. Tell the students you'll be asking a question or giving them an idea to talk about with their partner (the person facing them). They'll each have about a minute to talk before "swapping" to let the other person talk. For a successful discussion, each partner should be a good listener and speak clearly when it's her turn.

Thought Swap Begins

This is how Thought Swap will go:

a) you pose a question from the list;

b) partners swap thoughts;

c) you call "time";

d) you debrief a few students;

e) students swap partners;

f) you pose a question, debrief, and so on.

1. Begin the Thought Swap by posing this two-part question for students to discuss:

- **How often do you normally eat seafood? What's your favorite kind?**

2. Walk along the two lines to help shy or reticent partners get started. When you call time, have a few students report something their partners told them.

3. Move Thought Swap along: Have one of the lines move one position to the left, so everyone is facing a new partner; the person at the end of the line walks around to the beginning of the line. Everyone can now greet his new partner. Ask the next question for the new partners to discuss:

- **What kinds of fish have you caught or have you seen someone else catch?**

4. Again, walk among the students to help the discussion along. After calling "time," have a few students describe their partners' responses.

5. Continue with the Thought Swap sequence, posing each of the questions below. After each question, debrief the students by calling on a few to describe their partners' responses.

- **Describe how you think the seafood you just tasted may have been caught.**
- **Think about the activity Apples and Oceans. Where do you think most of the fisheries of the world are located? Why?**
- **Recall the meaning of "overfishing." Can you think of an example?**
- **What can people do to make sure that enough fish will be around for future generations to eat?**

6. After calling "time" for the last question, spend some extra time discussing it with students. Write down their responses on chart paper, to be revisited after the class learns about actual fisheries.

7. Distribute the handout, Dolphins and Your Tuna-Fish Sandwich, as homework (or an in-class assignment) to be read in time for the next class. Tell students they'll be reading about what real people *have* done to try to solve problems associated with one specific fishery: tuna. Let them know they'll be studying tuna—and four other fishery species—in greater depth later in the activity. They'll have lots of opportunity to share what they learn about all those species with the rest of the class.

World Fisheries

1. Lead a class discussion about the reading assignment, Dolphins and Your Tuna-Fish Sandwich. Discuss the following questions as a whole group:

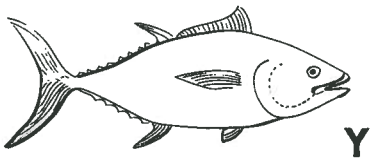
- Are you concerned about overfishing? About other environmental problems related to fisheries, such as bycatch? Why or why not?
- Do you think any of the seafood we ate in the Seafood Smorgasbord may have come from species that are overfished?
- What do you think a "scientific" approach means? An "activist" approach? Which strategy for problem solving do you think is the most effective? Is there only one "right" answer?

2. Call attention to the three major problems facing fisheries: ***overfishing***, ***habitat destruction***, and ***bycatch***. Ask students to share any proposed solutions.

3. Introduce the concept of ***maximum sustainable yield***, or ***MSY***: the total amount of fish that can be caught and still leave enough to reproduce, so that the population doesn't continually get smaller. Students will come across this term again in their fishery assignments in Session 2.

4. If you wish, paraphrase for the class some of the important information on the Overview of the World's Ocean Fisheries, before distributing it to each small group in Session 2.

*In this activity we often refer to the **maximum sustainable yield (MSY)**, a long-standing regulatory tool for managing fish stocks. But we may not really know the "maximum" for any given fishery—and by dictating a quota, we risk making a mistake about the sustainable harvest. So the concept of MSY is gradually being displaced by other management ideas. One other approach uses the **optimum sustainable yield (OSY)**, in which fishing limits are based not just on total populations of fish, but also on safety for the fish stock, or highest economic value, or most jobs created for fishers. Another is the **acceptable biological catch (ABC)**, which takes evolutionary and biological oceanic changes into account, unrelated to the fisheries.*



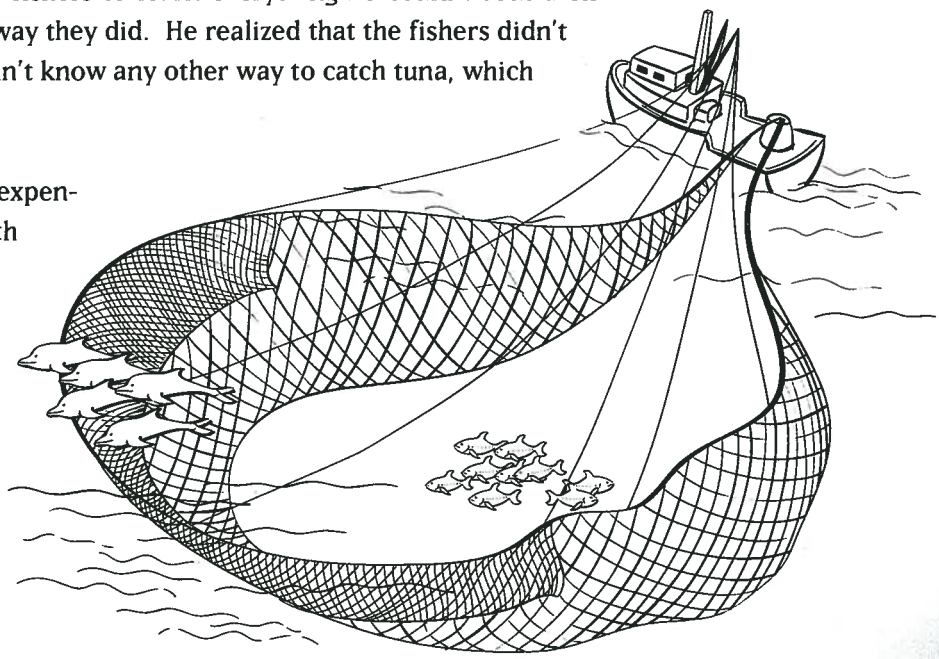
Dolphins and Your Tuna-Fish Sandwich

When you take a bite out of a tuna-fish sandwich, do you ever think about where that tuna came from or how it was caught? Tuna is one of the most common seafoods eaten in the United States—and the methods for catching it have created quite a stir over the last 30 years. Tuna along the west coasts of North and South America often swim under schools of dolphins. Tuna-fishing boats speed around the dolphins, encircling them in huge nets (a process called "setting" on the dolphins). Then the nets are pulled in, full of tuna...and full of dolphins. In the late 1970s, about one dolphin died for every ton of tuna caught.

There have been many efforts by people to solve this problem. There are many strategies for working to protect the environment and ensuring that people use natural resources (like tuna) in sustainable ways. Read the short stories below and think about how you would solve a tough problem like the tuna/dolphin controversy!

The Ken Norris Story

In the 1960s and 1970s, a marine biologist and dolphin expert named Ken Norris learned that hundreds of thousands of dolphins were being killed each year in tuna nets. For every 550 tons of tuna caught (to use an example you'll see again in a moment) nearly 600 dolphins were killed—and that could happen in just a few "sets" of the net! He decided to use all his skills as a scientist to find ways of catching tuna that would not kill dolphins. He spent time onboard the tuna boats, observing how they operated. He swam inside the tuna nets to see how the dolphins behaved when they were trapped. He talked with and became friends with many of the fishers to learn everything he could about their jobs and why they did things the way they did. He realized that the fishers didn't *want* to kill dolphins, but they didn't know any other way to catch tuna, which was how they made their living.



He discovered that by using more expensive, finer-mesh nets (nets with smaller holes), and by driving the fishing boats a certain way, most of the dolphins could be saved. After the dolphins had been encircled and most of the net had been hauled onto the stern (back) of the ship, if the captain quickly reversed the ship's engines it could drag the edge of the net down under the water

and the dolphins could easily slip out over the top of the net. He called this "backing down." He convinced one captain to try it out—and it worked! The ship caught 550 tons of tuna (like the example in the last paragraph) but killed only 11 dolphins—nearly 50 times fewer than with the old method. And Ken thought that with more practice, they could get it down to just one or two. Ken took his discovery to the United States Congress and worked hard to pass laws to force all tuna fishers in the U.S. to use better nets and employ this new fishing method. Ken helped write new laws and the rules to enforce them. He had the idea that there should be an official "observer" on every tuna boat, to make sure dolphins weren't being killed in their nets—and that if too many dolphins were killed, the fishers should have to stop fishing until the next year. Within a few years, the number of dolphins being killed decreased dramatically. Many people thought Ken was a real-life hero—he had made observations, talked with people on both sides of the issue, and quietly found a solution that was fair to both the fishers and the dolphins. It allowed the tuna fishers to keep fishing, but forced them to make extra efforts to protect dolphins.

The Sam LaBudde Story

With the success of Ken Norris, many people thought the tuna/dolphin controversy was over. But in the early 1980s, stories started to appear again about dolphins being killed in tuna nets. What was happening? Well, foreign boats had an advantage over U.S. boats, since they could use quicker, cheaper fishing methods that killed more dolphins. Many U.S. tuna boats registered in other countries so they wouldn't have to abide by U.S. laws. At the same time, there were rumors that on some U.S. boats the fishers locked the observers in their cabins for the entire trip, or threatened to hurt them if they reported what they actually saw. Few people wanted to be observers, and many boats sailed without one. At the same time, to help the U.S. fishing industry compete with foreign countries, the president of the United States relaxed enforcement of the fishery laws Ken Norris and others had worked so hard for. More dolphins than ever were dying in the nets.

That's when Sam LaBudde (pronounced "LaBuddy"), a young environmental activist, decided to take matters into his own hands. Sam got a job onboard a foreign tuna boat to secretly record what was really happening when the boats fished. Many people warned Sam that if the fishers found out what he was trying to do, he could be in serious danger. He took a video camera with him onto the boat and told the crew that he was just taking "home videos" to show his family what it was like to live at sea and to be a fisher. In fact, this is what Sam's camera recorded: In a single set (encirclement), two hundred dolphins were trapped in the nets. The captain did *not* use the "backing down" procedure, and every dolphin died a terrible death. Many were crushed as the nets were pulled in by electric winches through large metal pulleys. Many drowned. It was a catastrophe. Sam left the boat as soon as he could and released his videotape to television stations all over the country. The video he shot on that tuna boat created a small revolution! A U.S. fisher soon stepped forward with a similar tape from a U.S. boat. After seeing the tapes, environmental groups in San Francisco sued the federal government and received a court order to place observers once again on every U.S. tuna boat. Environmentalists demanded that big tuna companies like StarKist and Bumblebee stop buying tuna from boats that killed dolphins. But still, the killing went on.

Students Step In

In 1989 and 1990, after seeing Sam's video, students across the United States got together and decided to do more to stop the killing of dolphins. They organized education campaigns, wrote articles in school newspapers, and sent huge waves of letters and drawings to the tuna companies and to government officials. They pressured school cafeterias and restaurants to stop serving tuna. One group of 200 middle school students went to Washington and met with U.S. senators to explain how tuna fishing methods led to the killing of dolphins. Young people took on the biggest tuna company in the world, StarKist (which is owned by H.J. Heinz Co.); they sent boxes and boxes of letters to its chairperson. Finally, on April 12, 1990, all the hard work of students and adults paid off. StarKist announced it would no longer buy tuna caught by setting on dolphins, and began selling tuna in cans labeled "Dolphin Safe." Every other U.S. tuna company followed StarKist's example, and once again the number of dolphins being killed began to drop.

Your Turn!

This story isn't over. Despite the efforts of Ken Norris, Sam LaBudde, dedicated environmentalists, concerned government officials, and thousands of determined students, dolphins are still dying in tuna nets. There are no easy solutions that protect both the dolphins AND the fishers' right to make a living fishing. Fishing boats registered in other countries can still set their nets on dolphins—even in U.S. waters—as long as they sell their tuna to countries outside the United States. In fact, U.S. tuna fishers can set on dolphins too, if they sell their catch outside the United States. Even the "backing down" method of saving dolphins is now controversial! To understand the latest challenges and problems with the tuna fishery, search for information on the Internet, if you have access to it. (Try searching for "tuna/dolphin.")

The tuna fishery isn't the only fishery with problems. About 70 percent of all the world's fisheries are being fished to capacity (meaning the population is barely able to sustain itself), or are overfished (meaning the population is decreasing). Here's a terrible statistic: One-third of the worldwide ocean catch of 93 million tons is wasted—thrown back into the sea, dead or dying. These wasted marine animals (like the dolphins described above), caught along with the intended (target) species, are called "bycatch." Bycatch is a very serious environmental problem.

What do you think should happen next? If you got involved, what strategy do you think would be the most effective? Which would you take: the approach of a scientist like Ken, or of an activist like Sam? Could you persuade your fellow students to get involved for real? As you continue with "What's the Catch" in class, remember that it's more than a science activity. This isn't an imaginary problem. While you've been reading this page, thousands of tons more tuna have been caught and thousands more dolphins have died. Other fish and marine mammals are in danger from current fishing methods too, and many ocean habitats are being destroyed.

Will *your* ideas help to find the next solutions?

Overview of the World's Ocean Fisheries

- Most of the world's ocean fisheries are not sustainable. This means that more fish are being caught each year than can reproduce, and the population just gets smaller and smaller.

- 70 percent of the world's fisheries are fully fished (the population is barely able to sustain itself) or overfished (the population is decreasing). Thirteen out of the 15 major ocean fishing areas are now overfished. Four areas have actually been "fished out" altogether. Some parts of the ocean have been closed to all fishing, in hopes the marine population will recover.

- Fish is an essential source of food for people all over the world. Nearly one billion people in Asia alone depend on seafood as a major source of protein.

- World population growth is the biggest reason for the increased demand for fish. Ocean fisheries can't keep up with the growing demand created by overpopulation.

- About one-third of the worldwide ocean catch of 93 million tons is wasted! This 30 million tons of *bycatch* (incidental take) is thrown back into the sea, dead or dying, because it's not what the fishers were fishing for.

- One-third of all the intended ocean catch is turned into animal feed, including feed for "farmed" marine species such as shrimp.

- Nearly every individual fishery in the world is currently in decline.