GROUPER MOON PROJECT

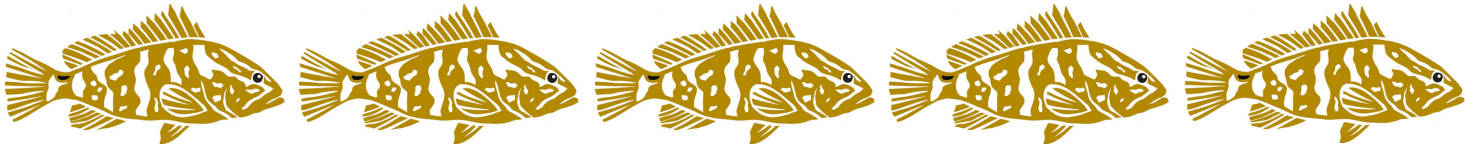
An Integrated Marine Science Curriculum

Do You Know Where Your Fish Comes From?

The Thinking Behind: Do you know where your food comes from? Where does the meat in your hamburger come from? Or the ham in your sandwich? Or the fish at the local market? More than ever before, people are separated from the sources of their food. It simply appears, as if by magic, on our dinner plates, at our favorite restaurants, or on the supermarket shelves. It appears to always be there, so why should we care?

Current agricultural practices can have massive and often detrimental effects to our environment. The choices we each make as consumers have a big impact on the types of food that are sold. This is why it is important that we not only understand where our food comes from, but also how it got there. The more we know, the better able we are to make informed choices that support sustainability and avoid bad choices that hurt our environment. The primary reason the Nassau Grouper is now on the endangered species list is overfishing. As we have been learning, a strong population of Nassau Grouper affects the overall health of the reefs, which in turn impacts the fish available to us to eat and sell, as well as the tourist industry (diving, snorkeling, etc.). If we are to preserve Cayman's fisheries for generations to come, we must become more aware and critical about the fish we eat.

Objectives: Students will engage in market research to find out the source of the fish we eat on Grand Cayman. Students will work in small groups to identify the different places fish are purchased and consumed. They will create surveys and conduct them at the various locations the groups have identified. Through this research students will learn firsthand the types of fish that are purchased and eaten on Grand Cayman, where they are coming from, and weather or not they are a threatened species. Through these interviews, students will be exposed to a wide range of perspectives and allow them to draw their own conclusions. They will literally be constructing their own understanding of these complex conservation issues. Students will also see how a supply and demand economy affects our natural resources and indeed how their own food choices matter.



Part I: Classroom Discussion and Brainstorming

Class Brainstorm: Ask students to discuss the various relationships we have with fish, specifically here in the Cayman Islands. For example: food, fish markets, fishing, snorkeling, SCUBA, tourism, aquaculture, etc.

Student Journal and Discussion: Ask each student to think about the fish they consume. Ask them to reflect on the following questions: What types of fish do you eat? Where do you buy fish? Is there an abundance of these fishes? After 5-10 minutes have the students share their ideas out loud.

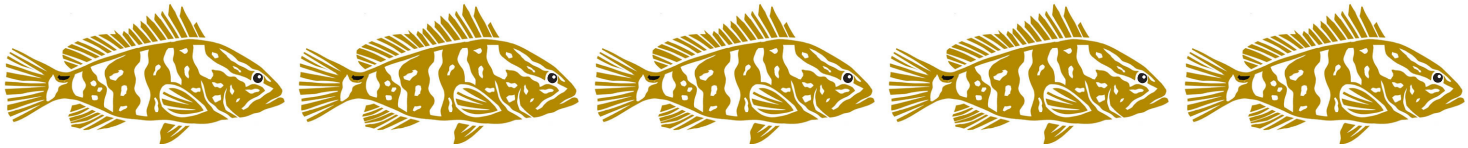
Part II: Small Group Research Projects

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?

Students will work in their groups to 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.



Data Analysis: Have students compile and analyze their collected data. They can produce diagrams, charts or other visual representations of their findings. What conclusions are they able to draw from their data? Each group can present their findings to the class or you can engage in a gallery walk of their visual presentations.

Position Papers or Mock Debate: Have students take on the different roles of the people they interviewed. Have them write a position statement on the current state of the fisheries here in the Cayman Islands. Are we using them in a sustainable way?

Reflection: Each student should write a reflection addressing the following questions:

- Has this project changed your ideas about the fish you eat? Will it affect what you buy in the future? Why or why not?
- As a consumer, how can you have an impact on what fish is sold?
- Was the information you gained from this project conclusive? Are there questions still unanswered? Did new questions arise from the data you collected?

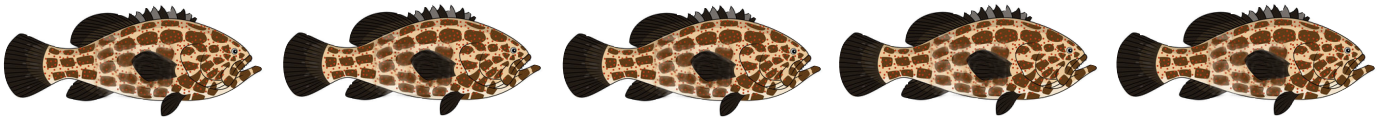
Action Project: Brainstorm with the students some possible action projects to address their findings. **For example:** Create a fish consumer guide for Grand Cayman. List the different fish that are bought and sold and whether or not they are threatened by overfishing or unsustainable fishing methods. These guides could be handed out by DOE, REEF, and local markets.

USEFUL RESOURCES

National Marine Fisheries Service Regional Councils (www.nmfs.noaa.gov)
United Nations Food and Agricultural Organization (www.unfao.org)

Credit

"Do You Know What fish You're Eating" was created by the Rosenstiel School of Marine and Atmospheric Science as part of its Fish Trouble Teaching Guide. For additional information and resources, visit www.rsmas.miami.edu



HANDOUT 1
Overfished Marine Species in the United States

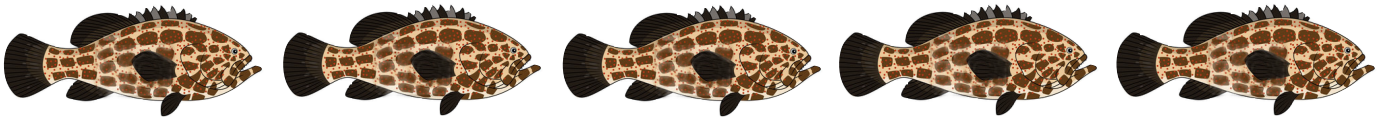
Albacore—North Atlantic
American Plaice—North Atlantic
Atlantic Halibut—North Atlantic
Atlantic Salmon—North Atlantic
Barndoor Skate—North Atlantic
Bigeye Tuna–Atlantic
Black Grouper—South Atlantic
Black Sea Bass—South Atlantic
Bluefin Tuna—West Atlantic
Bluefish—Mid Atlantic except Gulf of Mexico
Blue 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 Marling—Atlantic
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, Big eye 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 in-clude supermarkets, restaurants, and fish markets.

Fished Species Supermarket Restaurant Fish Market

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

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.