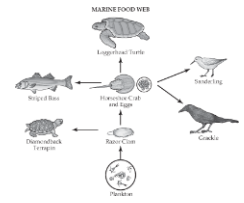


Trawling for Shrimp [MC]



Adapted from NOAA Fisheries

Grades: 6-8

Time: 45 minutes to 1 hour

Goals: To reduce the number of bycatch species while increasing the number of individuals of the intended catch.

Objectives:

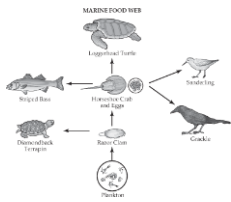
Students will be able to: understand and define bycatch and how it affects catch rates of commercial fisheries; conduct an experiment to introduce bycatch reduction devices; and conduct data analysis to determine the best method of reducing bycatch.

Materials:

- Wire coat hangers
- Plastic grocery bags
- Tape
- Construction paper
- Other craft materials (string, pipe cleaners, etc.)
- Cardboard
- Scissors
- Colorful goldfish
- Orzo pasta
- Elbow pasta
- Penne pasta
- Sprinkles
- Shallow bowls
- Student data sheet (provided)

Procedures:

1. Pre-Activity (introduction): Prior to the activity, mix goldfish, assorted pastas, and sprinkles into a large mixing bowl; distribute into smaller, shallower bowls for each group of 4-5 students. Designate on the board which species (see student data sheet) are represented by each item in the bowls. Begin by asking the students whether they've eaten shrimp or seen some at their local supermarkets. Explain how the shrimping industry works and the issues commercial fishermen face with the use of trawl nets. Introduce the term "bycatch reduction device" (or BRD) and elaborate on any species that would be deemed "bycatch" while trawling for shrimp. Explain that the activity involves creating their own trawl nets and BRDs to limit the number of bycatch species and maximize their shrimp catch.



2. Activity: Divide the class into groups of 4-5 students and hand out the trawl net materials, shallow bowls, and student data sheets. Begin by instructing them on how to create a trawl net: 1) stretch the wire hanger into a diamond shape; 2) wrap the edges of the plastic bag around the hanger and secure with tape; 3) use the additional materials to create your BRD and attach to your net. Allow students approximately 15-20 minutes to brainstorm and construct their nets.

Explain to the students that they will have three trials to perfect their BRD and reduce the number of non-target species they collect. After each trial, they will sort through their catch, record the number of individuals of each species on the data sheet, and return the catch to the bowl (“ocean”).

3. Post-Activity (review): Have each group choose a “representative fisherman” to report their catch statistics on the board for each trial. Point out the percentages of non-target species caught by each group. Discuss these results as a class. Explore what happens to the ecosystem when these non-target species are removed accidentally, since most of them die before they can be released back. As an extension to this lesson, have the students graph their individual results, as well as the class results, and create a cost analysis of bycatch species for local fishermen.

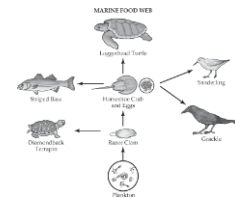
Key Words:

Bycatch	Reduction devices	Trawling
Commercial fishing	Species decline	Non-target species

Background Information:

Adapted from NOAA Fisheries

When you are fishing with large nets, longlines, or purse seines, any species you catch that is not considered your target species is collectively known as “bycatch.” Depending on the method of fishing and the fishing regulations, bycatch species may be killed instantly or can endure a prolonged death while the catch is sorted through. This can cause problems with the recovery of species considered endangered or threatened if too many individuals are caught as bycatch.

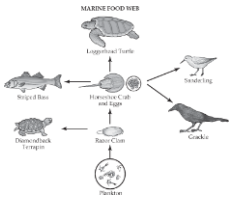


Research has been ongoing to reduce the number of bycatch species and some fishing methods and gear have been altered to meet the growing demands of the commercial fishing industry. Some gear have been created to be more selective on the target species, while some regulations have assisted in reducing the take of a certain size or age class. One example of altered gear is the Turtle Excluder Device, which is simply a metal gate placed inside a shrimp trawl net with an opening for larger species to swim out of. These excluders do not necessarily keep large species out of the nets, but they do reduce the number of individuals from drowning in nets and weighing down the gear. Another example is the use of streamers on longlines in Alaska. This reduces the likelihood that sea birds will be attracted to the fish caught on the lines.

The shrimping industry is one of the top commercial fisheries in the United States, since it is not only one of the most popular, but still remains one of the easiest fisheries. Shrimp is also one of the healthiest, being low in saturated fat and a good source of protein and vitamin B12. Within the last few years, it has become one of the highest marketable fisheries, pulling in close to \$150 million.

To regulate bycatch on shrimping vessels, scientists board ships at port and keep a detailed report on the type of fishing gear being use, whether their turtle excluder device has been installed properly, and how much bycatch is reduced per trawl. If the shrimping effort exceeds the allowable catch or does not adhere to the specific guidelines of the industry, scientists can recommend that licenses be reduced or certain areas be closed off to fishing. These strict regulations have assisted with the recovery of some stocks of shrimp and other species that were commercially fished to extinction (no longer viable as a commercial fishing industry).

Student data sheet on the follow page.



Bycatch Reduction Student Data Sheet

Date: _____

Vessel Name: _____

Fishing Crew Members: _____

	Shrimp	Herring	Bluefish	Yellowfin Tuna	Mako Shark
TRIAL 1	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:
TRIAL 2	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:
TRIAL 3	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:	# caught: % of catch:

Describe BRD made before Trial 1:

Describe BRD modifications made before Trial 2:

Describe BRD modifications made before Trial 3: