

# 9/14/07

## Scales and Tails

# DRAFT

### Activity Description

This activity teaches students about commercial fishing and the impacts it has on the fish population in the local fishing grounds. It also serves as an introduction into the different types of fish found around Cape Cod.

### Take Home Message

The Fishing industry has a direct impact on biodiversity and therefore directly affects the local economy.

### Massachusetts Frameworks

Life Science

Adaption of Living Things #10

Classification of Organisms #1

### Supplies and Materials

- Local nautical chart showing fishing grounds
- Pictures of fish species
- 3 Pans or trays to hold “fish” (9” x 13” baking pans work well)
- Label the pans, on shore, near shore, and off shore
- About 15 goldfish crackers per pan
- About 12 pretzel goldfish crackers per pan
- 3 giant goldfish crackers per pan
- About 10 colored goldfish crackers per pan blue (“bluefin tuna”) are especially valuable
- Straws to use for catching fish ( the fishing poles)
- Cups for collecting caught fish ( the boats)
- Prizes – small cups with a dozen or so goldfish

### Set-up

Lay out the nautical chart on the table and tape it down. Next place one pan next to Martha’s Vineyard, one around Nantucket, and one half off the chart to the farthest end of the chart. If you can’t get it half off the chart, then as close to the end as possible. Place lots of regular goldfish in each tin along with some colored, a few pretzel and a few giant goldfish (see set-up above for guidelines). Place the list of fish prices under the map so the kids can’t see ahead of time what the fish are worth- and keep the fish picture card off to the side. Have the cups and straws in the bucket but close at hand. If you have time, you can pre-fill some small cups with goldfish for prizes.

Giant fish= \$20

Colored fish= \$10 (Blue ones are \$100)

Regular goldfish= \$1

Pretzels are trashfish and worth nothing

Depending on the size of the table and the number of kids per session you will have to modify the fishing routine. The goal is to make it a bit of a challenge to catch the fish, but not so hard that the fish drop on the floor and make a mess. With older children they are generally able to control the fish on the straw and move it to the end of a table, with younger children, we found it helpful to have the kids hold the cup in their hand, and transfer the fish to the cup in hand. Experiment until you find a setup that works for your situation.

Variations on the game:

For younger children you may want to only use three types of fish:

Big Fish = \$20.00

Colored Fish = \$5.00

Yellow (most will be this) =0

## Background Science and Vocabulary

### Fish Biodiversity

The fishing industry is a large part of today's economy in the United States. Fish are found in greatest abundance on continental shelves, near islands, and in areas of strong upwelling. Few fish are found in the open ocean. Over many years, fishing pressure has reduced most stocks of commercially caught fish to near or below the population size that can support continued fishing. In order to continue having fishing grounds open, regulations have to be enacted to ensure that the population will be able to recover for the future. Fisheries managers strive to find "maximum sustainable yield," the greatest amount of fish that can be caught annually where the number of fish caught is replaced by reproductive recruitment.

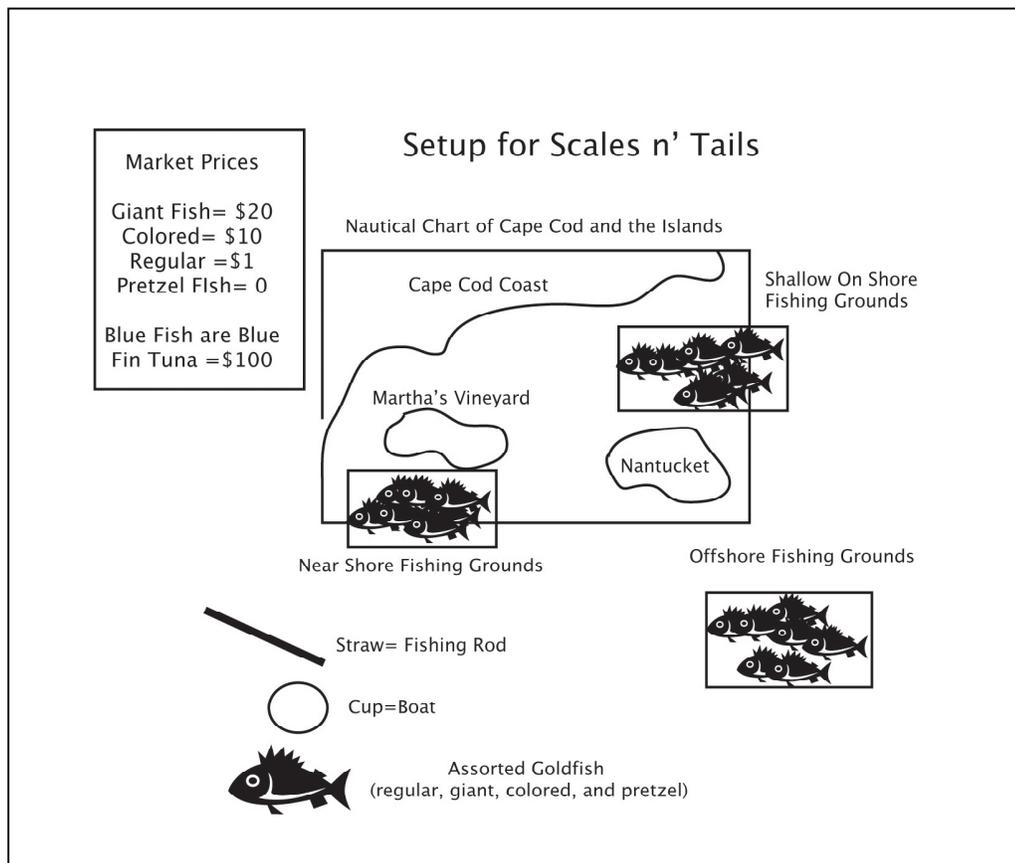
Pressures in the fishing industry do not only come from the desire to bring in the most fish. Most fishermen have a large number of financial obligations. They must pay the costs of their boat loan, insurance, fuel, fishing gear, safety equipment, fishing license, crew, food, and bait in order to go fishing. They also have homes, cars, health insurance, and family expenses. These financial pressures motivate fishermen to catch as much fish as the laws allow. Some government restrictions have been enacted in order to protect large fishing areas. Restrictions on fishing include mesh size (the size of the openings in a fishing net), closed fishing areas, closed seasons or days, a cap on total allowable catch weight per season, bans on some types of gear, and limits on the number of licenses issued.

Some types of fish are much more valuable than others; these species are the target of heavy fishing pressure. Many times these species are the first to be depleted and it takes years to protect the stock in order to restore the population to sustainable numbers. Fisheries can be managed to support a sustainable annual amount of catch.

When looking at a nautical chart of the waters around Cape Cod there are many important things to note. The numbers, lines, and color in the water areas represent the depths of the water. The deeper waters are white and gradually get darker as the water gets shallower. The largest fishing areas are in George's Bank located off the coast of the Cape to the South East. Around Cape Cod Bay and Nantucket Sound there are a variety of species of fish that are caught. They include: flounder, cod, mackerel, tuna, skate, striped bass, goose fish/monk fish, haddock, wolffish, spiny dog fish and herring.



**George's Bank** - highly productive fishing grounds off Cape Cod



### Script/Activity Procedure

- **Ask the students, has anyone ever gone fishing?** At least one will say they have or that someone in their family fishes. You can even talk about what they catch sometimes.
- **Ask the students, what is this map in front of me?**
  - They will give you all sorts of answers but you want to get them to say of the water and then ask them who uses it?
  - You want them to say fisherman and other boaters to guide them in the ocean
- **Ask the kids what they see on the map**
  - Point out the numbers and different colors in the water areas.
  - You will want to explain that the numbers and colors represent the depths of the water.
  - The deeper waters have higher numbers and are light blue or white on the chart.
- **Ask the students, why would a fisherman want to use one of these charts or why would they want to know how deep the water is?**
  - Many will say so they don't crash their boat
  - Point out that fish live in different depths of water, and the map will help the fisherman to go where the fish live.
  - Here you explain how certain fish like more shallow or deeper waters, and therefore the chart shows fisherman where they may find the fish they want.
- **At this point take a look at the fish cards. See if the kids can identify any of the fish and name them.**
  - You will want to point out both how to identify one or two of the fish as well as share with the kids in what depths of water each fish is most likely found.
- **Ask the students what do fishermen need in order to fish.**
  - You are looking for a boat, gas, and fishing gear, we are not worried about bait here.
- **Tell the students it is time to start fishing.**

- At this point you will explain to the students that they are very poor fisherman because they are just starting out, so they only have enough gas to be able to fish off the coast in the shallow waters (**on shore**).
- Show the students that they can only fish in the first pan. They have to leave their cups in a line at the end of the table near shore ( depending on the age, younger kids might need to hold cups to prevent fish dropping on the floor.
- Tell them that because they don't have a lot of money, they only have simple fishing rods
  - Hand the students a straw and say you can only use your straw in your mouth and no hands,
  - you can demonstrate the technique
- Let them fish for about 30 seconds and then say stop.
- **Ask the students what they notice about the fish in their boats and fish left in the pan (water). See if they can identify some of the problems they may have had.**
  - You are looking for them to point out that they took fish, it was hard, many will say it was not fair because they got pushed out of the way or something along those lines. ( Be careful with the younger children...they may not be able to handle the competition as well)
- **Tell the students that now it is time to bring the fish to the market**
  - Get out the sheet with the different price ranges on it.
  - Total how much each kid made at market
- **At this point you can changes the stakes a little bit.**
  - Have the student who made the most money move out to the next fishing area (**near shore**), because they now have more money for gas
  - The rest stay behind at the closest fishing grounds
- **Tell them again that they can start fishing and fish for 30 seconds.**
  - After they fish again ask them what they noticed
    - They should comment on the number of fish and try to get them to see that there are less of the expensive fish because now they know they are worth more, also probably no one will try for the pretzels anymore as they are worthless
    - Explain though that when you deplete the population there will be no more expensive fish left, so no one can get those again in that fishing area
    - Have the student who was fishing farther away comment on what they noticed
- **Tell them it is time to go to market again and have them total their winnings.**
  - The student who was farther out probably got the most.
- **Have them all fish again ( If you are short on time, skip the third fishing round and go to \*)**
  - The student who sold the most moves to the outermost fishing grounds (**off shore**) At this point this student has made a lot of money and upgrades their equipment so they can use their hands to hold the goldfish once they pick it up with the straw.
  - The students who placed second can move out to the middle fishing grounds (**near shore**), but the rest are to stay behind (**on shore**)
- **Go to market for the last time.**
  - This time focus on what is happening to all the fish populations. Have them notice that the fish populations are almost depleted.
  - Once the most successful fisherman could use better technology and equipment the problem got worse because they were taking all the fish, leaving nothing behind, so the fish can't even reproduce, meaning that each year you will have to go farther and farther out.
  - Share that this is what happened with codfish. You used to be able to get codfish right off shore in abundance, but now you have travel as far away as George's Bank to get it sometimes, making it hard on everyone to earn a living or afford to pay for fish.
  - Also point out that when they bring only one fish, like flounder to the market, the price drops even more because the market becomes saturated (oversupplied) with flounder and prices must be lowered to move the supply.
- **\*Ask the students what they think could be done to make the fishing more fair or evenly spread out among the fishermen, as well as what would allow the fish populations to reproduce.**
  - Some ideas they may have include the formation of a coalition
    - Ask them who would be in the coalition, or who would make the rules for the coalition
      - government maybe?
    - Ask who would monitor the fishing, fish police?

- Department of fish and game
- Some rules that they might implement are
  - What kind of fish they can catch,
  - Where they can catch fish during different years and seasons
  - Time limit on how long they can fish for
- **After they have finished you can wrap-up by asking, is the industry fair to everyone.**
  - Review that over fishing depletes the biodiversity of the fish in the waters and regulations are necessary to both protect the fish biodiversity as well as ensure the future of fishermen
  - As the students answer different questions in the wrap-up you can give them a small cup of gold fish to take away as the prize (they can eat these)
  - Make sure they don't eat the goldfish in the tin...as they have kid drool on them.

## Clean-Up

### *During the festival*

- After each group you will want to pick up the straws and wrappers if they didn't throw them out themselves
- Dump the caught goldfish back in the tins and add goldfish if need be to the tins to make them even
- Hide the price chart under the map so they don't see it till later

### *After the festival*

- Dump out the goldfish in the trash and clean all food residue off the tins,
- Make sure all the food that has been opened gets back in the airtight containers and that they are shut tightly.
- Sweep the crushed goldfish from the floor.
- Return everything to the Rubbermaid bin and break down the table.

**\* Note: Another possible variation, is to offer the kids the opportunity just before they go to market to put back some of the smaller fish (regular size) into the protected area (under a napkin) or a tomato basket. You don't tell them why its important at this point, just give them an opportunity, explain that the rewards will come later, as the fish will be protected, grow and the population expand. At the end of the game, if any child has thrown back fish, you give them a few extra goldfish crackers for being proactive to save the fish population.**

