

Lab: Fisheries Mismanagement

(MAKEUP VERSION)

(modified from Life on an Ocean Planet)

Background: In 1497, a mere five years after Columbus' epic voyage, another explorer named John Cabot found rich fishing grounds off of what is now Canada's Newfoundland. He remarked that there were so many cod fish that they virtually blocked his ship, and all that one had to do to catch them was throw a basket overboard. For the next four centuries, this rich fishing ground was considered inexhaustible.

Traditionally, Canadians fished mainly in waters close to shore in small craft called dories using traps, gill-nets or longlines. Sail vessels called cod schooners were used to reach fishing grounds further offshore. In fact, the Canadians weren't the first to fish here. The region was frequented by Spanish and Portuguese fishers long before Newfoundland was even colonized.

Even into the mid-1950's, Newfoundland's highly productive population of northern cod had yielded an annual catch of about a quarter million tons annually. But by the late 1950's Newfoundland's schooner and dory fishery was being displaced by a new breed of fishing vessel. These new "factory trawlers" were modeled on the distant-water factory ships used in whaling. They also targeted not only the cod but herring, haddock, flatfish, capelin, and redfish. Up until the late 1970s these distant-water factory trawlers from Germany, Great Britain, Spain, Portugal, Poland, the Soviet Union, Cuba and even from as far as Asia legally fished to within the 12 mile limit of eastern Canadian and the U.S. New England coasts. Working twenty-four hours a day, and in almost any weather, the



factory ships hauled their enormous nets, quickly processing and freezing nearly all the fish they caught.

The concept of maximum sustainable yield lies at the heart of fisheries management. Maximum sustainable yield is the number of target species that fisheries can take without jeopardizing future populations. The precise definition of overfishing is taking more of a species than the maximum sustainable yield.

The increased efforts of these foreign fleets caused a peak in the cod catch of over 800,000 tons by 1968. By 1975, the intense fishing pressure saw the catch decline to less than 300,000 tons. Both Canada and the U.S., concerned that stocks were being decimated, passed laws in 1976 that extended their jurisdictions over marine resources out to 200 nautical miles. All foreign fishing fleets were banished from what had been open territory known as the "high seas." Yet even after the expulsion of the foreign fleets a mere 139,000 tons of cod were caught in 1978. Many now believe that the federal government should have capped it at this level, giving the stock a chance to recover. But instead of implementing a strategy to conserve the stock, both government and private investors soon employed the same factory ship tactics. The huge trawlers, also called draggers, became the mainstay of Canada's Atlantic offshore fishing fleet, and the northern cod catch again began a steady rise. The hugely increased fishing effort paid off, it was thought, because by the mid-1980s Canadian vessels were landing more than 250,000 tons of cod annually. But the size of the catch masked the underlying reality.

The massive draggers hauled enormous nets, as long as a football field. The mouth of the nets are held open by huge steel plates called "doors." At the bottom of the net opening there are heavy chains and rollers that plow and scrape the ocean bottom. The nets easily swallow up entire schools of fish and cause immense damage to immature and non-

targeted fish populations. They also destroy the benthic community, devastating critical habitat and destabilizing the very ecosystem that supported the cod for centuries.

Even more devastating was that the trawlers targeted huge spawning aggregations of cod. Spawning is a time in the fishes' life cycle when they are most vulnerable to capture. It has been shown that selective fishing on spawning grounds can have disastrous effects on the trophic structure of ecosystems and greatly compromise spawning success. The result is a decline in the targeted species and an increase in the invertebrate and vertebrate predators that prey on cod eggs, larvae and younger fish. The fishery was now in serious trouble.

The annual catch of Canada's cod fleet now hovered around 250,000 tons and investment continued to be promoted. Meanwhile, Newfoundland's small-scale, inshore cod fisherman were voicing concerns that the northern cod population was not as healthy as scientists were reporting. Contradictory to scientific data, traditional inshore fishermen began to notice declining catches before the mid-1980s. It wasn't until 1986 they recommended the total allowable catch to be cut in half. Yet, instead of invoking the precautionary principle to protect dwindling cod by reducing catch quotas, the government enacted only moderate reductions of the total allowable catch. It wasn't until 1990 that an independent review of the cod stock concluded that the species was in decline and that allowable catch was at a dangerously high level.

By 1992 the biomass estimate for northern cod was the lowest scientists had ever measured and the Canadian Minister of Fisheries and Oceans had no choice but to declare a ban on fishing. For the first time in 400 years the fishing of northern cod ceased in Newfoundland. In 1995 it was estimated that the entire northern cod population had declined to just 1,700 tons, down from 400,000 tons in 1990. The Minister of Fisheries and Oceans also predicted that even if the fish stock started an immediate recovery – which was virtually impossible – it would still take at least 15 years before it would recover enough to resume fishing.

Soon after the ban on cod fishing, fisheries for cod in other areas and for most other species of groundfish around eastern Canada and the northeastern U.S. also had to be either severely curtailed or closed altogether because of serious depletion. Some blamed the collapse on changing environmental conditions while others maintained that it was overfishing by either or both foreign and Canadian vessels.

In the end, the moratorium was devastating for many of the fishing communities whose economies depended on the cod. With more than forty thousand people out of jobs, Newfoundland became an economic disaster area as processing plants shut down, small vessels went idle and the huge draggers were sold overseas at bargain prices. But there was also a ripple effect in the community as small businesses unrelated to fishing were faced with fewer customers, and many were forced to close. In response to the local devastation, the Canadian government paid out over a billion dollars in social welfare payments and retraining of fishers.

What should be done?

Activity: The class will be divided into nine groups representing the following stakeholders:

- a. Older Fishermen: You are 50 years old and have been fishing all of your life. Both your father and grandfather were fishermen. You have seen the size of your catch decreasing for years, and even warned the government of the decreasing cod population. You do not think you could find another job, even if you wanted to leave fishing.
- b. Younger Fishermen: You are 30 years old and left high school early to become a fisherman because it paid so well. Therefore, many other jobs are now closed to you due to a lack of education. There are few jobs in your area anyway, so your future is very uncertain. You also have a family to support.
- c. Federal Government: You have the difficult task of balancing what is best for the fish population and what is best for the fishing communities. You will have to deal with all of the emotion that the moratorium generates while explaining why the moratorium is necessary. Money for social welfare and retraining programs would have to come from somewhere.
- d. Provincial Government: Your role is to look at opportunities for the displaced workers in coastal communities, hopefully staying within the industry. A priority is trying to keep small communities intact and rejuvenate local economies.

- e. Government Scientist: You're a government scientist whose research shows that the population of cod should rebound in a few years, and that the fishery could be reopened soon. You feel that the crash was due in part to a change in environmental conditions.
- f. University Scientist: You're a university scientist whose research shows that the population of cod may never recover. You believe that anyone who depends on the fishery for income cannot depend on it anymore. You feel that the crash was due to overfishing by domestic and foreign fleets, particularly the large trawlers.
- g. Community Shop Owner: You fear that with the fisheries closed your business will suffer. You cannot afford, nor do you wish, to move out of Newfoundland, but you worry about a declining customer base and struggling economy.
- h. Production Worker: With the fisheries closed, factory processing plants will be closed as well. You are concerned about finding another job in an area with a struggling economy and high unemployment rate.
- i. CEO of an international fishing conglomerate: You are in charge of a global fishing company. You are concerned about a loss in profits due to the diminishing cod population. Any moratorium in Canadian waters does not influence you because you cannot fish there anyway, but concerns over cod populations persist throughout the North Atlantic.

STEP ONE: Choose one stakeholder viewpoint and write a one-half page stakeholder statement that describes your point of view on the problem and what should be done about the situation.

STEP TWO: Write a one-half page solution statement that describes solutions that take into account ALL stakeholders. Include compromises that need to be made by each stakeholder in order to achieve your goals.

Analysis Questions:

1. Ultimately, the collapse of the cod fishery was due to Tragedy of the Commons. Define Tragedy of the Commons.
2. How could the collapse have been avoided in the first place?
3. Which stakeholder group do you feel was ultimately responsible for the collapse? Defend your answer.

Watch the video at <https://youtu.be/Egkky6vqeN0> and answer the following questions

4. What makes cod a "great commercial fish"?
5. Name several countries that fished for cod, other than Canada.
6. What changes in fishing and preparation techniques led to increased catch of cod?
7. How did government subsidies play a role in the cod industry?
8. What is meant by Maximum Sustainable Yield?
9. Where did a similar issue occur and how was it handled differently?
10. What did you learn from this makeup lab?