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Cold war military technologies have devastated global fish populations

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Spin-off technologies from the cold war—sonar, satellite data and the Global Positioning System (GPS)—have led to an unprecedented decline in fish stocks worldwide, according to a study led by researchers at the University of British Columbia (UBC) in Vancouver, Canada.

With these technologies fisherman now have an unprecedented view of the ocean—enabling them to guide their nets around sea mountains, drop them into deep ocean abysses, and navigate almost every rock pile like an underwater video game.



Silver hake catch on the deck of a Soviet factory trawler off the Canadian east coast. Fleets of industrial scale fishing vessels like this one, many of which use sonar and satellite data to find fish, are responsible for the massive decline in fish stocks worldwide.

Photograph courtesy of International Observer Program, Maritimes Region, Fisheries and Oceans Canada.

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The total weight of tablefish—species eaten by man—in the oceans has declined by a total of 85 percent in the last century and continues to decline at 2 percent or more per year, said Villy Christensen of UBC. Many species are being hunted right down to the last fish.

At the end of the cold war, the Navy declassified sonar-mapping technologies that were far superior to their civilian counterparts. The United States Geological Survey then used this technology to produce exquisitely detailed three dimensional maps of the ocean floor.

Now the USGS is enthusiastically using this sonar technology to map the seabed, revealing intricate details of underwater landscape which are then open to exploitation [by fishermen], said Callum Roberts, of the University of York in the England, at a meeting of the American Association for the Advancement of Science last week in Boston.

The military also declassified a highly accurate version of GPS that was previously unavailable to civilians, said Roberts.

The combination of ultra accurate GPS data and ocean floor maps has been devastating. With sonar maps fisherman can identify the best regions to fish and the improved GPS directs their ships precisely to that spot.

Fishermen can now drop nets into holes and crevices with astounding accuracy. Or hover precisely over sea mountains and essentially scoop out every last fish, said Daniel Pauly, also of UBC.

But GPS data is not the only satellite data that gives fishermen the upper hand. The National Oceanic and Atmospheric Administration (NOAA) releases a daily fax

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to Atlantic swordfish fleets with satellite pictures revealing sea-surface temperatures around fishing grounds.

Big fish—like swordfish and bluefin tuna—are attracted to fronts where cold and warm waters meet. The satellite data guides the fishermen directly to these fronts for a fishing frenzy.

In addition to sonar-produced maps, many fishing vessels now carry sonar to locate schools of fish. Some nets are even outfitted with sonar to allow fishermen to steer their nets around obstacles and keep fishing lines at the same depth as their target.

The bluefin tuna trade is so lucrative—one fish fetches \$10,000 or more in Japanese fish markets—that fishermen even hire pilots to cruise around in spotter planes to locate a school of tuna, which at six to nine feet long, are easy to spot.

Technology has enabled us to fish too well—there is no place that is too deep, remote or dangerous that is beyond our reach, said Roberts.

Fish census

Pauly and his colleagues wanted to determine the impact of this fishing on the world's marine ecosystem over the last century and paint a global picture of fish populations. The first phase of their study, funded by the Pew Charitable Trusts, focused on the North Atlantic.

The researchers painstakingly collected thousands of reports on landings, or fish catches, from ports around the world for the last century. But the landings don't tell you where these fish come from, or where the fishing

fleets have been, said Pauly's colleague Reg Watson of UBC.

Watson and Pauly backtracked and used the composition of the catch to determine where the fishermen had been fishing. The researchers then divided the North Atlantic into a grid made up of 22,000 squares and superimposed the catch data.

The researchers found that quantity of fish hauled from the North Atlantic has doubled since the 1950s and increased eight-fold from levels harvested at the turn of the last century.

The result has been the collapse of fisheries in the North Atlantic and around the world—fish stocks in the Northern Atlantic are only one third of what they were in 1950 and one sixth what they were in 1900.

And this decline is accelerating, said Daniel Pauly, who led the study.

Fishes depleted one by one

Once a particular fish stock is depleted the fishermen simply move onto another species. They gradually work their way down the food web, catching smaller and smaller fish. This changes the entire structure of the ecosystem. Creatures that were previously prey become the predators, and thrive.

In the last decade there have been huge increases in the populations of non-fish, such as shrimp, scallops and crabs, because the fishermen have removed the large fish. These non-fish are at the bottom of the food web. Once they are gone there is almost nothing left, said Pauly.

Because the ecosystem has been changed so dramatically a fishing moratorium is not sufficient to allow fish populations to recover.

A study of more than 90 marine fish populations—including cod, tuna, haddock, herring, mackerel, etc—revealed that many species that suffered more than a decade of more than 60 percent declines did not rebound, even after 15 years, said Jeffrey Hutchings, of Dalhousie University in Halifax, Nova Scotia.

There is a widespread misconception that fish are less prone to extinction, than birds or mammals for example, because they produce millions of eggs and thus low populations can quickly recover, said Hutchings. But this is not true. These fish stocks have been so depleted that there are few young. Fewer still escape predators and fishing nets and survive long enough to reach sexual maturity and reproduce, he added.

Protected marine reserves

What is needed to slow—and eventually reverse—declining fish populations is the creation of more marine reserves. In these reserves fish are as safe as bears in Yellowstone National Park and their habitat is also protected.

Fishermen, both commercial and recreational, are happy to have marine reserves in areas where they do not fish, said Andrew Rosenberg, of the University of New Hampshire in Durham, and former deputy director of the National Marine Fisheries Service—which creates US marine reserves. The North Atlantic basin is massively overfished and the fisheries are in dire

trouble—but no one is taking this lesson to heart, said Rosenberg. If the public wanted to protect the oceans they could exert political pressure to oppose the fishing industry, he added. But right now elected officials tend to respond to the fishermen's needs, said Rosenberg, because the general public are not interested or engaged in the debate.

Some marine reserves exist along the Northwest Atlantic—three in Georges Bank and one in the Gulf of Maine and a few small reserves have also been established off the coast of Florida.

The reserves in Georges Bank have had a major impact—the scallop populations have grown considerably and the seriously depleted cod fishery, has shown some faint glimmers of recovery. It shows the power of these reserves, said Rosenberg.

Reduce fishing and fleet size

Rosenberg emphasizes that all is not lost. We do know how to make some things better because the science has really improved, said Rosenberg.

We need to reduce fishing pressure and fleet sizes and have broader protections for habitats and ecosystems. No-take zones are the best, but the hardest to achieve politically, he said.

Certain fishing areas in the North Atlantic should be tightly restricted, and catch quotas should all be implemented, added Rosenberg.

We need to close at least 30 percent of the North Atlantic Ocean to fishing, said Pauly. Without such measures we will lose all our fisheries.

The irony, explains Pauly, is that reducing fishing wont decrease the fish catch because small fish will have the opportunity to grow old and produce many offspring. The idea is that the marine reserves be considered money in the bank—leaving fishermen to skim the bountiful interest.

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