The destruction of life in the oceans has progressed farther than anyone had suspected, according to a new report in SCIENCE magazine. The report is published in the February 6 edition of SCIENCE but the focus of the new report is overfishing alone. SCIENCE is the voice of the American Association for the Advancement of Science (AAAS).

The world's catch of ocean fish peaked in 1989 and has been declining since.[3] In the early 1990s, scientists reported that 13 of the world's 17 major fisheries were depleted or in steep decline.[2] Typical is the Grand Banks fishery off the shallow coast of Newfoundland in the north Atlantic. There, after 350 years of commercial exploitation, the haddock, cod and flounder have all but disappeared and the fishery was officially closed a few years ago.

The depletion of the world's most popular fish species has set off three trends, each of which is adding to the oceans' troubles: (1) fishermen are adopting new technologies that (2) allow them to fish in deeper waters, and (3) they are fishing lower on the food chain.

New Technologies

** Don Tyson, the Arkansas chicken magnate and supporter of Bill Clinton, has gone into the fishing business in a big way. Commercial fishing can be very profitable if conducted on a grand scale. In 1992, Tyson bought the Arctic-Alaska Fisheries Company, and three other fishing companies. They operate a fleet of industrial super-trawlers that each cost $40 million to build and reach the length of a football field. These trawlers pull a net rather than a seine net, and thus are not affected by the new catch limits. These super-trawlers stay off-shore for months at a time, processing and freezing their catch as they go, thus giving them a major advantage over smaller land-based boats.

Approximately 40 percent of what these super-trawlers catch is considered trash and is ground up and thrown back into the ocean. They call it "bycatch" and, according to investigative reporter Jeffrey St. Clair, it can include endangered sea lions, and seals, as well as unwanted fish.[4] (In the northeast Atlantic alone, the bycatch in a year's time amounts to 3.7 million tons.[1])

** Trawlers are now using technology developed by the military to fish waters as deep as a mile, catching species that few would have considered edible or useful a decade ago. Now that the shallow fisheries are in serious decline, trawls nets fitted with wheels and rollers are dragged across the bottom of the deep oceans, removing everything of any size. Squid, skate, rattails, hoki, blue ling, black scabbard, red crabs, black orees, smooth orees, deep shrimp, chimeras, slackjaw eels, blue hake, southern blue whiting, sablefish, spiny dogfish, and orange roughy are now being harvested from the deep ocean and sold in seafood stores, cooked into "fish sticks" at McDonald's, or processed into fake "crab meat" for seafood salads.

Part of the problem is consumer ignorance. For example, orange roughy began to appear in fish stores and on the menus at fancy restaurants in the U.S. just a decade ago. Yet in that short time the species has become threatened with extinction. The orange roughy lives up to a mile deep in cold waters off New Zealand. Now scientists have learned that species living in deep, cold waters grow very slowly. The orange roughy, for example, lives to be 150 years old and only begins to reproduce at age 30. Recently, the principal stocks of orange roughy around New Zealand collapsed. Still, today in Annapolis, Maryland, fish stores, orange roughy is available for $8.99 per pound, and there's no sign telling consumers that the species is threatened. "People wouldn't eat rhinoceros or any other land creature that they knew was threatened -- with extinction. But they're eating fish like orange roughy without a clue to what's happening," says Greenpeace fisheries expert Mike Hagler in Auckland, New Zealand.[3]

Radar allows ships to operate in the fog and the dark; sonar locates the fish precisely; and GPS (geographical positioning system) satellites pinpoint locations so that ships can return to productive spots. Formerly-secret military maps reveal hidden deep-sea features, such as mountains, which are associated with upwelling currents of nutrient-rich water, where fish thrive. Combined with larger nets made from new, stronger materials, modern fishing vessels guided electronically can sweep the oceans clean -- and that is precisely what is happening. As a result, the ocean's fish are disappearing, and so are the family-scale fishing operations that used to dominate the industry.

** Because modern fishing equipment is immensely expensive, the stakes are high. With big money on the line, the fishing industry has curried political favor. As a result, modern fishing factories like Tyson's are subsidized by federal and state governments. Tyson's company has received more than $65 million in low-interest loans from the federal government, to help build 10 of these super-trawlers. According to Jeffrey St. Clair, the Seattle-based factory-trawler fleet has received $200 million in federal subsidies.

Furthermore, because so much is at stake, deep-water factory trawlers cannot afford to let up. They must keep fishing until the last fish is gone.

But it gets worse. The new report in SCIENCE shows that humans are now fishing not only in deeper waters, but also lower on the food chain.[1] This has ominous implications, because as the lower levels of the food chain decline, the chances of revival at the top of the food chain are diminished even further. Scientists are now discussing the "wholesale collapse" of marine ecosystems.[5] "It is likely that continuation of present trends will lead to widespread fisheries collapses..." says Daniel Pauly, the author of the new study.[1] "If things go unchecked, we might end up with a marine junkyard dominated by plankton," he says.[6]

Pauly's new study examined the diets of 220 fish species, then gave each species a numerical ranking in the food web, between 1 and 5. Those assigned a 1 are plankton -- tiny floating plants that photosynthesize, using the energy of sunlight to convert water and carbon dioxide into carbohydrates, thus forming the bottom of all aquatic food chains. Level 2 is zooplankton -- tiny floating animals that eat plankton. Top predators, such as the snappers inhabiting the continental shelf off Yucatan, Mexico, receive a ranking of 4.6.

These data were combined with Food and Agriculture Organization (FAO) data on fish landings worldwide. The result is an estimate of the average place in the oceanic food web (the average "trophic level") where humans are harvesting fish. The new study reveals that the average trophic level has been steadily declining for 45 years, meaning that humans are progressively taking fish from lower on the food chain. The steady decline has been about 0.1 trophic levels per decade. "Present fishing policy is unsustainable," says Pauly. Of the 220 species studied, at least 60% are being overfished, or fished to the limit.[6]

Pauly believes that the true situation is somewhat worse than his study indicated, principally because many countries under-report their fishing harvest.

Even if a fishery does not collapse completely, fishing down the food chain can have serious consequences. In the north sea, the cod population has been so depleted that fishermen are now concentrating on a second-level species called pout, which the cod used to eat. The pout, in turn, eat tiny organisms called copepods and krill. Krill also eat copepods. As the pout are removed, the krill population expands and, then the copepod population declines drastically. Because copepods are the main food of young cod, the cod population cannot recover.[5]

Fish farming might seem like a way out of this problem, but it is not -- at least not as presently practiced -- because farmed fish are fed fish meal made from unpopular fish such as herring or menhaden.[6]
It would seem to be only a matter of time before the herring and menhaden too are depleted.

Dr. Pauly believes that in 3 or 4 decades, many oceanic fisheries will "collapse on themselves." The result will be a loss of high-quality protein for humans, even before the fisheries collapse completely. Humans eat somewhere between trophic levels 2.5 and 4. Lower then that, there isn't much that people eat. "There is a lower limit for what can be caught and marketed, and zooplankton [at trophic level 2] is not going to be reaching our dinner plates in the foreseeable future," Dr. Pauly wrote in SCIENCE.

Solutions? Government could limit the kinds of fishing technology that are allowed --to give the fish a chance --but this would put "the public interest" up against the likes of Don Tyson. In today's political climate, with private money dominating our elections, Don Tyson would win because he's wealthy and he supports all the right politicians. Dr. Pauly believes there is an urgent need to create protected areas where fishing is simply not allowed. He sees no-fishing zones as easier to implement and enforce than fishing quotas, limiting fishing time at sea, restrictions on allowable fishing gear, and controls on pollution --though these steps, too, are needed. He believes No-fishing zones can be created quickly and can be enforced. In Britain, the fishing industry has begun to accept no-fishing zones as a way to save the industry in the face of declining fish stocks.[7]

The most important idea, proposed in SCIENCE magazine February 6th, would be to shift the burden of proof onto the fishing industry.[8] Those who profit from public resources such as the oceans should have to demonstrate, before they can begin fishing, that their activities will not harm the public resource. At present, it is assumed that fishing will not damage life in the oceans, and the burden is on the general public to prove otherwise. At this point, abundant evidence has come to light indicating damage, so it is definitely time to shift the burden of proof onto the fishing industry. For example, owners of super-trawlers should have to show that their yield will be sustainable before their ships can put to sea.

Here again, it seems unlikely that the present Congress --snuffling around in a trough of filthy lucre, as it is --will act to protect the public interest. Therefore, it is urgent that we get private money out of our elections completely. Elected officials need to be answerable to the people who elected them, not to wealthy benefactors.

Otherwise our children will inherit oceans without fish.

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)