

Trawling Underwater Trees
Are We Undermining Our Own Survival?
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I.

During the summer of 2005, Bunny McDiarmid boarded the *Esperanza*, a Canadian ship in an international fleet of bottom trawlers. She spearheads Greenpeace International's campaign for a ban on deep-sea trawling and runs the campaign from the Greenpeace headquarters in Auckland, New Zealand. Bunny was looking for fish: not the ones going to market, but the ones that would soon be discarded as "bycatch," unwanted marine animals that are caught accidentally in trawls, which are heavy, weighted nets dragged along the sea bottom and used by industrial fisheries. Bunny and her fellow activists were trying to raise awareness of the negative effects of bottom trawling on marine life: "We want to get across [...] that we're not anti-fishing or anti-fishermen, but this is an unsustainable way of doing it."

II.

Before the mid-1800s, life below 400 meters underwater was thought to be non-existent. Michael Sars, a Norwegian marine zoologist, was one of the first to catch a glimpse of deep-sea life in 1910 on an expedition in the Atlantic Ocean. Today, scientists estimate that there are between 500,000 and 100,000,000 species that live in the ocean depths. However, we don't know much about this precious ecosystem; the sea floor is still a vast, new frontier in science and has not been completely mapped. And even though we have only recently discovered this underwater oasis of life, we have been destroying it for centuries. Introduced species, pollution through waste and toxic chemicals, and unsustainable fishing practices throughout history have all contributed to the extinction of an estimated 90% of marine species. If we don't reduce the giant human impact on the world's oceans, deep-sea life may become extinct altogether.

III.

"Bottom trawling is the most destructive of any actions that humans conduct in the ocean," says Dr. Les Watling, a professor of zoology at the University of Hawaii. Dr. Watling spoke in 2008 at a presentation called "Drednet: Bottom Trawling, the World's Most Severe and Extensive Seafloor Disturbance." As trawls scrape along the bottom of the ocean, they chop down deep-sea forests that have taken millions of years to grow and mature, exposing marine animals like sea cucumbers that have a slow reproductive rate and find it hard to survive without adequate shelter. Today, with ever-improving technology like more efficient gear, GPS systems, and weather predictions, trawlers are able to fish at greater depths and cover bigger areas of the sea floor. Bottom trawling is the easiest way to catch groundfish, cod, haddock, and shrimp, among other species; the large nets capture so much fish that bottom trawling needs to be performed only a few times a year. This practice is analogous to clearing forests: the total area of sea floor that is routinely trawled worldwide is 2.5 times the size of Brazil. According to Kofi Annan, the UN Secretary-General from 1997-2006, bottom trawling causes 95% of damage to seamounts, hidden islands and mountain ranges on the

ocean floor that house most of the biodiversity of the deep-sea world. Once a habitat is destroyed, it is extremely difficult for the surrounding ecosystem to recover and produce a healthy number of fish; this is why trawlers can't cover the same area too often and why the practice causes so much irreversible damage.

As described by Roddy Scheer and Doug Moss, authors of "Earth Talk," a section of *Scientific American* magazine, bottom trawling also disturbs the sediment lying on the seafloor, creating "plumes" that block out the sunlight that kelp and other photosynthetic organisms need to survive and support the marine food chain. These plumes are so big and destructive that they can be seen from outer space. Also, toxins like DDT and PCB reside in ocean floor sediments, and when stirred up by bottom trawls, they are consumed by plankton and filter up through the food chain, magnified at every successive trophic level, up through humans. DDT and PCB can have detrimental affects on our bodies, such as retardation of brain development in children and possible cancer growth. These sediment plumes also affect the concentration of oxygen in our oceans by stirring up harmful nutrients like phosphorus that have settled in the sediment. These nutrients attract oxygen to particular locations, causing algal blooms, and deplete oxygen in others, creating regions called dead zones. Algal blooms can attract harmful algae that infect fish, kill marine life and cause illness or death in humans that consume infected seafood. Dead zones negatively affect reproductive capacity in fish, threatening the survival of species that reside within the dead zone.

Lastly, bottom trawling creates a huge problem by catching unwanted marine life, or "bycatch," in nets. As mentioned before, bycatch is usually thrown overboard and left to die in the ocean, unused by fisheries. Bunny McDiarmid describes bycatch found in trawls that come up from the sea floor: "we've seen sponge and we've seen other fish species that live on the bottom that are destroyed in the process." According to *Shifting Gears*, a 2003 report by Lance E. Morgan, a conservation marine biology author, and Ratana Chuenpagdee, the Canada Research Chair in Natural Resource Sustainability and Community Development, there are three different types of bycatch. Economic bycatch constitutes species that are thrown away because they are not sellable. Regulatory bycatch includes species to be sold that are instead thrown away because of market regulations. In collateral mortality, species are killed in fishing gear, but are not used by fisheries.

IV.

A typical strategy for reducing the bottom impact of trawls is to improve the overall efficiency of the fishing gear. Catching the same amount of fish in less time is more profitable for a fishery. And if it takes less time to catch the fish, the trawl is on the bottom for less time and bottom impact is reduced. According to a UN report by the Food and Agriculture Organization (FAO), new mesh designs for trawls allow species to be sorted by the actual trawl, according to size and/or behavior, and exit windows allow unwanted animals to be discarded promptly and safely. For example, sorting grids in nets for prawn or shrimp fishing release young cod before the net is brought on board. Modern technology also allows fishermen to monitor trawls underwater and detect the presence of bycatch. Seabed maps allow fisheries to plan carefully where trawlers will drag their nets so that the areas with a higher density of marine life can be targeted. In this way, the net will capture the same amount of fish, but will cover a smaller area, reducing bottom impact.

However, the only way to prevent as much damage as possible to deep-sea ecosystems is to make sure that trawls do not touch the sea floor at all. Off-bottom, or pelagic, trawling can efficiently catch many groundfish species when they seasonally migrate

upward. Groundfish are typically caught through bottom trawling. Lighter trawl components, such as rubber discs or round bobbins, and gear parts that can lift the trawl off the bottom, such as off-bottom rigging, help keep a trawl off the sea floor. However, pelagic trawling for some species is less efficient than bottom trawling (for shrimp and prawns, for instance, since these species reside and migrate on the sea bottom). Due to the reduced efficiency in catching both groundfish and species like shrimp with pelagic trawling, fisheries that catch both are sometimes unwilling to switch to this more environmentally friendly method.

On the other hand, there is other efficient fishing gear that can be used in place of bottom trawls. For instance, bottom-set gillnets, stationary nets that are vertical and weighted by a ground line, are some of the most energy-efficient gear, and target species can be easily caught by using different mesh sizes. Occasionally, quality of fish caught in gillnets is compromised, and lost nets can result in “ghost fishing,” in which fish are captured and killed, but will not be used by the fishery or even brought up in nets as bycatch. Bottom-set long lines, another type of fishing gear, are attached to the boat and use bait to attract fish, which are then hauled back on board. Long lines are very useful in catching some fishes like cod and haddock that are otherwise caught through bottom trawling, but not helpful for catching shrimp or small fishes, and can become costly due to bait. Baited pots and traps are widely used by many different sizes of fishing boats, as they can easily be placed on the sea floor, even in small, rocky areas that contain much life. However, in areas where bottom trawling is mainly used, pots and traps do not catch enough fish efficiently. Pots and traps are also notorious for ghost fishing, an economic and environmental downfall for this type of gear.

V.

Nations around the world have started acting in response to the unsustainable practice of bottom trawling. But recent closures and regulatory measures, including a 2004 ban on bottom trawling in Sable Gully, a bio diverse underwater canyon off the coast of Nova Scotia, have a paradoxical effect. Closing certain territories to bottom trawling only ensures that the areas that remain open are trawled more frequently, causing even more damage to the sea floor in the open areas. Also, the closed areas do not recover very quickly from trawling. A survey performed in Tasmania by Australian scientists from the CSIRO Marine and Atmospheric Research Center and the University of the Sunshine Coast showed that even after trawled seamounts had been closed for 5 or 10 years, they showed few to no signs of recovery.

Moreover, only national jurisdictions have the power to ban bottom trawling, and only in their own territorial waters. National jurisdictions or international agencies, such as the UN, lack the power to ban trawling on the “high seas.” For this reason, deep-sea trawling by big fisheries is highly unregulated and unrestricted. New technology has made the ocean “transparent” to humans, according to *Shifting Gears*; in effect, trawlers are free to wreck as much of our precious deep-sea ecosystem as they like. “It's absolutely legal to destroy the entire bottom of the seabed out here,” Bunny McDiarmid reported. “It's totally legal to do that while you're fishing.”

VI.

Like any commercial business, a fishery will always try to find the best possible way to maximize profits with as few expenses as possible. At the present moment, few fisheries are willing to invest the time, effort and money necessary to use alternatives to bottom trawling. But the current global push towards environmentalism is bringing more awareness to the general public of the current dangers that our oceans are facing. As more customers stop buying seahorse keychains and shark products, and as more of us start asking where exactly our fish come from and how it was caught, fisheries will start to catch on as well. A profit-driven industry is entirely dependent on the consumer, and such a push towards more environmentally friendly practices for fisheries will surely either force bottom trawling companies out of business or force them to switch to alternatives like pelagic trawling and long lines.

Most important is a strong regulatory system. The FAO of the UN has argued the need for international agencies to band together to create a network of worldwide marine-protected areas and to implement a monitoring system to make sure that all regulations are being followed. National jurisdictions need to follow in the footsteps of Palau, a small island near the Philippines, whose government banned all bottom trawling in territorial waters and by all national fishing boats. Scientists also need to conduct more surveys, studying affected areas and widely publicizing their findings. And we, as citizens of the world, need to be mindful consumers: to tell ourselves and everyone around us to refuse to buy or eat any deep-sea creature only caught through bottom trawling, such as the orange roughy fish. A convenient resource for this endeavor is the iPhone App “Seafood Watch” made by the Monterey Bay Aquarium. This app gives information about safe and sustainable seafood to eat. We need to spread the word and advocate for our oceans. After all, this Earth is 72% water, and our own survival may well be fully dependent on millions of deep-sea species waiting to be discovered.