Fish...

to EAT or NOT TO EAT

(Sustainable Seafood)

Essay by ***Alex Rose*** | Photographs by ***Michael AW***

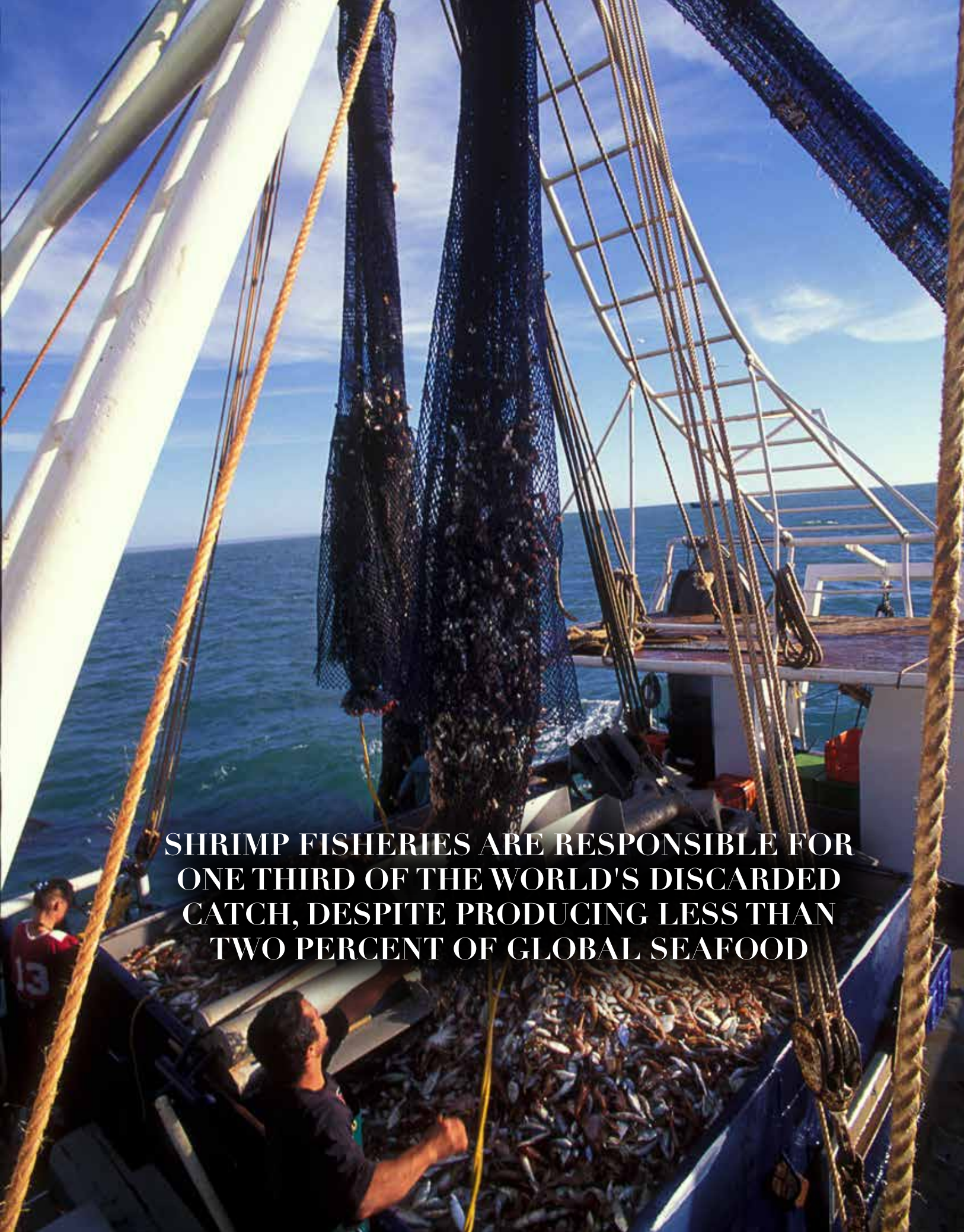
Understanding what sustainable seafood truly means and using our collective buying power to

SHIFT GLOBAL DEMAND TOWARDS MORE ENVIRONMENTALLY FRIENDLY OPTIONS ARE THE WAVES OF THE FUTURE.

We have all grown up knowing that seafood is a healthy part of our diet, but is it healthy for our planet? Bluefin tuna has been fished to the brink of extinction, wild salmon spawning runs get sparser each year, the north Atlantic cod fishery collapsed in the early 1990s, and wild shrimp is harvested in one of the most environmentally destructive ways ever invented. This may make a trip to the grocery store to pick up a piece of "sustainable" seafood for dinner seem like a daunting task but it all comes down to being a conscious consumer. We must all be aware of the choices we have and which ones are good for both our bodies and our environment. Fishery management practices that accurately reflect the needs of fish populations instead of the relentlessly increasing human demand, and laws that reward sustainable fishing methods and punish the opposite are also necessary if we are to continue harvesting our ocean beyond the middle of this century. Understanding what sustainable seafood truly means and using our collective buying power to shift global demand towards more environmentally friendly options are the waves of the future. It is no longer a case of "plenty of fish in the ocean". In order to get a clearer picture of exactly what "plenty" once was (so that we have a goal in mind when discussing the rebuilding of fisheries), we will need to begin by travelling back into the pre-industrial world.

The Industrial Revolution was a period of incredible advancement, growth, and invention associated with hallmarks of progress such as the steam engine, telegraph, reliable light bulbs, canned food, large-scale assembly lines, and incredible expansion of our world's canals, roads, and railways. The foundations of daily life changed drastically as massive improvements in mining, manufacturing, technology, agriculture, and transportation altered the socioeconomic and cultural landscape of our existence. Nobel Prize winner and economist, Robert E. Lucas, Jr., once said, "For the first time in history, the living standards of the masses of ordinary people have begun to undergo sustained growth". However, our growth has been far from sustainable. The Industrial Revolution forever changed the way we fish, and signalled the beginning of the age of unsustainable and environmentally destructive fishing practices in which we currently find ourselves.

With the advent of steam-powered ships, humans were now able to regularly employ quite possibly the most efficient, yet destructive method of fishing ever conceived: the beam trawl. This piece of equipment is nothing more than a large net held open by a wood or metal beam that is then dragged through the ocean, but until steam was used to power fishing vessels, sailing ships driven by wind alone were not strong enough to haul these huge nets. The pestilential power of trawls was recognized and regularly debated long before their widespread use. The English actually convened commissions starting in the late 1870s with the goal of reducing the carnage brought on by trawlers, catalysed by an already apparent decline in fish catches in the North Sea. These efforts did nothing to curb the steady growth of a fleet of trawlers increasing in size, destructive capacity, and numbers.



SHRIMP FISHERIES ARE RESPONSIBLE FOR ONE THIRD OF THE WORLD'S DISCARDED CATCH, DESPITE PRODUCING LESS THAN TWO PERCENT OF GLOBAL SEAFOOD

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The world's wild catch remains at an astronomical 170 billion pounds annually; this amount is equal in weight to the entire human population of China!

Shrimp trawlers catch 10–20kg of marine species in the tropics to obtain just 1kg of shrimp. This "bycatch" is discarded, dead or dying, overboard.

Trawlers indiscriminately capture all living things in their path and leave in their wake, a complete destruction of the seafloor. This was evident at the turn of the century when fishermen tried to demand that their governments outlaw the use of these detrimental fishing practices. A New England newspaper article in 1911 stated that, "the continued operation of these trawlers scraping over the fishing grounds and destroying countless numbers of young and immature fish, is the greatest menace to the future of fisheries, and the greatest danger the fisheries have ever faced along this coast". Sadly, not only did these factual proclamations not reduce trawler use, this fishing method has grown ever more efficient. Nets are now equipped with chains to stir up all remaining wildlife, rock hoppers and giant tires allow the nets to be dragged over uneven terrain, decimating these habitats to nothing but rubble as they are pulled along the ocean bed. According to the Alaska Marine Conservation Council, 82 percent of everything caught by bottom trawling in North Pacific fisheries is unwanted bycatch, which is discarded dead and dying back into the ocean. Factors like this one make it almost impossible to accurately estimate the damage done by trawling, but one does not need to be a fisheries biologist to comprehend the magnitude of biomass loss brought about by trawlers and other types of environmentally destructive fishing methods such as long lining and dynamite fishing.

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One-and-a-half centuries of rampant pillaging of our world's waters by unsustainable fishing practices, has reduced the bounty of our seas to a mere glimmer of what it once was. It is has been determined that all the major stocks of large fish in the world such as cod, tuna, swordfish, halibut, and many others have been reduced to approximately 10 percent of what their populations were in the 1950s. This is the number associated with the total "collapse" of a fishery, a term defined as "a state where 90 percent or more of the historical population is gone." It has also been shown that it only takes 10 to 15 years of modern industrial fishing pressure to reduce any healthy fish community to this 10 percent mark. Yet the world's wild catch remains at an astronomical 77 billion kilos annually; this amount is equal in weight to the entire human population of China! As fish populations shrunk, our fishing methods were made even more efficient in order to extract the same amount of seafood. Even as I write, our last giant bluefin tunas are being hunted down by sophisticated sonar in the largely unmanageable international waters of the open ocean, and slaughtered to feed our bottomless appetite for sashimi. There are too many exploited populations of fish to cover in anything less than a book, but in an effort to succinctly analyse the nature and condition of our world's fisheries, I will focus on four representative marine animals and the issues associated with each of them: cod, salmon, tuna, and shrimp.

All the way up until the 1970s when some of the first documented local fishery collapses began to occur, the validity of the idea that our ocean could be overfished was dismissed as impossible. Even into the early 1980s, the U.S was still heavily subsidizing the expansion of the American fishing fleet to the tune of about $800 million in order to make up for declining catch numbers. This huge increase in fishing pressure along with the use of the ubiquitous ocean destroyer, the trawler, brought about something unimaginable: the collapse of the Atlantic cod fishery. In 1992, the Canadian government closed the Grand Banks to cod fishing and in 1994, the Georges Banks, known as the most prolific cod fishing grounds in the United States and the area whose abundance gave Cape Cod its name, were officially closed to commercial cod fishing. This "industrial fish" that had been the very image of plenty and the definition of commonness, was nearly wiped out and only about 5 percent of the historic population of cod remained. Great care has been taken since the closing of these once-fecund fishing grounds and the passage of the Sustainable Fisheries Act in 1996, to ensure that these populations are rebuilt in a reasonable timeframe. Policy makers are always under extreme pressure from fishing interests to raise allowable catch limits to satisfy our growing demand for whitefish flesh, a requirement on the order of 18 billion kilos annually (that is the equivalent of 41,000 fully loaded Boeing 747s), but have managed to maintain some of these crucial cod breeding grounds as no catch zones, allowing their decimated populations to recover and stabilize.

However, even with these regulations, it is unlikely that the North Atlantic cod (*Gadus morhua*) will ever return to their former levels of abundance, nor will they really be the same fish. This is due to two main factors: our unintentional selective alteration of the cod genome, and the scarcity of fish for cod to eat. By fishing a stock to collapse, we are taking out the biggest fish first, followed by the next biggest fish, etc. By the time a stock has reached the stage of collapse, the only fish left that are still reproducing and consequently passing on their genes, are much smaller than what the average sized fish used to be prior to intense overfishing. Studies show that "removal of 70-80 percent of a fish population has a certain degree of reversibility… in a case where 20-30 percent of fish are still in the water, the population may be unstable and vulnerable but still has a reasonable potential for recovery because the genome of the stock is not likely to have been heavily depleted". When 90 percent or more of the fish have been lost, it is probable that the entire fish genome has been affected and that a full recovery is unlikely; this is the scenario playing out in the North Atlantic cod fishery. By catching all the big animals, fishermen have inadvertently selected for smaller fish. The other major problem is that the fish populations that cod depend on for food are also drastically declining. Cod eat fish in the herring family, all of which require open access to clean, shallow, freshwater spawning grounds, conditions which have all but disappeared as a result of dam construction. These prey species are also being harvested from the ocean at unsustainable rates, essentially ensuring that cod will be unable to return to their original range or density due to a lack of food.

There have been attempts to both farm cod and find a reasonable "replacement" fish, neither of which has been entirely successful. Farming cod, or any large predatory fish for that matter, represents a net loss in terms of marine protein removed from the sea because several kilos of feed are required to make one kilo of saleable fish. This poor feed conversion ratio makes predators expensive to farm and buy, as well as contributes to overfishing of small fish that are lower on the food chain. Replacing cod with different whitefish has been difficult as well. There was an effort to grow the New Zealand hoki fishery sustainably in hopes of diverting our consumption of cod, but the hoki fishery also collapsed under the weight of demand and improperly set catch limits. Alaskan pollock is currently filling the void left by cod with an annual harvest of 907 million kilos, primarily made into fish sticks and other highly processed, cheap whitefish products. It is yet to be seen if pollock can withstand this collection pressure long term.

The next fish on our menu is salmon. Salmon has been called "The King of Fish," but unfortunately has not been treated that way. The decline of salmon populations has been well documented since the end of the 18th century when countless river tributaries were dammed for power generation, cutting off the access these fish need to their natal spawning grounds. There is Atlantic and Pacific salmon and both are anadromous fish, meaning that they live, feed, and grow in the sea, but return to fresh water to reproduce. Each fish will come back to spawn only in the waters from which it hatched, making salmon them extremely susceptible to local extirpations resulting from anthropogenic changes in natural landscapes. Between the damming of rivers and streams, which barred them from reproducing, and the aggressive fishing of the largest known aggregation of Atlantic salmon (*Slamo salar*) in the waters off Greenland beginning in the 1950s, wild populations of these fish are now virtually non-existent and none are commercially fished. The story of the Pacific salmon in the genus *Oncorhynchus* is decidedly different. These fish are born and spawn in the rivers and tributaries of the American Pacific northwest and Russia, and spend most of their lives in the Bering Sea. Increasingly sparse runs of these fish still occur from California up to British Columbia, Alaska, and parts of Russia, and the fishing of these fragile sub-populations is heavily regulated and monitored from one year to the next, but even this has not kept the runs from diminishing or oceanic salmon from being caught.

While there is not much wild salmon to be had, our supermarkets are all overflowing with their succulent orange flesh. This is because the majority of the salmon we consume is farm raised. Being a large predatory fish, salmon must consume large amounts of food in order to sustain themselves and gain enough weight to be able to make the incredibly strenuous and time consuming journey from the open ocean back to their freshwater spawning grounds. This means that the feed conversion ratio for salmon is undesirably high. Over the last few decades, salmon in their domestication have been selectively bred to grow faster and get to "market size" on much less food than a wild salmon requires. It takes 10 kilograms of small fish and other prey items to produce 1 kilogram of wild salmon, whereas it only takes about 4 kilograms of feed to produce 1 kilogram of farmed salmon. This is still a problematic ratio that reflects an unfortunately large net seafood loss, but is probably the least disturbing aspect of salmon farming.

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SERIOUS, DEVASTATING, IMPACTS ON THE MARINE ENVIRONMENT

Pollutants are not the only problem facing farmed salmons. Recent studies have found contamination with radioactive waste and there are concerns about the use of antibiotics to kill parasites and infections.

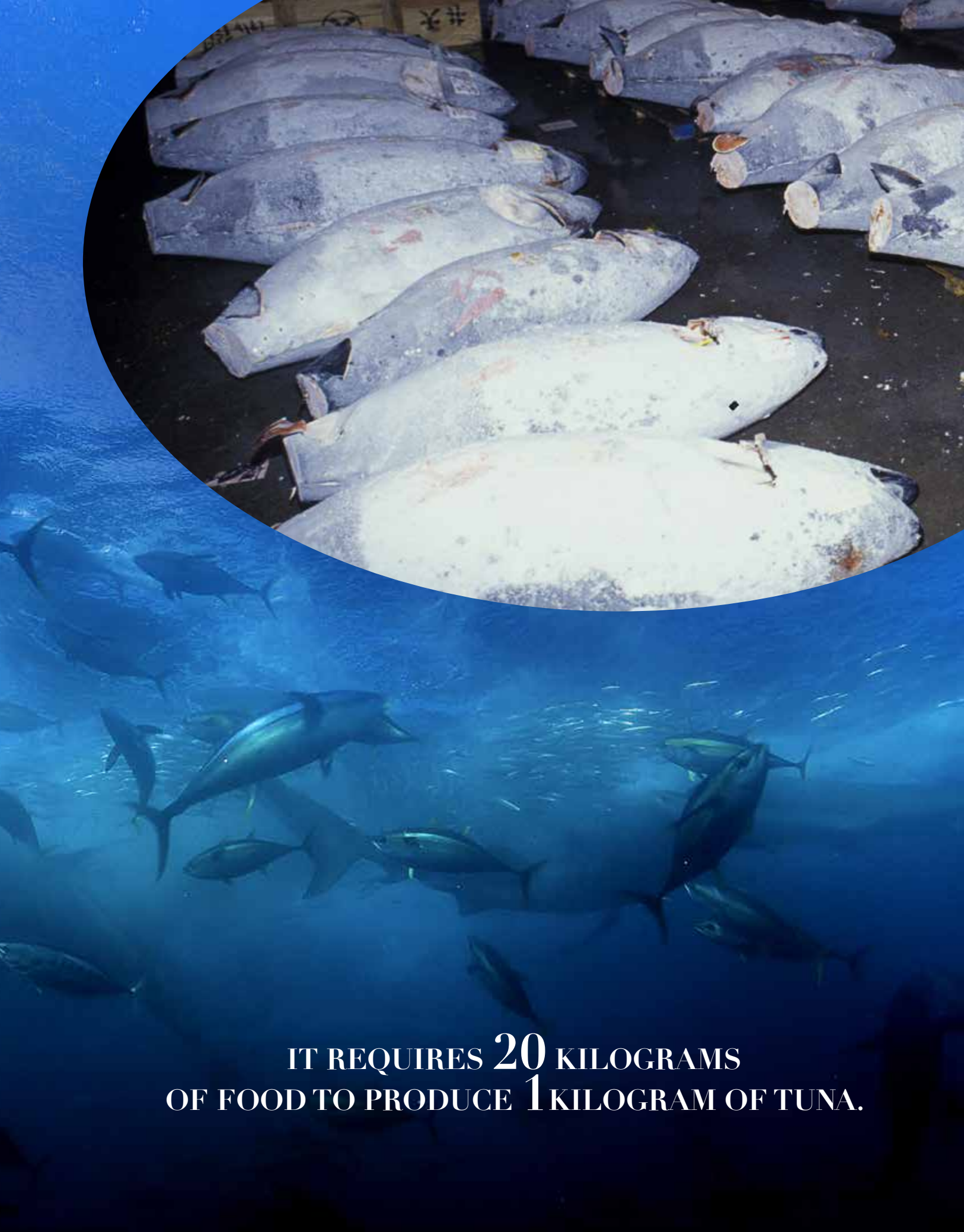
Farming of carnivorous fish species presents many problems. Salmon are most commonly farmed in open ocean netted pens where they are in close contact with wild populations of salmon. This is a serious issue because many farmed populations of salmon harbour parasites such as sea lice due to unnaturally high stocking density, and as wild fish swim near the pens, they become infected too. This is particularly detrimental to young wild salmon and they often perish. Antibiotics are also used to control disease and these are then released directly into the ocean. There are usually "dead zones," areas of low oxygen where life cannot survive, beneath these fish pens as a result of large amounts of animal waste and uneaten pellet food being degraded via decomposition, a process that consumes oxygen. There is also the issue of large percentages of farmed salmon escaping and competing with wild salmon for food. Farming salmon is currently not an environmentally friendly alternative to catching wild fish, but perhaps the near future will bring us a land-based polyculture system of fish, algae, and filter feeders that reduces waste while minimizing the environmental impact of eating a predator.

A fish that should never be farmed is bluefin tuna, yet this is an idea being promoted as a "solution" to our great dilemma with this animal. It is not so much farming; it is really just fattening. This unfortunate practice involves netting shoals of young bluefins, keeping them in sea cages, and feeding them huge amounts of wild caught forage fish until they are fat enough to sell. This method is intensely flawed because not only is it doing nothing to reduce the fishing pressure on these animals, but it is attempting to farm one of the most predatory animals in the ocean. As such, the feed conversion for bluefin tuna is incredibly high at 20:1, meaning that it requires 20 kilograms of food to produce one kilogram of tuna. This may sound like a financially suicidal investment, but the desire for this fish only seems to be increasing along with its scarcity.

This insatiable drive to catch every last bluefin can only be properly illustrated by pondering that a single tuna weighing 220 kilograms was sold in Japan's infamous Tsukiji fish market for 1.8 million dollars last year. Considering that breeding adult bluefins can weigh in excess of 680 kilograms, this was a small fish, and yet it commanded a mind-boggling price of almost $8,108 per kilo. The breeding stock of these animals is being decimated at an alarming rate and it is estimated that there could be as few as 9,000 giant spawners left in the western stock of the North Atlantic. As explained by Charles Clover in his book *The End of the Line*, "The eastern Atlantic bluefin is now listed as an endangered species and estimated to be equivalent to the giant panda in its closeness to extinction. The western Atlantic bluefin stock is in even worse shape and is officially described as critically endangered. That puts it in the same bracket as the black rhino." These incredible animals that can travel at speeds topping 64 kilometres per hour and accelerate faster than most European sports cars, have been fished to the brink of extinction, making them the most threatened wildlife that we are still allowed by law to eat.

The bluefin fishery is particularly difficult to manage because their habitat falls into the category of the "high seas," a part of the ocean that is essentially unmanageable. Catch limits are set each year by the International Commission for the Conservation of Atlantic Tuna (ICCAT), and every year these same catch limits are dramatically broken because there are few ways to enforce the laws governing the take of seafood from the open ocean. If we are to save these fish without imposing a worldwide moratorium on the catching of bluefins, we must radically decrease our consumption of these amazing creatures. "Dining on a 500-pound (227 kilogram) bluefin tuna is the seafood equivalent of driving a Hummer," says Paul Greenberg, author of *Four Fish*, and should be avoided entirely.

Eating one kilogram of bluefin tuna is roughly the same as eating 100 kilos of less resource demanding seafood such as tilapia, sardines, or shellfish. While it is favourable to consume sea creatures that are lower on the food chain in place of eating our ocean's top predators, this will not necessarily solve our problems. Shrimp is a prime example of this paradox. Trawling is still the most common method used to capture shrimp in the wild, a practice that is responsible for levelling seascapes and wiping out entire species. Wild shrimp have one of the highest bycatch rates of anything in the ocean, with 10–14 kilos of unwanted bycatch for every kilo of shrimp produced. It is estimated that up to 23 billion kilograms of seafood may be discarded annually as bycatch, including not just fish but sea turtles, marine mammals, and sea birds as well. According to a 2009 marine policy study, "All modern forms of commercial fishing produce bycatch, but shrimp trawling is by far the most destructive: it is responsible for a third of the world's bycatch, while producing only 2 percent of all seafood". As is typical with the overfishing of all species, annual catches of shrimp are decreasing together with their average size.



IT REQUIRES 20 KILOGRAMS
OF FOOD TO PRODUCE 1 KILOGRAM OF TUNA.

Farming of shrimp is a valid option, but the way most coastal shrimp farming is conducted is detrimental to our near shore habitats. The organic wastes, antibiotics, and chemicals associated with raising these marine animals in large densities often wind up polluting ground water and estuarine wetlands. As stated by the World Wildlife Fund, "In some cases, ecologically-sensitive habitat has been cleared to create ponds for shrimp production. Also, some aquifers that supply water to farms have been contaminated with salt water. Some forms of shrimp farming have had a devastating effect on mangroves around the world. These mangroves are vital for wildlife and coastal fisheries, and serve as buffers to the effects of storms. Their loss has destabilized entire coastal zones, with negative effects on coastal communities." Shrimp farming has the potential to be both sustainable and highly profitable, but it must be conducted in environmentally friendly ways that do not contribute to pollution and habitat destruction.

Examining the poor condition of four of our ocean's most iconic seafood species can be rather disheartening as it seems as though we may have already pushed our fragile marine ecosystems beyond the point of recovery (in some instances this might indeed be the case). If global overfishing continues at its present rate, most of our world's fisheries will collapse by the year 2050. We are harvesting seafood at a much faster rate than it can be naturally replaced; 80 percent of our world's fish stocks are already either fully exploited or in decline. Pavan Sukhdev of the UN Environmental Programme said that, "We are in the situation where 40 years down the line we, effectively, are out of fish."

The good thing about knowing these statistics, however discouraging they may be, is that we still have time to change our future. Much of the damage that has been done is at least reversible to some extent if we are able to accurately measure and effectively manage remaining fish stocks, modify and minimize destructive fishing methods, protect vulnerable ecosystems, and change our eating habits. We must establish more Marine Protected Areas so the fish that are left have somewhere safe to spawn and grow, while pressuring governments to limit subsidies that encourage unsustainable fishing practices. We need to regulate and monitor fishing to reduce the amount of illegal catch, while simultaneously modulating our global demand for seafood by choosing sustainable options in our daily lives. It is also important not to underestimate the power of conscious consumerism, and programs such as Seafood Watch, Fish Watch, and Right Bite have created "seafood guides" to help us all make better choices.

The Save Our Seas Foundation states that, "If left unchecked, (overfishing) will destroy the marine ecosystem and jeopardize the food security of more than a billion people for whom fish are a primary source of protein." The Food and Agricultural Organization confirmed that, "One in five people on this planet depends on fish as the primary source of protein."Overfishing is ultimately robbing future generations of their food supply for the temporary profitability of companies today and must be stopped before there is no chance of recovery. So, what are you having for dinner?