

FISHERIES PART ONE OF A THREE-PART SERIES EXAMINING MARINE ECOSYSTEMS

Jellyfish of the day

GAELIN ROSENWAKS
 Special to Sun Media

Imagine ... you are sitting in a restaurant with your family about to order the fresh catch of the day for your dinner. You ask the waiter for tonight's special, and he replies that there is a lovely broiled jellyfish available. You sit baffled, expecting to be offered a nice filet of salmon or halibut, but there are simply no big fish left in the ocean.

Unfortunately, this scenario may become a reality within our lifetimes according to Dr. Daniel Pauly of the Fisheries Centre at University of British Columbia, unless we change how we approach

fisheries management. Dr. Pauly refers to this scenario as "Fishing down the food web," the process in which commercial fleets go through the transition from harvesting "fully exploited" large predatory fish, like salmon, halibut, and tuna, to targeting smaller shorter-lived species, like mackerel, sardines, and squid that are lower on the food chain.

Can't rebound

This complete disruption of the marine ecosystem makes it virtually impossible for fish stocks to rebound as not only are the top predators over-harvested but their prey is as well. This allows lower level predators

like the jellyfish to take over the niche once occupied by the large predatory fish.

What is the problem? Oceans are in peril from over-fishing, destructive fishing methods, and habitat destruction. From the Atlantic to the Pacific coasts, Canadian marine resources are being exploited and threatened. The history of the Atlantic cod fishery has proven that over-fishing can lead to the collapse of fisheries and the disruption of ecosystem function, and yet we continue to allow the over-harvest of wild populations of fish. The Food and Agriculture Organization of the United

Nations reports that 47% of major fish stocks in the world are considered "fully exploited," 18% are considered "over-exploited" and 10% are considered "depleted." In total 75% of the world's fish stocks are harvested either to their maximum or beyond, an alarming statistic as we move into the future.

The problems facing our fisheries are not limited to over-harvest but also include destructive fishing methods and bycatch. Bottom trawling is the marine equivalent to clear-cutting forests as the massive nets scrape along the ocean floor behind the boat, destroying deep

sea corals and sponges along with the bottom structure that serve as habitat the fish need to re-establish their populations. A healthy vibrant ecosystem can be destroyed with one pass of a trawler, leaving a barren wasteland. High seas bottom trawlers destroy an area of the ocean floor equivalent to the size of the United States every year.

Bycatch

This loss of habitat is not the only problem with trawling; these nets also collect all of the organisms in their paths, both the target species like shrimp and fish, and also non-target species such as starfish, skates, turtles and

many other species. These non-target species are classified as bycatch and are either discarded dead or are retained and sold as part of the vessel's allowed take as bycatch. Global fisheries are estimated to discard more than 20 million tonnes of fish and other marine creatures every year. This constitutes more than 20% of the global catch.

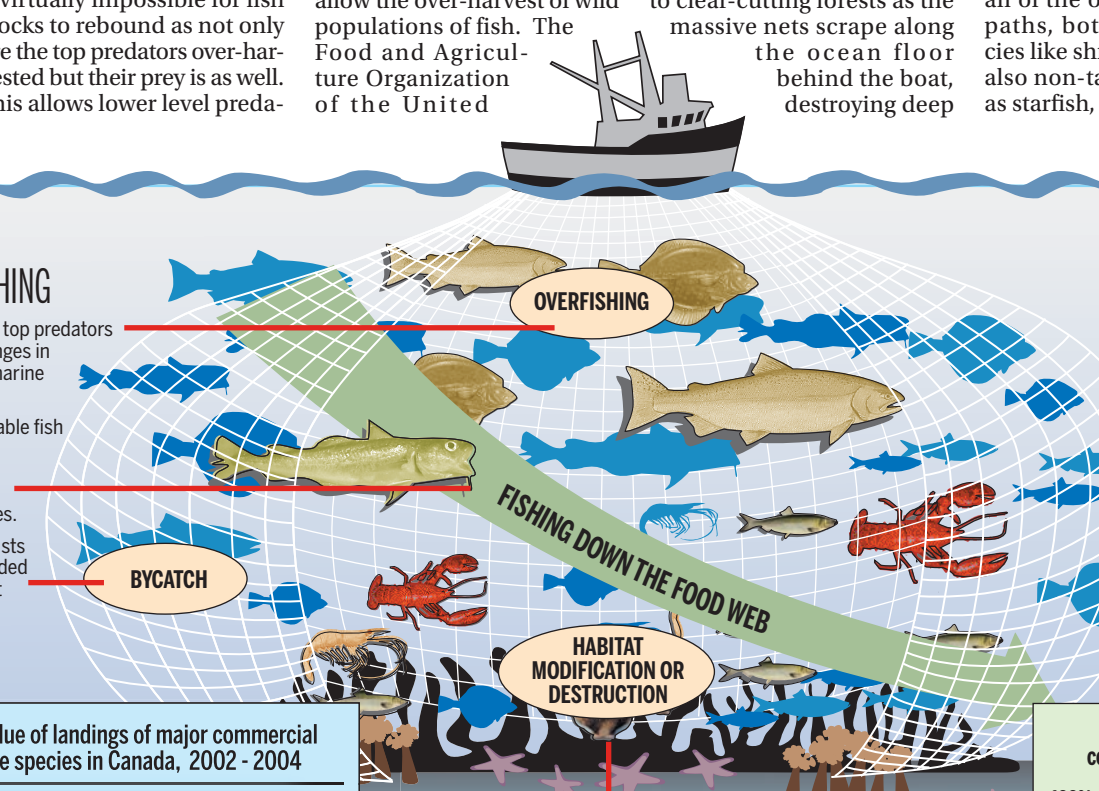
While the conditions facing our fisheries are dire, all hope is not lost if we impose further restrictions on the catch of wild fish populations. Personally, I don't look forward to the day when poached jellyfish in dill sauce is the most attractive seafood dish on the menu.

ECOSYSTEM OVERFISHING

■ **Overfishing:** Often removes top predators and can result in dramatic changes in the structure and diversity of marine ecosystems.

■ **Food web:** As the more valuable fish populations decline, fishermen begin "fishing down the food web." This causes a decline in the sustainability of the fisheries.

■ **Bycatch:** Worldwide, scientists estimate that fishermen discarded about 25% of what they caught during the 1980s and the early 1990s — that's about 60 billion pounds of fish each year.



Best choice of seafood to eat:

Currently fished/harvested sustainably.

U.S. and Canadian sourced catfish	Hake	Sardine
Sturgeon	Haddock	Shrimp
Clams	HerriAng	Swordfish
Pacific cod	Lobster	Tilapia
Crab, Pollock	Mussels	Rainbow Trout
	Oysters	Tuna (except Bluefin)
	Sablefish	

Avoid these choices of seafood:

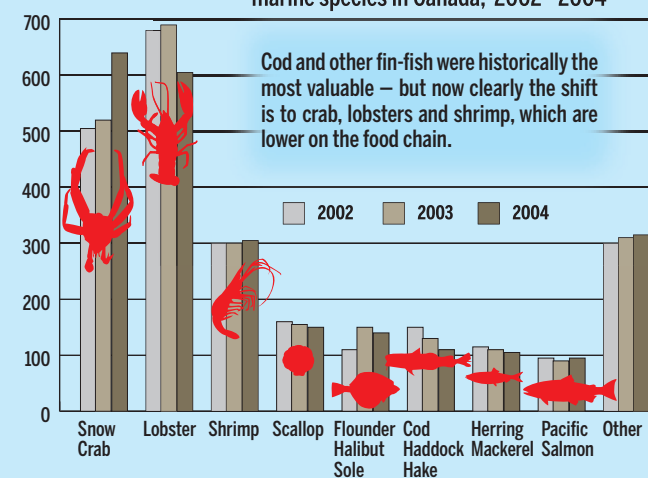
Sources that have a combination of problems.

Intl. wild sturgeon	Grenadier	Farmed salmon
Chilean seabass	Trawl-fished haddock & halibut	Scallops
Dredged clams	Monkfish	Shark
Atlantic cod	Orange roughy	Intl. shrimp
King crab	Rockfish	Swordfish
Flounder/sole		Tilapia

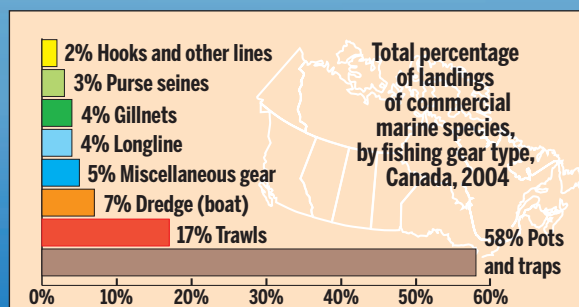
Source: Canada's Seafood Guide, www.seachoice.org

LANDED VALUE (\$MILLION)

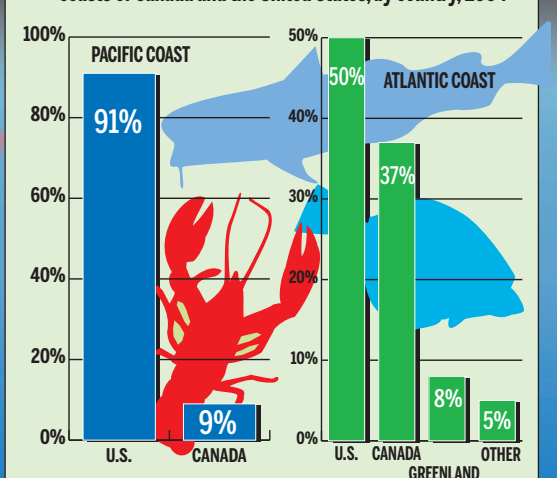
Total value of landings of major commercial marine species in Canada, 2002 - 2004



■ **Habitat destruction:** Fishing gear that drags along or digs into the seafloor destroys habitat needed by marine wildlife, including commercially fished species. Bottom-dwelling invertebrates can take up to five years or more to recover from one pass of a dredge.



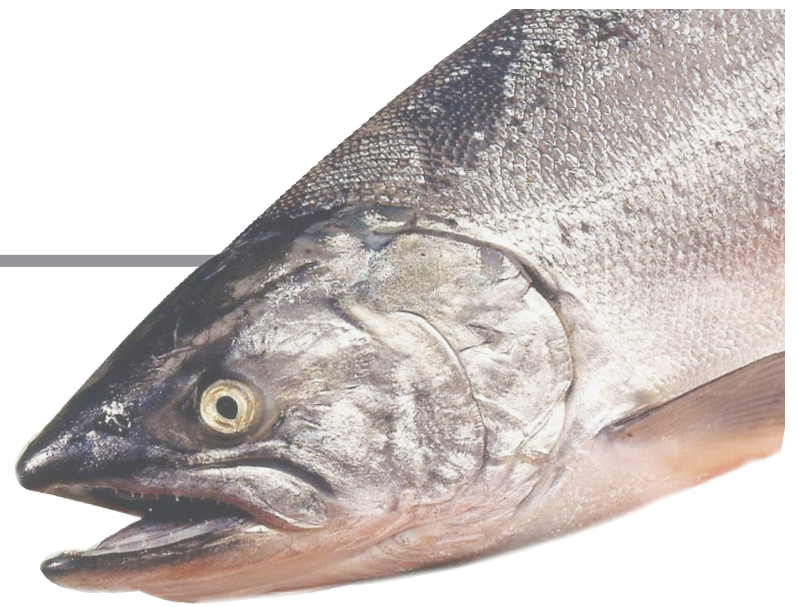
Percentage of total catches on the Pacific and Atlantic coasts of Canada and the United States, by country, 2004





Green Planet

FISH FARMING WHAT SEEMED LIKE A GOOD IDEA ISN'T, AT LEAST NOT YET



Risky business

Gaelin Rosenwaks
Special to Sun Media

Aquaculture is largely viewed as a sustainable way to relieve pressure on wild stocks of fish and provide protein to the world's population. Today's open net-caged operations raising carnivorous fish do not meet this goal.

Canada is the fourth largest producer of farmed salmon in the world behind Norway, Chile and the U.K., having produced a total value of \$543 million in 2005. Of the aquaculture production in Canada, 48% is in the waters of British Columbia with 24% of the production centred in New Brunswick.

Growth

The 1980s saw a tremendous boom in all aquaculture production, with a four-fold increase from 11.4 metric tonnes (mt) to 45.7 mt from 1985-2000. Salmon farming mirrored this growth with increases in production from fewer than 50,000 mt in 1985 to more than one million mt in 2000, surpassing the wild capture of salmon.

In 1984, Ottawa encouraged foreign investment in the industry, paving the way for multi-national corporations to build salmon farms in the waters of B.C.

With Norwegian investment, a shift from farms growing predominantly Pacific salmon to farming Atlantic salmon occurred in B.C. waters. Atlantic salmon continue to dominate the B.C. salmon farming industry representing 80% of the market.

Nearly all salmon farming is done in net-pens floating in the ocean, often in protected bays and coves at the mouths of rivers. These open systems, often holding up to 700,000

fish in 12,000 square metres, are where many of the environmental issues arise.

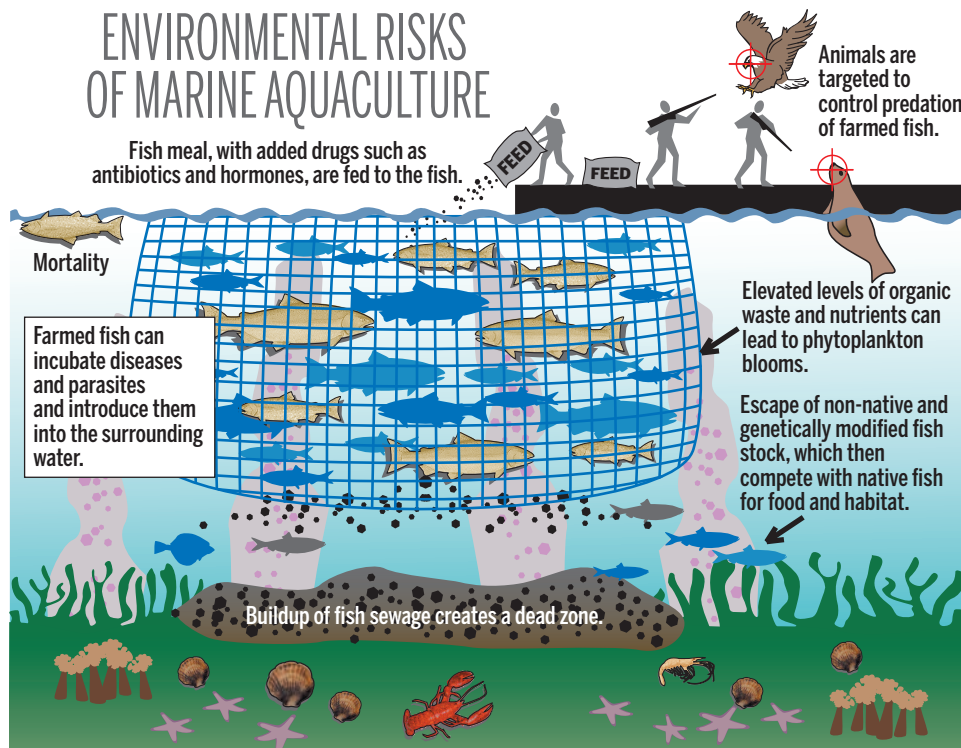
Pollution

The farm benefits from the circulation of clean oxygenated water and free removal of wastes into the surrounding waters. This pollution from waste feed and feces can smother bottom-dwelling marine life under the net-pens and the excess nutrients can lead to harmful algal blooms. Organic waste is not the only problem, antibiotics and pesticides given to the fish and anti-fouling paints used on the pens release harmful materials into the surrounding waters.

With high densities of fish, disease and parasites are often problems. These diseases can threaten wild populations of salmon as seen with the breakout of infectious salmon anemia in the Bay of Fundy in 1997.

Sea lice, a marine parasite, are another significant problem as an infestation can both lower the value of the harvested fish and harm wild juvenile salmon migrating from the river to the ocean. An infestation in the Broughton Archipelago led to a collapse of the pink salmon run in 2001.

The interaction between wild salmon and the farm does not end at the farm site. A high degree of escapement



of farmed fish into the wild has been observed. The UN declared that second to habitat destruction, "biotic invasions" are one of the world's major environmental issues, and this escapement is just that, a huge invasion.

Feed sources

While all of these environmental problems can be mitigated by human intervention, the problem of wild har-

vest of forage fish such as sardines, anchovies and herring used in the feed pellets will remain.

More than three pounds of these wild caught fish are needed to grow one pound of salmon resulting in a net loss of fish protein.

Not only are the effects seen in declining wild populations of these forage fish, but farmed salmon do not have the same nutritional

value as wild fish as they tend to have higher levels of toxins due to their feed and less of the desirable omega 3 fatty acids.

With continued research into environmentally sound farming practices and alternative feed, aquaculture of salmon may prove to be sustainable in the future.

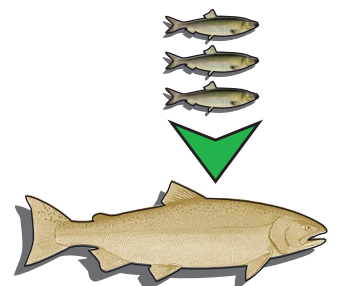
- Gaelin Rosenwaks is an oceanographer and conservation biologist based in New York.

FEEDING THE FISH

Fishing and Processing: Farming carnivorous fish such as salmon requires that small pelagic fish such as anchovies and sardines are caught by industrial fishing fleets. The small fish are processed into fishmeal and oil.

Feeding and Harvesting: The processed fishmeal and oil are fed to salmon in densely packed netpens. After about two years, the salmon are harvested and transported to markets primarily in the United States.

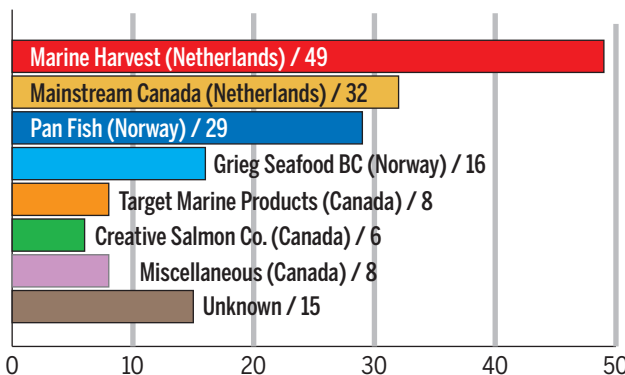
Ratio of Feed to Fish: In 2000, the production of 876,000 metric tonnes of farmed salmon required fish oil manufactured from 2.5 million metric tonnes of small pelagic fish.



Approximately three pounds of small wild fish are taken from the oceans to produce one pound of farmed salmon.

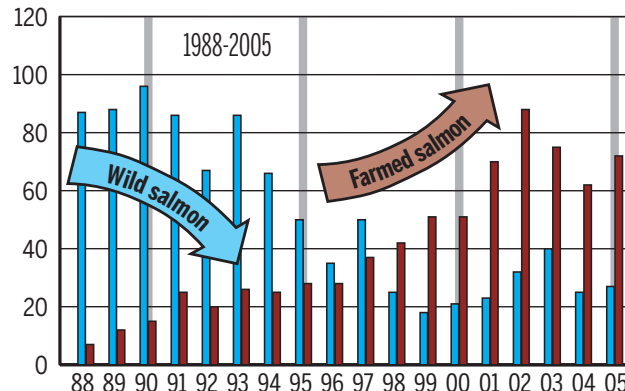
B.C. SALMON FARM LICENCES

Name of Company/ Ownership/ No. of Licences (as of Nov. 2006)



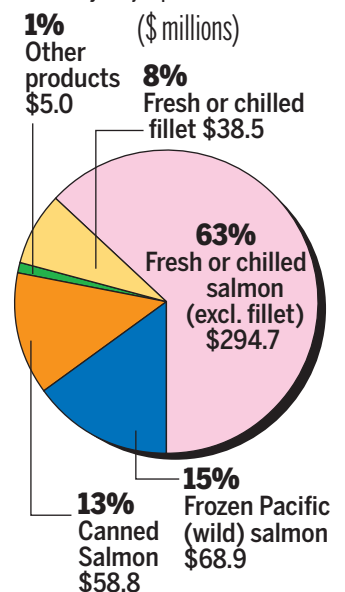
B.C. SALMON HARVEST/PRODUCTION

Quantity (tonnes in 000's)



SALMON EXPORTS

by major products, 2005



canoe.ca
GET MORE.
For more on environmental issues, go to:
canoe.ca/science

Sources: Seaweb Aquaculture Clearinghouse, PEW Oceans Report, FAO Fisheries & Aquaculture Dept., MMK Consulting, LivingOceans.org

Graphics: Susie Mah, Sun Media

● **SEAFOOD** CONSIDER THE ENVIRONMENT BEFORE DECIDING WHICH FISH TO EAT

Proceed with caution

Gaelin Rosenwaks
 Special to Sun Media

Your mind is overwhelmed by the variety of seafood as you stand in front of the fish counter at the market.

What should you buy for dinner? You think of frolicking dolphins and sea lions, jumping salmon heading upstream to spawn, killer whales cruising in the kelp, soaring bald eagles and all of the beauty and natural wonders along Canada's vast coastlines and surrounding waters.

What can you eat without hurting the marine environment? What is sustainable? What can you do to ensure that you can enjoy seafood for years to come?

Education

To be an educated consumer, the SeaChoice program of Sustainable Seafood Canada outlines three questions to ask when purchasing seafood, "what type of seafood is this, where was it fished or farmed, and how was it caught or farmed?" The criteria for choosing your seafood are based on the impacts that the fishery or aquaculture site are having on the ocean ecosystem.

For wild harvest fisheries, the first question to ask is whether the stock is over-harvested or healthy and sus-

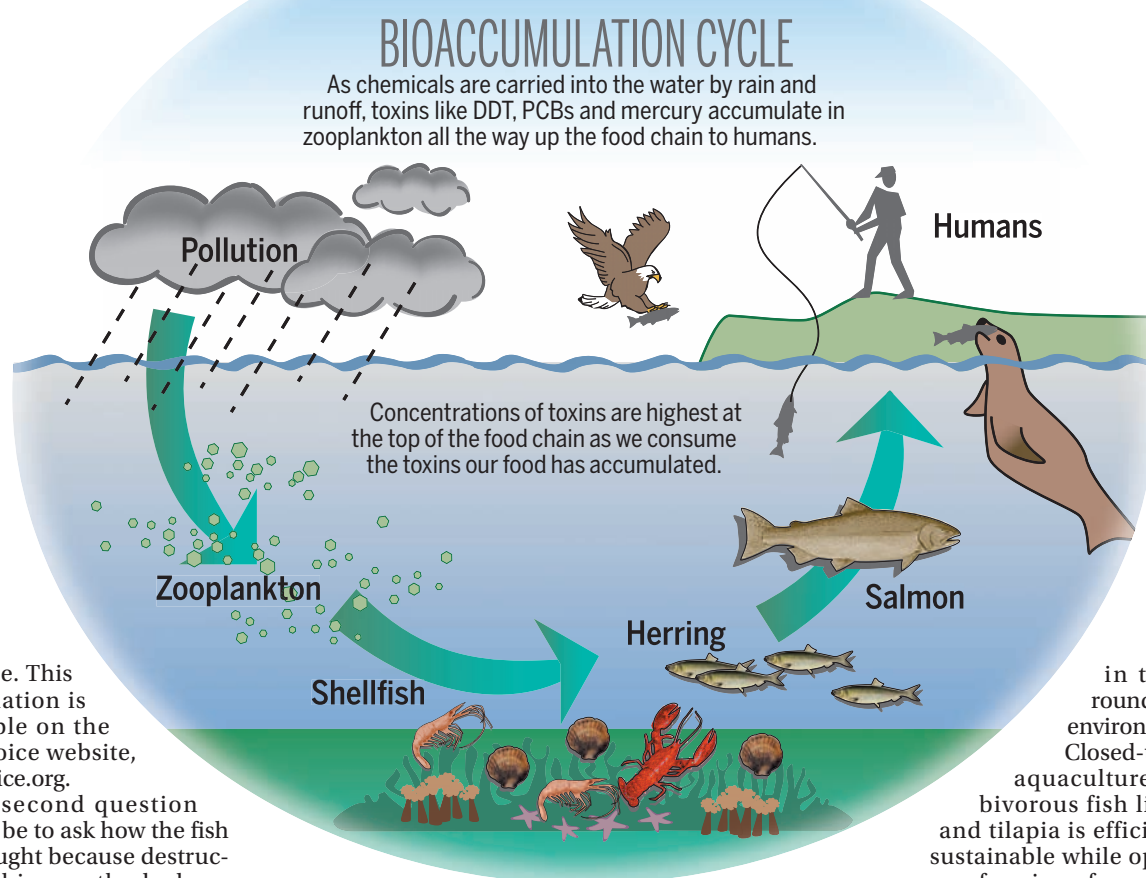
tainable. This information is available on the SeaChoice website, seachoice.org.

The second question should be to ask how the fish was caught because destructive fishing methods damage ecosystems through habitat destruction and the taking of unwanted species called bycatch.

While destructive methods are still used, many fisheries use more efficient, targeted methods.

For example, troll-caught tuna, trap-caught prawns, and harpooned swordfish are a few fisheries that appear sustainable without having negative impacts on other species. While some wild fisheries

can provide a sustainable catch, aquaculture, when done properly, is most likely the best option for the future. Shellfish, for example, can be farmed efficiently and can help improve water quality



There is a movement in British Columbia to move all salmon farms into closed-tank systems which would be a move in the right direction providing the industry finds a more efficient method for feeding the fish.

Food choices

This brings us to the next issue, human health.

Eating lower on the food chain, not the big carnivores like salmon and tuna, is not only a more efficient use of energy, but it is better in terms of toxins.


Larger predatory fish, both wild and farmed, have higher levels of toxins such as PCBs and mercury because of bio-accumulation.

What else can we do? We should be aware of our impacts on the natural environment and keep our watersheds clean by not polluting and putting toxic chemicals down the drain.

As a consumer it is important to proceed with caution when choosing seafood. Sustainability of the natural environment is paramount in our seafood choices because it is just that, a choice.

Ultimately, the consumer drives the market for seafood.

— Gaelin Rosenwaks is an oceanographer and conservation biologist based in New York



FOR HEALTHY CHOICES

SeaChoice

Consult Canada's Seafood Guide, downloadable at www.seachoice.org, for a list of best choices of seafood to buy and eat. SeaChoice ranks seafood according to:

1. The vulnerability of the species fished.
2. The status or health of the stock.
3. The catch of unwanted species.
4. Ecosystem or habitat damage caused by fishing.
5. Effectiveness of management.

137 Species depend on salmon

From grizzly bears to grey wolves — at least 137 species depend on salmon for part of their diet. Even trees and plants benefit from the nutrients brought back by salmon from the seas.

