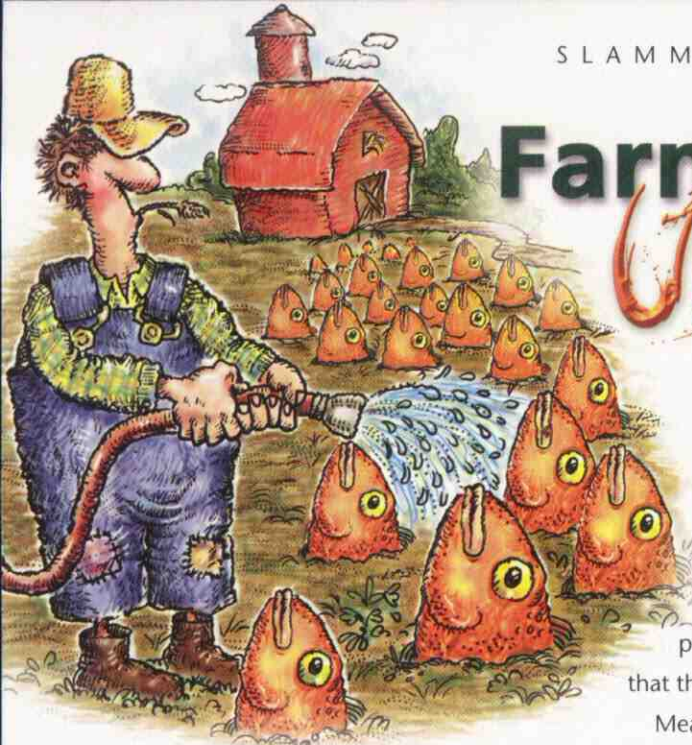


# Farmed Salmon Under Fire

By David Schardt



## The Salmon Story

"Wild salmon are an amazing food source," says Peter Tyedmers, an ecological economist at Dalhousie University in Halifax, Nova Scotia.

"They reproduce themselves, go out to sea and grow for years on things humans won't eat, then return in a group to a certain place at a certain time, making them easy to catch."

But wild salmon are catchable only from late May to late September, so fresh wild salmon is hard to come by most of the year. And even during its brief season, you can expect to pay about \$15 a pound for fresh fillets. (Frozen fillets, which are available year-round, are generally no cheaper.)

Enter farmed salmon. In the 1960s, Norway pioneered the intensive farming of salmon in pens along its thousands of miles of lightly inhabited coastline. Norwegian multinational corporations then exported the system to other countries. Today, you can buy fresh farmed salmon year-round for around \$6 a pound.

As recently as 1980, the world's fishing fleets caught more than 99 percent of all salmon. Today, farms supply about 40 percent. Four countries—Norway, Chile, the United Kingdom (mainly Scotland), and Canada—produce close to 98 percent of the world's

farmed salmon. Nearly all that's sold in the U.S. comes from Chile and Canada.

## Down on the Farm

"Just like the huge factory ships that depleted many populations of wild fish during the past two decades, salmon farming has focused on increasing production without giving enough consideration to its environmental and biological consequences," says conservation expert Michael Weber, author of *What Price Farmed Fish: A review of the environmental and social costs of farming carnivorous fish* (Sea Web Aquaculture Clearinghouse, 2003).

"It has grown faster than the ability of governments and industry to control its environmental costs."

Among the charges:

■ **Salmon farming is slowly reducing the amount of fish available for human consumption.** In the wild, salmon feed on deep-ocean krill and other small fish that are generally not eaten by humans. Farmed salmon, on the other hand, are fed processed anchovies, sardines, menhaden, and herring.

Not only are those species more likely to be contaminated with industrial chemicals (since they're caught closer to shore), but they're fish that humans eat. And it takes three to five pounds of them to provide enough fish oil and fish meal (ground dried fish with the oil

## The Bottom Line

- Salmon farming pollutes ocean shorelines and is slowly depleting the oceans of fish.
- Eating farmed salmon reduces your risk of dying of a sudden heart attack far more than it increases your risk of cancer.
- If you score the flesh, grill or broil the salmon (so that the juices drip off) until it reaches an internal temperature of 175° F, and remove the skin before eating, the fish could lose half of its harmful contaminants.
- If you buy farmed salmon, ask where it was raised. The safest places: Chile and Washington state. The least safe: Scotland and the Faroe Islands.
- The best advice: Eat a variety of seafood. Include wild and "organic" salmon if you can find (and afford) it, as well as canned salmon (see "Go Fish," p. 11).
- Even though most contaminants concentrate in fat tissue, *Consumer Reports* magazine reported last July that none of the 16 top-selling fish oil supplements it tested contained significant amounts of mercury, PCBs, or dioxins.

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pressed out of it) to add one pound of weight to a farmed salmon.

"The striking trend in salmon farming is a shift to a greater reliance on fish oil than fish meal," says Weber. Oil costs more than meal, but it makes the salmon grow faster—and it contains the omega-3 fats that seem to cut the risk of heart disease in fish eaters. It also carries the contaminants like PCBs and dioxins that led to this year's warning about eating farmed salmon.

Another problem: "It takes about twice as much fish to produce a pound of fish oil than it does to produce a pound of fish meal," explains Weber. And that's taking an increasingly large bite out of the oceans.

The industry is working on a way to reduce the amount of fish fed to farmed salmon, but it's not there yet. "Farmers may be able to give soybean feed to the salmon for most of their lives, then give them fish oil during their final weeks so that they'll still be a rich source of omega-3s," says Paul Brown, a fish nutritionist at Purdue University in West Lafayette, Indiana.

■ **Salmon farming pollutes the shoreline.** A salmon farm of 200,000 fish releases as much fecal matter as 65,000 people, the Pew Oceans Commission reported in 2003. That can kill fish and aquatic plants and spawn harmful blooms of algae.

■ **Salmon farming harms wild salmon.** "Most marine aquaculture operations inadequately separate [farmed] fish and their diseases from surrounding seas, making escapes and contamination inevitable," according to the Pew Oceans Commission. Escaped farmed salmon can carry sea lice that eat fish flesh. What's more, if farmed salmon escape and breed with wild salmon, they can pass on traits—like smaller fins and larger bodies—that may weaken the ability

of the wild salmon to survive.

■ **Farmed salmon are contaminated with industrial chemicals.** "Salmon are what they eat," says Michael Weber. And what farmed salmon eat is fish and oil tainted with industrial chemicals, judging by a study that analyzed more than 700 wild and farmed salmon purchased in eight countries. The study was funded by the Pew Charitable Trusts in Philadelphia.

"We found that farmed salmon contained seven times higher levels of PCBs, dioxins, and pesticides than wild salmon," says David Carpenter of the State University of New York at Albany, one of the principal researchers.

In fact, the least-contaminated farmed salmon (from Washington state and Chile) contained significantly higher levels of PCBs and other carcinogens than most wild salmon—high enough to trigger advice from the U.S. Environmental Protection Agency to eat no more than one meal a month containing salmon farmed in those regions. (See "How Much Can You Eat?")

Farmed salmon from Canada, Maine, and Norway were twice as contaminated as salmon from Washington state and Chile. That translates into no more than one meal every *two* months. And farmed salmon from Scotland and the Faroe Islands were so contaminated that you shouldn't eat them more than once a year.

### The Risk

Here's what the Pew study boils down to: if you eat a six-ounce serving of cooked farmed salmon from Washington state or Chile once a month for your entire life, your risk of getting cancer rises by roughly one in 100,000. (Eight ounces of raw salmon cooks down to six ounces.)

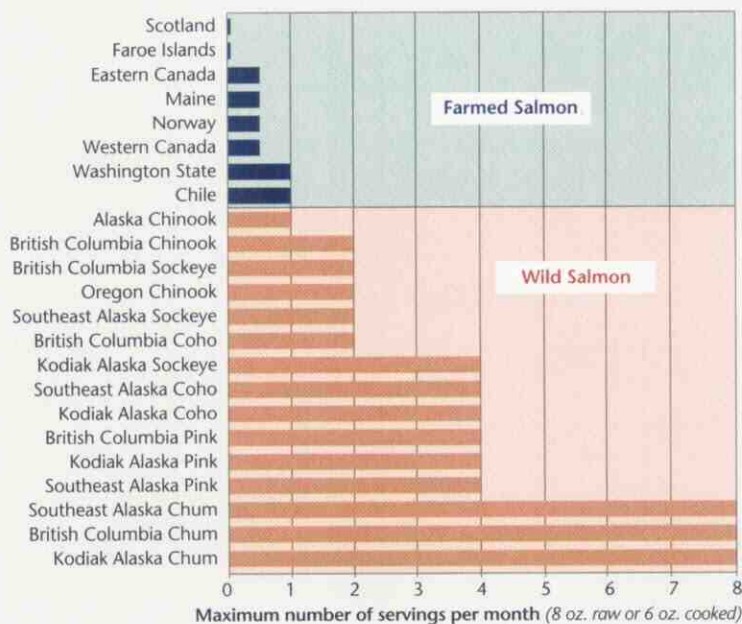
Another way to look at it: 33,000 of every 100,000 Americans who live to age 80 will be diagnosed with cancer. If all 100,000 ate farmed salmon from Washington state or Chile once a month, the number of cancer cases would climb by just one, to 33,001.

If they ate the farmed salmon once a *week*, the number of cases would rise to 33,004 (or to 33,008 if the salmon was farmed in Canada).

Compare that relatively small number of additional cancers with the impact of salmon on sudden cardiac death. While there are no exact numbers available, a conservative estimate is that roughly 5,000 out of every 100,000 Americans die of cardiac arrest. If all 100,000 ate salmon (farmed or wild) once a week, researchers estimate that the number of deaths would drop to 3,500. That's 30 percent fewer lives lost.

"Of all the nutrients in our diet, nothing has a greater impact on preventing death from sudden heart attacks than the omega-3 fatty acids in seafood like salmon," says William Harris of the University

## How Much Can You Eat?



This graph shows how many servings of salmon you can eat without raising your lifetime cancer risk by more than one in 100,000. You can eat twice as much if you score the flesh, grill or broil the fish (so that the juices drip off) until it reaches an internal temperature of 175° F, and remove the skin before eating.

Sources: *Science* 303: 226, 2004 and the U.S. Environmental Protection Agency.



# Go Fish

The American Heart Association recommends that people eat fish, especially fatty fish, at least twice a week to lower their risk of coronary heart disease. That's consistent with other recommendations to get about 1,000 mg a day of omega-3 fats. To minimize the risk from contamination, it's best to eat a variety of fish.

## Wild Salmon

**Source:** ocean and rivers  
**Environmental impact:** low  
**Contamination levels:** low  
**Omega-3 levels:** very high (about 3,000 mg in 6 oz. cooked)  
**Cost:** around \$15 a pound  
**Comments:** There isn't enough affordable wild salmon to satisfy the world's appetite. Chum is the least contaminated species of wild salmon. (It has one-eighth the level of pollutants of *farmed* salmon from Chile or Washington state.) Chinook from Alaska is the most contaminated. (It's no cleaner than Chilean or Washington state farmed salmon.) All salmon from Alaska is wild. You can buy frozen wild salmon year-round for about \$15 a pound at markets like Trader Joe's or Whole Foods or via the Internet.

## Farmed Salmon

**Source:** ocean pens  
**Environmental impact:** high  
**Contamination levels:** high  
**Omega-3 levels:** very high (about 4,500 mg in 6 oz. cooked)  
**Cost:** around \$6 a pound  
**Comments:** Almost all farmed salmon are the Atlantic salmon species, wherever they're raised. Most salmon sushi comes from farmed fish. Beginning this fall, all labels will have to state where seafood was caught, where it was processed, and whether it's wild or farmed.

## Canned Salmon

**Source:** wild salmon  
**Environmental impact:** low  
**Contamination levels:** low  
**Omega-3 levels:** very high (about 3,000 mg in 6 oz.)  
**Cost:** \$2 to \$8 a pound  
**Comments:** Most canned salmon is from Alaska—either sockeye (red) or milder, less expensive pink. Canned salmon is higher in sodium than wild or farmed, but it usually contains (edible) bones, so every six ounces provide about 400 mg of calcium.

## Smoked Salmon

**Source:** usually farmed salmon  
**Environmental impact:** low (if wild) or high (if farmed)  
**Contamination levels:** No data available. While smoking and heating destroy some contaminants, smoking creates others.  
**Omega-3 levels:** very high (about 2,700 mg in 6 oz.)  
**Cost:** \$10-\$40 a pound  
**Comments:** According to an analysis conducted by the industry group Salmon of the Americas for *Nutrition Action Healthletter*, smoked salmon is an excellent source of omega-3 fats. The 10 products tested ranged from 270 mg to 740 mg per ounce. Government numbers suggesting that smoked salmon has lower levels of omega-3s are based on two samples that were tested several decades ago.

## Farmed Organic Salmon

**Source:** ocean pens  
**Environmental impact:** medium  
**Contamination levels:** no data available  
**Omega-3 levels:** no data available  
**Cost:** around \$12 a pound  
**Comments:** Most "organic" salmon comes from farms in the North Atlantic that comply with one or more European definitions of organic (the U.S. doesn't set standards for organic seafood). The term often means that the fish are raised in less crowded pens, fed trimmings of fish fit for human consumption, and exposed less often to pesticides.

## Farmed Catfish

**Source:** inland ponds  
**Environmental impact:** low  
**Contamination levels:** low  
**Omega-3 levels:** medium (about 300 mg in 6 oz. cooked)  
**Cost:** around \$6 a pound  
**Comments:** Catfish accounts for more than 60 percent of U.S. aquaculture production. The fish are fed mostly plant meal made from soybean, corn, wheat, and cottonseed meal, supplemented with a small amount of dried fish.

## Farmed Trout

**Source:** inland "raceways" that simulate flowing streams  
**Environmental impact:** medium  
**Contamination levels:** low  
**Omega-3 levels:** high (about 1,300 mg in 6 oz. cooked)  
**Cost:** around \$10 a pound  
**Comments:** Farmed trout are high in omega-3s and they're less contaminated than salmon.

Omega-3 sources: wild, farmed, & smoked salmon—Salmon of the Americas; canned salmon—our estimate based on wild salmon data; catfish & trout—USDA.

of Missouri-Kansas City School of Medicine. "That's why the American Heart Association recommends that adults eat fish, particularly fatty fish, at least two times a week."

Clearly, the benefit to the heart from making one of those servings salmon outweighs the increased cancer risk.

But that risk, while small for any individual, isn't trivial for the entire population. If everyone in the U.S. today ate farmed salmon once a week, there would be somewhere between 300 and 2,400 extra cancer cases during their lifetimes.

Consumers aren't helpless, though.

You can slash the increased cancer risk roughly in half, says the U.S. Environmental Protection Agency. How? By scoring the salmon fillets, grilling or broiling them and letting the juices drip away, cooking them until the internal temperature reaches 175° F, and removing the skin before eating. 🍷

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