

## Time to veto the 'virtuous' choice

Wild salmon is good and fish farming is bad, right? At least that's what environmentalist **Cameron MacDonald** always thought, and taught - until a random classroom comment inspired him to go out and do his own research

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VANCOUVER - From a distance, the salmon farm floats like a mirage at the mouth of Grice Bay near Tofino on the west coast of Vancouver Island.

Surrounded by jade mountains and dark water, the farm looks tranquil, seemingly immune to the controversy that swirls elsewhere around the aquaculture industry in British Columbia.

As we approach, bouncing across the light chop in an open boat, I see the farm is smaller than I'd expected: eight pens, each 15 metres square, surrounded by a metal walkway. The whole complex has a surface area comparable to the ice surface at your local hockey rink.

At the dock, I am greeted by Spencer Evans, general manager of Creative Salmon. Together, we look into the murky depths of the first pen, which seems to be empty. Then, Mr. Evans tosses a scoop of feed pellets into the water and suddenly hundreds of little silver bullets shoot to the surface.

As a biology instructor at Langara College in Vancouver, I have twice annually given an anti-salmon-farming lecture to my environmental-studies class. This past semester, I was again reciting the litany of abuse, but my heart wasn't into the diatribe - my lecture sounded too much like propaganda pulled from a website, which is exactly what most of it was.

Then, the lecture faltered completely. I was describing the dyes some producers use to colour the meat pink, when a student raised a hand. "The Vancouver Aquarium recommends eating wild salmon instead of farmed salmon," she said. "What do you think is worse for the environment?" I knew the answer I was supposed to provide. Every environmental organization, from the David Suzuki Foundation on down, clearly states that consuming farmed salmon is a mortal environmental sin.

Consuming wild salmon is presented as virtuous by comparison.

Commercial devastation But I have worked in the commercial fishery. I have been on deck when trawlers emptied their nets of 10,000 pounds of fish randomly scraped from the bottom of the ocean. Even though wild salmon are not harvested this way, the image of that devastation is still relevant.

Then, in Nova Scotia, in the late nineties, I watched the last handful of wild Atlantic salmon work their way up the Gaspereau and Lehave rivers. Commercial fishing, as we are painfully well aware of in Canada, has exhausted almost every harvestable species and permanently altered the fragile ecosystems those fisheries sustained.

"I don't know," I finally responded to my student. "I've never seen a salmon farm first-hand. But commercial fishing is ecologically disastrous. You are not saving the world when you eat wild salmon." "For me it's just a theoretical question," the student replied.

"I'm a vegetarian." "Then you are truly walking the high road," I said as the hallway buzzer ended the discussion.

The tour of Creative Salmon's farm site helped to confirm a thesis I had had percolating since working as an at-sea observer for the Department of Fisheries and Oceans on the bottom trawlers

of the West Coast. My suspicion: Both salmon farming and commercial salmon fishing have an impact on ecosystems, but that of salmon farming pales in comparison. In my view, British Columbia could largely abandon the commercial fishery, and with only a modest expansion of salmon farming, bring more fish to market, increase rural employment and contribute more revenue to the provincial economy. And, most important, runs of wild salmon, unmolested by gill-netter and seiner, would recover, bears would gorge, rotting fish carcasses would fertilize trees.

But the issue is complicated, and clouded by abundant propaganda from both sides. Check out any anti-fish-farming website and you will find the following allegations: escapees, pollution, health risks and parasite transmission.

Are these allegations insurmountable, easily mitigated, or simply false?

## **1. Escapees**

It's true that nets can tear and farmed salmon can escape into the wild, raising fears that partly domesticated lineages of Atlantic or Pacific salmon (respectively 95 per cent and 5 per cent of the B.C. industry) will compete with or hybridize with local stock, compromising the genetic integrity of wild populations.

In fact, Atlantic salmon are only distant genetic cousins of Pacific salmon and therefore are unable to produce hybrids. Additionally, Atlantic salmon do not readily establish themselves outside their home range - in the 1930s and 40s, various governments throughout the Pacific Northwest attempted, in vain, to introduce Atlantic salmon for the sport fishery.

Farmed Pacific salmon, if they escape, could potentially hybridize with wild populations because they are recently derived from wild stocks. But the issue here is moot: Billions of hatchery-reared Pacific salmon are released into the Pacific annually to subsidize the commercial and sport fisheries. These swarms compete with and genetically contaminate populations of wild salmon, making the potential impact of farm escapees insignificant.

## **2. Pollution**

The surface footprint of a salmon farm is relatively small, but the ecological footprint on the ocean floor extends much farther.

Salmon feces and any uneaten feed accumulates on the sea floor directly under and downstream of the pens, potentially affecting bottom-dwelling organisms by creating an anoxic environment, lacking in precious oxygen. Currents can also carry organic pollution into nearby bays, where, if confined, it can have an impact on shellfish.

While there are few documented cases of this kind of offsite contamination, fish farmers can avoid the problem by situating fish farms in areas flushed by strong tidal currents, reducing pen densities and regularly fallowing farm sites.

As for environmental organizations concerned about seabed conservation, a better target by far would be the trawl fishery, which drags large, weighted nets across thousands of square kilometres of ocean floor.

Not only does this fishery result in tons of unwanted fish being caught and discarded, it also gouges and planes habitat features, such as sponges and corals, from the ocean floor. In comparison, Canada's entire West Coast salmon-farming industry has a direct impact on a paltry 12 square kilometres of seabed, a figure that includes a 100-metre buffer around most farm sites.

## **3. Health risks**

Thanks in part to smart environmentalism, there have been significant improvements in the industry since the 1980s. Farming now uses lower levels of antibiotics than are typical for most livestock production - Creative Salmon, for instance, has not treated any production fish with antibiotics since 2001.

Health Canada also encourages the consumption of farmed salmon, for its heart-healthy fatty acids, whereas many wild fish, such as canned albacore tuna, fall into the "eat-only-one-serving-a-week" category because of mercury contamination. Additionally, concentrations of polychlorinated biphenyls in Canadian farmed salmon are about a 50th of the levels allowed by Health Canada

#### **4. Parasite transmission**

Parasites are the real issue. Atlantic salmon (though not chinooks) are susceptible to sea lice, which can proliferate in densely populated fish farms. When salmon farms are located near the mouths of rivers that support runs of pink salmon, juvenile pinks migrating to the ocean can acquire higher than normal parasite loads and suffer higher mortality rates as a consequence.

Much of the concern regarding lice transmission originated with the 2002 collapse of the pink salmon fishery in the Broughton Archipelago, an area east of Port Hardy that supports the largest concentration of salmon farms in B.C. In 2000, the run of Broughton pinks was the largest recorded since monitoring began in the 1950s, but the 2002 run was near historically low levels.

Commercial fishermen implicated salmon farming as the culprit.

However, the runs had also been commercially fished in all previous years; it would be statistically difficult to separate the relative effect of these two industries on the number of pinks. As well, most wild fisheries are subject to substantial natural fluctuation, a reality that makes harvest management a logistical nightmare.

I would argue that - notwithstanding a few specific runs of pinks whose migration routes skirt salmon farms - lice transmission has far less impact than commercial fishing on coastal salmon populations.

And compared with the commercial harvest, which has devastated thousands of runs of salmon around the globe, the potential impact of lice transmission seems modest.

Consider also that Broughton supports a quarter-billion dollars' worth of farming activity annually, compared with a commercial harvest worth at best a few million dollars.

#### **The downside**

The pro-salmon farming argument is certainly not without its flaws.

Salmon, both farmed and wild, are carnivores. Their diet in captivity is fishmeal, basically small forage fish and fish scrap converted into bite-sized pellets. It takes about three kilograms of fishmeal to produce one kilo of salmon (about 10 kilos of forage fish are required to produce one kilo of wild salmon).

In B.C., increasing our reliance on salmon farming could take the pressure off wild salmon, but put more pressure on fish populations used in fishmeal and the ecosystems they come from - Peruvian anchovies, for example, are one of the primary forage fish used in fishmeal.

Additionally, the protein used to make the fishmeal could be used directly to feed the hungry in Peru or elsewhere. In this sense, a salmon farm is different from a prairie wheat field or cattle ranch - instead of feeding the world, the salmon constitute a high-end product for consumption by the wealthy.

Given my charge that most commercial fisheries are ecological nightmares, it's only fair to point out that the farming industry is sustained by the same kind of commercial harvesting. I have real trouble

with the image of high-sea trawlers gorging on wild fisheries, particularly the fisheries of developing nations, in order to export half their product to aquaculture industry (the other half goes into poultry and pig feed).

Some farms are experimenting with fishmeal containing vegetable protein. Advocating for Canadian farmed salmon would certainly be more defensible if their diet contained a significant amount of Canadian grain. It would be even better if the industry used fishmeal produced via aquaculture rather than commercial harvest, although this opportunity has yet to be explored.

Seals and sea lions are another problem. As occasional salmon eaters, they look at salmon farms the way coyotes look at chicken coops. These giant predators (a male Steller sea lion can weigh more than 900 kilos) can cause significant damage to farm infrastructure and deplete salmon stocks. Several farms have received federal permits to shoot them, but such aggressive measures are ultimately ineffective and philosophically questionable. Better technology, primarily in the form of robust cages to effectively isolate the pens, would drastically reduce the threat.

### **Future considerations**

Environmentalists have recommended moving salmon farms into land-based closed containment loops - giant concrete pools continually flushed with fresh seawater that could then be treated before being pumped back into the ocean.

Closed containment has obvious appeal, but it also has significant environmental costs: millions of tonnes of cement for construction and the burning of large amounts of fossil fuels to pump seawater.

A better route might be to pursue the development of partial containment: growing salmon in membranous nets, for example, that would allow water through but capture most of the organic pollution.

Many British Columbians dream of salmon runs returning to historic levels, when the fish carried energy and nutrients into terrestrial ecosystems like red blood carrying oxygen to anoxic cells. The dream could come true with the shutdown of the commercial salmon fishery and the expansion of aquaculture and the sport fishery.

The sport fishery is a windfall, contributing significantly to the provincial economy. Licences, guides, lodges - on a per fish basis, the returns are huge. And without a commercial harvest the sport fishery would be phenomenal. Sport fisheries, because they generally harvest a smaller proportion of available fish, are also politically and ecologically easier to manage.

Fish farms, meanwhile, could provide more employment than the commercial fisheries - and to many areas that desperately need it.

Creative Salmon, for example, operates within the traditional territory of the Tla-o-qui-aht First Nation, and members of that community make up 35 per cent of its work force of 45 full-time employees - a significant contribution to the Tofino economy. After decades of subsidizing the commercial fishery, governments, in particular, are excited by the prospect of a coastal industry that can stand on its own.

Certainly, I am not advocating a rapid expansion of salmon farming.

The industry should grow slowly, and in conjunction with careful environmental assessment and government regulation. Neither should the industry expand to fill every suitable inlet and channel.

Even areas that have been abused in the past by every industry - forestry, commercial fishing, and salmon farming - could slowly be reclaimed as wild space.

Several weeks after my first visit to Creative Salmon, I kayaked past the same fish pens on Grice Bay. The farm still looked picturesque under a sombre winter sky.

A handful of employees were feeding the salmon, distributing just the right amount of food for optimum growth. Even from kayak height, I could see fish boiling at the surface in a feeding frenzy. In the distance, beyond the farm, there were a few small sport boats out working the channel for late-season coho.

In this one panorama, I think I gazed upon the future of the West Coast salmon fishery.

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