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Weathering the storm on B.C.'s fish farms

An experimental closed-containment system for salmon off Vancouver Island aims to quell the swelling controversy

BY MARK HUME

SATURDAY, SEPTEMBER 22, 2007
POSTED AT 1:37 PM EDT

CAMPBELL RIVER, B.C. -- When a storm roars down Okisollo Channel, where the blue Pacific braids through a cluster of islands like a giant river, Riley McFadyen has more to worry about than most farmers.

"This whole place rocks," says Mr. McFadyen as he looks out at the intricate web of galvanized steel gangplanks, cables, nets, mooring chains and anchors that hold his precarious floating world together.

Mr. McFadyen is part of a relatively new breed of farmers in Canada who have forsaken the land to grow massive crops of salmon on the open ocean.

The sites are engineered to withstand the worst storms, but the salmon farming industry is being buffeted by more than high seas this year as a growing wave of criticism rises from scientists and environmentalists concerned about escaped fish, disease threats, pollution and the spread of sea lice to wild stocks.

Salmon farming started experimentally on the West Coast in the 1970s, and by the early 1980s "mom and pop" operations were taking root on the Sunshine Coast.

Although Pacific salmon were initially raised, and still are, most farmers quickly switched to Atlantic salmon because they grow faster and are easier to raise.

Since those early days, farms like the one Mr. McFadyen manages for Marine Harvest Canada at Cyrus Rock have spread along British Columbia's rugged coastline, evolving from nets hung from logs to industrial-scale operations monitored by sophisticated computer programs.

"There are alarms on everything," says Mr. McFadyen as he strolls down a shiny, metal walkway with Clare Bachman, environmental compliance manager for Marine Harvest.

On either side are a series of pens that each hold about 60,000 Atlantic salmon. There are 348,000 fish in total - each an average weight of around three kilograms - swimming in leisurely circles around the pens, which have walls of tough netting through which the ocean flows. Farms like this can hold 700,000 fish at full capacity and can grow a crop to harvest size in 22 months. Future farms are expected to hold one million salmon.

In the second floor apartment of a floating building where a five-member crew lives, eight days on shift, six days off, a computer monitor has signalled an alert. A system that uses pressurized hoses and rotating nozzles to spray feed into the pens - five tonnes a day - has crashed.

"There's always something to deal with," says Mr. McFadyen, who manages a farm so sophisticated that underwater cameras monitor feeding. When satiated fish allow pellets to drop to the ocean bottom untouched, feeding stops to save money and reduce organic waste.

Everything is measured and calibrated, from growth rates to the tensile strength of anchor cables, to how tidal

currents disperse fish waste.

But nature, as any farmer knows, is full of surprises.

Just a week earlier, Mr. McFadyen woke to see the water on the far side of Okisollo Channel turning red with an algae bloom. He had plastic screens to block surface water and an aeration system to push clouds of plankton away from the fish. But the bloom, which originated naturally in shallow bays nearby, still killed 12,500 fish.

Mr. Backman nods as he hears the report. It was the first algae kill at the site in 15 years.

"Sometimes there's just nothing you can do," he says.

Most fish (97 per cent) in the Cyrus Rock farm weren't affected. As Mr. McFadyen scatters a handful of feed pellets, the fish splash on the surface, showing bright silver flanks and green backs with black spots.

"They are beautiful fish," muses Mr. Backman.

When the first crop of farmed Atlantic salmon arrived in North America in 1982 from farms in Norway that had pioneered open-net production, The New York Times raved about "the most magnificent-looking fish on the market ... big, plump and firm ... [and] excellent eating."

Canadian salmon merchants noted the market excitement, and within a few years, salmon farms were popping up on both coasts. B.C. was particularly attractive because its clean waters, stable ocean temperatures and deeply indented coastline offer ideal conditions.

In Atlantic Canada, where there are now 67 salmon farms, activities have concentrated in the Bay of Fundy.

Cyrus Rock, one of about 80 active farms on the West Coast, is a state-of-the-art facility so well run that it is used by the industry as a "show off" site for tourists from cruise ships that stop at Campbell River, a one-hour water taxi ride away.

Mr. Backman says it is a cleaner operation than most but is otherwise typical of modern West Coast salmon farms.

And it is radically different from the farms of the mid-1980s. In those days, farmers lived in tents ashore while they built their farms and many thought that all they had to do was fatten the fish for market and rake in the money.

"In the early days, it was all so exciting and new," he says. "It was pretty well accepted as the thing that would take the pressure off wild salmon."

There was a gold rush attitude and not much criticism of the industry.

But concerns emerged in Norway and then Canada about pollution, diseases, escapes and the tonnes of dead fish, or "morts," that were dumped at sea or in landfills.

In 1986, the B.C. government imposed a moratorium on new farms with some 500 salmon-farm applications pending.

Since then, there have been several government studies - but the salmon farming business has never been able to fully shake its critics, and new site approvals have been rare.

There are now only about 130 approved sites, 70 to 80 of which are fallow at any given time.

Each new farm - four were approved this year - is greeted with a chorus of complaints from critics who feel the

industry needs to change, not grow.

This month, those criticisms increased when thousands of salmon escaped from a net pen in Clayoquot Sound. Last week, a group of 18 prominent scientists issued a statement warning about the threat of sea lice.

"For wild salmon to survive in an era of major environmental stresses through global climate change, a pathogen barrier must be established between B.C.'s farmed and wild salmon populations," stated the scientists.

Among the signatories was Daniel Pauly, a world-renowned fisheries researcher and professor at the University of British Columbia, who compares salmon farms to crowded feedlots, describing them as "floating pig farms."

Mr. Backman says sea lice are virtually non-existent on most farms, and when they do emerge, they are quickly treated with a chemical.

John Volpe, a fish scientist and an associate professor of environmental studies at the University of Victoria, says the industry could be safer, but isn't for economic reasons. "All of the issues ... like escapes and sea lice, organic pollution, toxic residue in the flesh ... all of these things have to do with trying to achieve something that's impossible - and that's cheap salmon," Mr. Volpe says.

In order to keep the price of salmon down, he says, the fish farming industry "off loads" costs to the environment.

The problem of escapes, for example, could be addressed by going to closed containment tanks instead of open net pens. But the fish farming industry resists because it costs more.

"Sea lice. Same story," Mr. Volpe says.

He says that if the public would pay for pricier, "eco-friendly" salmon, the industry could switch to contained sites.

A model of just such a farm is taking shape in a sheltered bay north of Campbell River, where Middle Bay Sustainable Aquaculture Institute is building what it hopes is the salmon farm of the future.

It takes a boat ride, often a long and arduous one, to get to most farms, which are typically located in remote sites because of a need for deep water and strong tides. But Rob Walker, director of development for Middle Bay, can drive to his because the technology allows it to be built just about anywhere.

Cutting through an industrial park, he comes to a dock where 75,000 Chinook salmon smolts are darting about in an innovative bag pen, built locally by Future SEA Technologies Inc.

The pen is a closed-containment system, which separates farmed fish from the open ocean with an impermeable wall. But it's only a temporary holding pen. Mr. Walker's non-profit, which has a \$2.4-million research grant from the federal government, plans to go farther by developing solid wall tanks that float in the ocean.

"So far, as we know, it's never been tried anywhere in the world before," he says.

The advantage of the technology, Mr. Walker says, is that hard tanks allow the farmer to better control the environment. Ocean water can be filtered entering and going out, aimed at removing sea lice. Waste will collect on a cone shaped floor to be pumped into a treatment barge. Predators - seals, sea lions, otters - will be kept out and the chances of escapes are minimized.

"I refer to this as controlled-environment farming," Mr. Walker says.

The project is experimental - and may not work as planned.

"Right now, we are taking baby steps. There are many issues to be addressed, but I think it's very exciting," Mr. Walker says.

Mr. Backman is more cautious. He points out that closed-containment systems tested on land proved too expensive, driving up costs by 28 per cent. And he's not sure that tanks in the water, even if they require substantially less power, will be economical.

"But we are watching with interest," he says.

Catherine Stewart, a spokeswoman for the Living Oceans Society, says fish farmers won't change unless they are pushed.

Living Oceans and other environmental groups are doing just that, attacking the quality of farmed fish in the marketplace, hoping to create economic leverage for change and lobbying the government.

This year the cause was boosted when a special B.C. legislative committee on aquaculture called for a transition from net pens to closed containment technology.

"We have to create a barrier between farmed salmon and wild salmon," says Robin Austin, the NDP MLA who chaired the committee.

Mr. Austin says if fish farms embrace closed-containment technology and successfully address the big concerns - sea lice, disease, escapes, waste - the industry will thrive in B.C.

"If they are willing to accept a change in technology, they will grow, they will prosper, and B.C. will be able to export this innovative technology all over the world.

"Unless the concerns are addressed, every new fish farm licence issued in B.C. will be met with cries of outrage," he says. "People just don't accept this industry the way it is."

Key facts

Salmon farming primer

IN CANADA British Columbia, which has about 80 active salmon farms, and New Brunswick, which has about 70, are the top provincial producers.

Canada exports most of its production to the United States.

British Columbia

In B.C., salmon farms are found mostly on the southern and central coast. Applications for new sites on the north coast, near the mouth of the Skeena River, have generated controversy.

It costs about \$3-million to set up a salmon farm in B.C., with up to \$250,000 of that spent on the application process. Those costs, combined with international competition, have pushed out small, local operators, leaving just four big companies.

Atlantic Canada

Ninety per cent of the East Coast aquaculture industry is concentrated in the Bay of Fundy.

Worldwide

Canada ranks fourth in production globally, producing 115,000 tonnes of Atlantic salmon in 2006, compared with 125,000 by the U.K., 370,000 by Chile and 600,000 by Norway.

Demand for seafood in North America alone is expected to increase by 40 per cent by 2010.

cause for controversy

One of the biggest complaints against salmon farms is that tightly packed pens produce infestations of sea lice that attack passing wild salmon. In the Broughton Archipelago, on B.C.'s central coast, a pink salmon collapse in 2002 (in which a run of 3.6 million fish fell to 147,000) has been blamed on farm lice.

The debate heated up this summer when Norwegian billionaire, John Fredriksen, a major shareholder in Marine Harvest, expressed concern for the future of wild salmon, saying farms should not be allowed in fjords where there are wild salmon rivers.

When farmed salmon escape into the wild, they not only raise the threat of spreading new diseases, they can also compete with wild stocks - most of which are in decline - for food. On the Pacific, there is the additional worry the exotic species, Atlantic salmon, could spawn in rivers, pushing out threatened stocks.

Farmed salmon are fed supplements that include two pigments (astaxanthin and canthaxanthin) to give them the same rich, red flesh colour as wild salmon.

mhume@globeandmail.com

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