A man in a blue shirt and khaki shorts, carrying a large black net on his back and a white bag, walks away from the camera down a gravel path in a large, arched indoor salmon farming facility. The facility is filled with rows of green rectangular tanks. The structure has a high, vaulted metal roof with a translucent covering. The lighting is bright and even.

Steve Atkinson's closed-containment, land-based salmon farm plans to produce 100 tonnes of steelhead annually, with no impact on wild salmon stocks.

THE SALMON SOLUTION

IS THE TIDE TURNING?

BY ANDREW FINDLAY PHOTOS BY CATHIE FERGUSON



Steve Atkinson dips a pole into a large round tank of fresh water and scoops up a net full of squirming steelhead smolts — future protein for the masses, he hopes. The steelhead belong to the first generation of fish that will grow to market size on his land-based fish farm on the outskirts of Nanaimo before they end up as fillets in kitchens around North America.

In the background, an electrician with a complex-looking schematic in one hand and a coffee in the other gazes at the massive electrical panel that will be the nerve centre for the farm's high-tech water filtration and pump systems. As other tradesmen bustle about the site, Atkinson appears like a man with plenty on his mind, organizing the arrival of materials and ensuring the project doesn't balloon way over budget. It could be that the future of fish farming in British Columbia is in the hands of this self-described chef by trade, preacher by profession, and fish farmer by accident, and other aquaculture innovators like him.

"This is designed to be a family-sized farm. We hope this will be a model that will demonstrate the business case for land-based fish farming," says Atkinson, president of Taste of BC Aquafarms, as we tour the \$1.5 million steelhead farm housed in a 15,000 square-foot building, a mere two-minute stroll through a lush forest from his rural residence near Nanaimo's Jingle Pot Road.

Construction started in June of 2012, and once the farm is running at capacity, its 15 tanks filled with fish at different stages of the growth cycle, it will produce 100 tonnes of steelhead annually. Atkinson, who has been a hobby fish farmer for years, has received considerable assistance to bring this project from dream to reality. Fisheries and Oceans Canada (DFO) kicked in \$450,000 through its Aquaculture Innovation and Market Access Program (AIMAP,) the province contributed \$82,500 from its Aquaculture Innovation Fund, plus there was another \$100,000 in in-kind contributions. But Atkinson admits without access to land — the farm is located on property that has been in his wife's family for half a century — this dream may have drowned at the financing stage.

WITH OPEN-NET SALMON FARMS UNDER HEAVY CRITICISM FROM ENVIRONMENTAL GROUPS AND INCREASINGLY ECO-CONSCIOUS CONSUMERS, A CONSUMER PUSH IS GIVING INNOVATORS LIKE NANAIMO'S STEVE ATKINSON AN OPPORTUNITY TO TEST THE WATERS WITH NEW LAND-BASED FISH FARMING AND OTHER FISH-GROWING SYSTEMS AND TECHNOLOGIES.

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"Our business case is based on the belief that the cost of the technology will be mitigated by the increased productivity," he says, adding that he hopes his fish will fetch a premium 30 to 40 cents a pound when they're marketed as "eco-fish" on the market. "We're not trying to replace open-net pens but we are trying to create a new land-based industry. However, I do believe that the social license for open-net pen fish farming has diminished to the point where there is little room for expansion."

WADING INTO THE DEBATE

The salmon farming industry has indeed had a tough time earning and keeping social license for its activities. Environmental groups and citizens opposed to farming salmon on B.C.'s west coast have for years been touting the need to shift the industry from open-net pens to closed containment. They say it's the only way to eliminate the risk of disease transfer from farmed to wild fish, as well as the damaging impacts of accumulating fish waste on the ocean floor environment.

The industry counters that closed containment, especially land-based systems, are too energy and capital intensive, and that well-sited and monitored open-net pen fish farms are both sustainable and economical, especially on a coast as vast as B.C.'s with

its serpentine channels and inlets where aquaculture operations can be secluded far from human settlement and sensitive marine ecosystems. The growth of commercial fish farming has been either too fast or not fast enough depending on who you talk to. The industry got its start in the mid 1970s with a few economically marginal family-owned outfits. Today, there are more than 130 fish-farming tenures, the majority of which are located around Vancouver Island, with roughly 80 tenures active at any given time.

The industry is now 90 per cent owned by three Norwegian companies: Cermaq, Marine Harvest, and Grieg. Annual production has grown to more than 70,000 tonnes worth roughly \$350 million in landed values, and the majority of the product is Atlantic salmon, a species not native to the West Coast but considered more suitable for aquaculture and growth in open-net pens.

In the more than three decades since B.C.'s first fish farm appeared along the Sunshine Coast, the vitriol between this industry and its critics shows no sign of abating. Past efforts to develop alternative land- or ocean-based fish aquaculture technologies have died at the pilot-project stage, the victim of high infrastructure and energy costs, and a consumer not willing to pay premiums for sustainability.



Steve Atkinson (right) with son-in-law Shayne Gurr

Consumer demand for eco-fish is giving Steve Atkinson the confidence to pursue new ideas.

THE TURNING TIDE

However, there is a sea change underway in the fish-farming sector. Seafood customers are increasingly aware of sustainable choices, thanks to Vancouver Aquarium's Ocean Wise and other programs like SeaChoice, which is supported by the David Suzuki Foundation and a handful of other environmental non-profits.



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This consumer push is giving entrepreneurs like Atkinson a chance to test the waters with new land-based and other fish growing systems and technologies.

Atkinson's steelhead farm is technologically impressive, with its homegrown pumps, filters and water systems, all designed by Nanaimo's PR Aqua Ltd. Yet the up-front capital investment is daunting. That's why this minister-turned-entrepreneur expects to make his margins on improved efficiencies and the ability to maintain optimal growing conditions in the tanks. According to Atkinson, conventional net-cage farms require 1.5 kg of feed to grow 1 kg of fish; he hopes to cut that ratio to 1.1 kg of feed to 1 kg of fish. He also expects to compress the growing cycle by more than 40 per cent, further adding to the farm's profit margin.

"We will grow our fish from 20 gm to 2 kg in about 42 weeks. This would take about 18 months in a net cage," says Atkinson, his cell phone beeping regularly.

His steelhead will be marketed under the brand name Little Cedar Falls exclusively by North Vancouver's Sea Agra Seafood Ltd. Freshwater pumped from a nearby manmade pond will be 99 per cent recycled through the farm and nutrient-rich fish waste will be filtered out with plans to sell the organic solids for compost.

PROVING THE BUSINESS CASE

As optimistic as he is, Atkinson is also well aware that the aquaculture industry, as well as environmental groups who have been cheerleading closed-containment technology for years, will be watching his operation closely to see whether or not its business case plays out favourably in the marketplace.

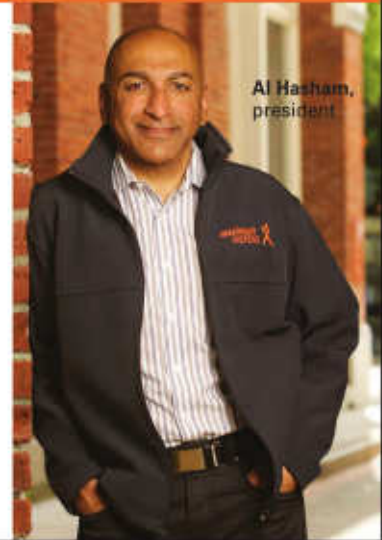
Also watching will be investors behind the Namgis Closed Containment Atlantic Salmon Farm, housed in a non-descript beige-coloured aluminum warehouse in a gravel clearing next to the Nimpkish River, the lifeblood of the Namgis First Nation traditional territory.

By next spring the farm, which is owned by the Namgis nation, will be shipping 450 tonnes of Atlantic salmon annually. Getting into the game of growing Atlantic salmon is a bold move for an indigenous community; with few exceptions First Nations on the coast have been vocally opposed to the industry. However, project backers hope it will set a new industry bar; it's the first closed containment Atlantic salmon farm in Canada and a host of non-profit foundation and government agencies have much at stake in seeing it succeed. Ottawa supplied \$3.75 million, channeled through three different ministries; BC Hydro Power Smart and The Coast Sustainability Trust came to the table with \$143,000 and \$113,000 respectively. The Ritchie Foundation provided \$155,000 and Tides Canada's Salmon Aquaculture Innovation Fund

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The farm's business case is anchored on some optimistic modeling: that they will be able to grow Atlantic salmon in half the time of open-net pen ocean farms using 30 per cent less feed and without the use of pesticides and antibiotics. The Save Our Salmon Marine Conservation Foundation (SOS), a Port McNeill-based non-profit, spearheaded the project and helped bring this unwieldy list of funders together with the Namgis nation to build this pioneering fish farm. Jackie Hildering, SOS communications director and project spokesperson, says the goal is to create "evolutionary pressure to move farms out of the ocean and onto land."

"It takes a big investment up front but the whole idea of closed containment is that you can control everything, factors like the energy inputs and growing conditions for the fish," Hildering says. "However, this project won't succeed unless we secure a premium price for our fish."

Guy Dean is VP and chief sustainability officer for Vancouver-based seafood wholesaler Albion Fisheries. Albion has an exclusive agreement to purchase the Namgis fish farm's entire production. He says the firm's research indicates that the B.C. consumer is much more educated about seafood sustainability than their counterparts elsewhere in Canada and are willing to pay a premium of between 15 and 30 per cent for seafood that makes this grade.

"IF YOU CAN REMOVE THE WASTE STREAM FROM A FISH FARM AND MAKE MONEY THEN YOU'VE GOT A BUSINESS MODEL."

STEPHEN CROSS, SCIENTIST AT THE UNIVERSITY OF VICTORIA

"We're hoping to get a price on the higher end of that range," Dean says, but he admits the Namgis facility is a small fish in a big sea of conventional and controversial open-net pen production, and that until other closed containment farms come online it will be a "while before we get enough volume to make a serious dent in the market."

SEEKING SOLUTIONS

Closed containment is one potential solution to the still poorly understood, murky environmental impacts swirling around the fish farming sector, but it's not the only one. Stephen Cross is a University of Victoria scientist who performed environmental assessments of net-pen farms in the 1980s. For the past decade, he has been conducting research into groundbreaking ocean-based



"We hope this will be a model that will demonstrate the business case for land-based fish farming," says Atkinson.

multi-species aquaculture. As CEO of SEA Vision Group Inc., he is lead researcher and designer of a pilot aquaculture operation in Kyuquot Sound, a biologically rich, island-dotted body of water on the west side of Vancouver Island known more for eco-tourism than aquaculture. The farm is licensed to grow a smorgasbord of 11 different species, including two varieties of mussels and sea urchins, scallops, oysters, sea cucumbers, sugar kelp, Nori, and its marquee product, sablefish, also known as black cod.

The principle behind this integrated system is surprisingly simple; in essence, the goal is to mimic ocean ecology but on a micro scale. Sablefish, the only commercial species at the farm that requires input feed, are raised in pens that resemble conventional net pens. But that's where the similarities end. Nutrient-rich waste from the sablefish drifts down through the water column where it is consumed by two tiers of strategically placed shellfish that are cultured on lines — oysters on the upper level and scallops on the lower level. Remaining fine organic particles drift further downstream, grazed upon by sea urchins, while dissolved nutrients are absorbed by kelp on the seabed. All of these marketable species are cultured in an integrated manner that helps remove the

accumulating and offending fish waste associated with regular fish farms that can turn the surrounding ocean floor into a marine desert devoid of life.

"If you can remove the waste stream from a fish farm and make money then you've got a business model," Cross says. He hopes investors will share this view. The National Research Council Canada, the National Science and Engineering Research Council of Canada, and DFO, all supported various aspects of the research behind the project. However, the SEAfood system — physical plant, seed, feed, boats, and other infrastructure — was funded privately. Now it's time to grow. The farm's specialty smoked sablefish is a popular attraction on restaurant menus around B.C., and Cross says preliminary sales in Tokyo and Los Angeles suggest there are distributors who will take all the sablefish he can grow. Cross has good reason to speak in bullish terms; he's looking for financing to ramp up the pilot project to commercial scale in a market that he admits is soft

for this type of investment. He won't say how much funding he needs but it's in the multi-million dollar range.

Jay Ritchlin, a marine biologist and western regional director for the David Suzuki Foundation, believes new, more sustainable models for fish aquaculture in B.C. are long overdue.

"We're at the point where we need to see more of these pilot projects get up to full scale, market production facilities," Ritchlin says.

Success of such innovative operations may ultimately lie in the hands of consumers and the ability of wholesalers like Albion Fisheries to market the product in a manner that convinces buyers they're paying more for added environmental value. The verdict is also still out on whether or not mainstream fish farming companies are ready to embrace a wholesale sea change from open-net pen farming to a more tightly controlled model. In the meantime, the global demand for fish protein is going nowhere but up and this gives pioneers like Steve Atkinson in Nanaimo faith that his fish farm will succeed.

"Will we make a 115 per cent return like some guys have claimed in the past? No. But I'm confident in a 15 to 20 per cent return on investment," Atkinson says. "I feel that British Columbia is falling behind in aquaculture when we should be leading the world." ■



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