

From water to land

Why closed containment is the future of international salmon farming

by Sue Scott

Taking the high road in the controversy over ocean net pen salmon aquaculture is pretty challenging, especially when the industry and government look askance at any investment in closed containment alternatives that would protect the environment. With the industry intent on maximizing its bottom line and both industry and governments in denial of research detailing the impacts of these salmon farms on the environment, getting a rational dialogue going is difficult. Despite this, the Atlantic Salmon Federation (ASF), headquartered in New Brunswick with offices in Nova Scotia, Prince Edward Island, Newfoundland, Quebec, and Maine, is proving that Atlantic salmon can be grown sustainably and economically in freshwater closed-containment facilities on land.

ASF has completed a 12-month trial project in land-based freshwater closed containment facilities, located in Shepherdstown, West Virginia. Our partner is The Conservation Fund, an American non-profit that has spent 20 years developing closed-containment aquaculture systems to grow trout, perch, and now salmon at its Freshwater Institute there. It is refining water recirculation techniques that continuously filter and recycle the water used to grow the fish. This means it can achieve large-scale fish farming with a small amount of water and release little to no pollution. This opens the door to commercial fish production in areas with limited water resources and away from sensitive coastal areas. The immediate appeal of closed-containment technologies is for fish farmers who want to market high-value fish raised in

a sustainable manner. There is a growing demand for such a product among chefs and consumers, who are educated on the serious environmental impacts of operations that grow salmon in open net pens in the sea. “Moving forward,” said Dr. Steve Summerfelt, director of aquaculture systems research at the Freshwater Institute, “we hope to make this technology more affordable for all kinds of fish farmers.”

Why is ASF so fired up about separating wild Atlantic salmon and their environment from open sea cage salmon production? Wherever this industry operates throughout the world, salmon living in adjacent rivers have suffered a much steeper decline in numbers, for some populations by as much as 50 percent. This was confirmed in 2008 by Dalhousie University (Jennifer Ford,



As seen through a porthole in the side of one of the tanks, the Atlantic salmon swim and grow in an environment entirely separated from any marine environment. As a result, the salmon are healthier, and cannot pass along infection or parasites to wild populations. (Photos courtesy of Sue Scott)

Ransom Meyers, “A Global Assessment of Salmon Aquaculture Impacts on Wild Salmonids”). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has identified salmon farming as a key threat to endangered populations of the Bay of Fundy and threatened populations in southern Newfoundland.

The Magaguadavic River in southwest New Brunswick is one of very few locations in North America where scientists can detect farmed salmon escapees and monitor their impacts on wild Atlantic salmon. This river is situated at the centre of New Brunswick’s open net pen salmon farming industry, and also has several hatcheries that leak juvenile farmed salmon into the river. In the 1980s, when the aquaculture industry began expanding, the annual wild run of salmon to the Magaguadavic averaged 800. By 1992, the run was reduced to 293 and by 2011, despite an active restoration program, to 19 wild salmon. From 1994 to 2011, in only two years have more wild than escaped farmed salmon entered the river. The genetic characteristics of salmon from aquaculture cages have been altered in controlled programs to provide domesticated strains of fish. This results in adverse genetic consequences for wild Atlantic salmon. Genetic studies specific to the Magaguadavic have documented that, as a result of the interbreeding between escaped farmed and wild salmon, the river’s genetic strain of salmon have lost their “wildness,” which may have compromised their ability to survive their rigorous migration from the Magaguadavic River to their ocean feeding grounds.

But you can quote this research and many other studies until you are blue in the face to government and industry and you will get adamant denial and fainter suggestions that they have research that proves just the opposite. Our repeated requests to see this research that proves ocean open-net pen salmon aquaculture has little or no impact on the environment have so far produced no results.

So to rise above the “they said; we said” approach, ASF partnered in the West Virginia project to grow out about seven tonnes of salmon that were harvested in the spring. Our next project will



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increase densities to produce 20 tonnes. The product we harvested in the spring was taste-tested by chefs and consumers who chose it over open net cage salmon for quality and taste. Bill Taylor, president of ASF, said, "Our mission is saving and restoring wild Atlantic salmon populations. But it is widely proven that current open net pen salmon aquaculture poses very serious threats to wild salmon, the coastal marine system, and the economic benefits generated by the recreational salmon fishery, commercial lobster fisheries, and tourism. ASF wants

to be a catalyst for positive change and help the aquaculture industry transition to more environmentally responsible and wild-salmon-friendly practices."

Taylor continued, "Land-based salmon aquaculture can be commercially scalable." He pointed out that "the upfront costs compared to open net pen aquaculture are obviously considerably more but, over the course of a few years, land-based aquaculture can become a viable option."

"No escapes, no need to use harsh chemicals to treat sea lice or antibiotics

to treat disease, no destruction and government compensation for ISA infected salmon, no threat to economic benefits generated by other fisheries and tourism, and a better product that conscientious consumers are willing to pay more for; all of this reinforces the viability of closed containment," said Taylor.

On Oct. 10-11, ASF and The Conservation Fund Freshwater Institute will host a workshop at ASF headquarters, just outside Saint Andrews, New Brunswick, for scientists, fish farmers, and government representatives to dis-



The advertisement features a large background image of a red Kverneland PB Plough being pulled by a tractor through a field of golden-brown crops. The plough is shown in profile, with its multiple furrows visible. In the upper left corner, the Kverneland logo is displayed, consisting of a green stylized arrow pointing upwards and to the right, followed by the word "Kverneland" in a bold, red, sans-serif font. Below the main image, on the left side, there is a smaller inset photograph showing the same plough from a different angle, highlighting its front end and the large front wheel. To the right of this inset, the text "Kverneland PB Plough !" is written in a bold, white, sans-serif font. Below this title, a list of seven features is provided in a smaller, white, sans-serif font. At the bottom of the advertisement, there is a white horizontal band containing contact information. On the left side of this band, the website "www.kvernelandgroup.com/ca" and the YouTube channel "www.youtube.com/kvernelandgrp" are listed. On the right side, the "Kverneland Group Canada" name is followed by the location "Drummondville, QC" and the phone number "Phone: 819-477-2055". To the right of the text is the Kverneland Group logo, which features a stylized graphic of a plough or field lines next to the words "kverneland group".

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cuss advances in closed-containment technology. The workshop will profile experts in land-based freshwater closed-containment, including farmers who are using the technology. Hopefully it will be a first step in overcoming some misperceptions by industry and government that constantly pop up in the media.

The industry portrays outbreaks of Infectious Salmon Anemia (ISA) as a disease that occurs naturally and must be expected as part of the business of salmon farming. It is true that some wild fish can carry this disease, but ISA only becomes a problem in the unnatural densities in sea cages where it can be spread quickly among farmed salmon that are tightly packed and stressed. This happens wherever these farms exist – Norway, Scotland, the Faroes, Chile, Maine, New Brunswick, Nova Scotia, and now Newfoundland and Labrador. Once the ISA is detected, and the Canadian Food Inspection Agency orders the fish be slaughtered, then the industry is compensated by governments with taxpayer dollars. Millions have been paid to the industry in New Brunswick and Nova Scotia. Growing in disease-free closed containment facilities circumvents the expense of destruction and compensation, adding to the economic viability.

The industry has greatly exaggerated the amount of land, water, and energy required in land-based freshwater closed-containment facilities. Summerfelt pointed out, “the industry claims that 8,000 football fields would be required to put the salmon farming operations of New Brunswick and Nova Scotia on land.” In 2011, Canada produced 31,000 tonnes of farmed salmon on the Atlantic coast. Summerfelt said, “Our research over two decades has found that growing 30,000 tonnes of salmon per year would require only 75 to 150 football fields, including the end zones.”

Summerfelt continued, “We have also come a long way in designing energy-efficient closed-containment farms with electricity use for a 3,000 tonne farm in the range of 2,250kW.

“European companies investing in this technology indicate that they are now achieving electrical load that is 70 percent

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In ASF's joint project, the Atlantic salmon are grown in tanks at the Freshwater Institute's facility in West Virginia. Wastes are collected, and water is recirculated. There has been no need for antibiotics in the growth process.

other resource users, rather than where it belongs – with the farmer.

There are at least four land-based containment facilities producing salmon throughout the world, and many more producing other species. In addition, facilities to grow salmon are currently under construction in Canada and Denmark, with more in the design and permitting phase expected to break ground in the United States, Canada, and Chile within the next year. The two largest projects plan to produce 3,000-5,000 tonnes of salmon per year. These projects are indicative of the belief of many entrepreneurs that salmon can be raised economically and responsibly in land-based closed-containment systems. These entrepreneurs also understand there is a growing demand by consumers for a product that is grown in a manner that respects our environment.

(Sue Scott is the vice president, communications of the Atlantic Salmon Federation.) ●

less than this estimate." When considering carbon footprint, it is also important to take into account the local effects of untreated pollution being discharged

from open net pen farms directly into the ocean. Ocean-based net pens do not have discharge limits, effectively placing the burden on the marine environment and



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