Tilapia standards

How do sustainable tilapia standards from GAA, WWF and others compare?

Farm focus

A U.S. catfish farm outside the catfish states of Arkansas, Mississippi, and Alabama finds its niche.
Page 28

Beating blackspot

A new method for treating blackspot discoloration in shrimp shows promise for producers of the popular seafood.
Page 30

FISH FARMING INTERNATIONAL

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The future?

One farm yields four products with little to no waste left behind. Is this the future of aquaculture?

PHOTO: Brian Harvey

OPINION

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Innovation is the lifeblood of business and a key factor in the success of the global aquaculture industry.

John Fiorillo
Executive Editor
IntraFish Media

In this issue of **Fish Farming International** you'll find several stories that demonstrate the innovative approach to business that so many aquaculture professionals possess.

Let's start with our cover story.

We headed out to see Steve Cross and his experimental aquaculture operation on the west coast of Vancouver Island, B.C.

Cross is at the forefront of integrated multi-trophic aquaculture (IMTA).

Thierry Chopin, at the University of New Brunswick, is working with Cooke Aquaculture Ltd. to develop and promote the concept on the other side of Canada.

IMTA conveys the idea of farming more than one trophic level. The idea is still in the development phase.

Right now, Cross is using several species to develop and test his IMTA theories.

At the top level are floating cages for sablefish. Downstream from the fish cages are trays of Japanese scallop. They feed on the fine particles from the sablefish.

Downstream?

"We've done the hydrology of the bay. The tidal currents go around in a circle. So, right here," Cross explains, pointing to the grid of scallop lines, "is actually downstream."

Further downstream, there is kelp to pick up the soluble nutrients.

R&D: Is a revolution brewing beneath these waters?

Photo: Brian Harvey

The heavy stuff, the insoluble waste – fish poop – as you would expect makes it through all of the trophic layers and lands on the bottom.

"So we need some animal that normally feeds on the bottom. Right now, we're trying sea cucumber in trays underneath the sablefish, and they're growing a lot faster than without the fish waste," said Cross.

Innovation, pure and simple.

Fish waste is a common problem for all aquaculture operations and the work Cross and others are doing hold promise as one potential option for dealing in an ecological way with the issue.

When it comes to innovation, keeping up with the gyrations of the sustainable seafood movement can be a full time job.

A decade ago, the eco-label concept was just filtering into the consciousness of the seafood world.

Today, it is without doubt the leading trend in seafood, and is clearly having a dramatic and permanent affect on the industry.

We're pleased to bring you an exclusive look at the first comparison of eco-certification schemes in the farming of tilapia.

Det Norske Veritas has completed a benchmarking study of certification standards set by the Global Aquaculture Alliance, WWF, GlobalGap, Friend of the Sea, Naturland, and Whole Foods.

I think you'll find this an interesting read.

Don't miss our feature on a new option for fighting blackspot in your shrimp.

Innovation – when it is at the heart of your business philosophy there is seemingly no end to the amazing ideas and solutions that can be generated.

UNDERWATER INNOVATION: Steve Cross explains the intracacies of his experimental aquaculture operation on the west coast of Vancouver Island, where he employs the principles of integrated multi-trophic aquaculture.

Photo: Brian Harvey

The future of fish f

Integrated multi-trophic aquaculture is a mouthful, but it might also be one of the best models for farming multiples species with the least impact on the environment.

Brian Harvey

Can you spot a trend just by looking at traffic?

Twenty-five years ago, driving a gravel road on northern Vancouver Island in Canada's British Columbia province all but guaranteed multiple encounters with logging trucks: scramble for the shoulder in a shower of stones, wait for the dust to clear, force yourself back out there with your heart in your throat.

As a fisheries scientist, I drove lots of logging roads; one biologist I know had his face rearranged by a logging truck.

When I drove north from Victoria to meet Steve Cross and visit his experimental aquaculture operation on the west coast of Vancouver Island, I saw exactly one logging truck in two days, and that one was way down south, in the Cowichan Valley.

On the 40-kilometer stretch of pockmarked gravel that winds downhill from the Island Highway to the port of Zeballos, I counted 20 warning signs but no trucks. What I did encounter, though, was a train of white semi-trailers laboring up the long grades.

Semis coming from Zeballos, a town struggling simply to stay on the map?

The mystery solved itself when I wandered down to the wharf and found three of them idling next to a seine boat tied up at the

Photo: Steve Cross

KELP ROPE: Kyuquot SEAfoods Ltd. production manager Nathan Blasco holding a 50-meter kelp line. The company can grow Nori kelp, the common wrap around sushi.

arming?

A fat suction hose rooted in the hold, spitting out a silver stream of sardines.

So that was the trend: logging down, sardines up. And not just sardines, because there were a lot more semis on the highway than even the most enthusiastic sardine fishery could provide.

North of Campbell River is salmon farming territory, so most of the trucks are crammed with squeaking Styrofoam boxes packed with Atlantic salmon fillets bound for the United States. The sardine boom may peter out, as such fisheries tend to do, but the farmed salmon probably won't. That's what the traffic told me.

Kyuquot SEAfoods (the SEA stands for Sustainable Ecological Aquaculture) is presently just a ripple on what some see as a farmed-salmon tsunami. That's why the operation interested me, because I have a fondness for the big picture. Back when logging trucks ruled the road to Zeballos

the salmon wave was just a ripple too – and look what it's grown into.

Unless you've been living under a rock, you know the farming of Atlantic salmon in net pens, especially in the protected waters of the Inside Passage, has its critics, most of whom focus on environmental concerns.

The main players in the industry are dealing with these issues in their own ways. But industry – along with governments and non-governmental organizations (NGOs) – is keeping an eye on what Cross is up to in Kyuquot, because his project might just turn some of those environmental concerns on their heads.

I didn't know Cross, but I knew of him; he'd gone through graduate school at the University of Victoria a few years after me. Around 10 years ago, I'd been dimly aware of what he was up to when I was writing a feasibility

Turn to page 22

From page 21

study for clam farming for one of the west coast First Nations, and found myself relying on a year-long field survey Cross had done of potential coastal sites.

This was obviously a guy who knew the territory. He wasn't hard to pick out as I waited on the dock in Fair Harbour, another 30 kilometers north of Zeballos: mid-50s, at the wheel of a 20-foot rigid-inflatable with a 90-horse-power Mercury. I jumped aboard, stuffed my hat in a pocket and we took off down the long inlet.

"Can you believe this boat?" shouted Cross. "I got it in a government-surplus auction. It even has a tow bar!"

He turned and grabbed the welded tower behind him. A decal on the console said "Don't Cruise With Booze." We flew past undisturbed shoreline beneath logged-over hills toward the Sea Vision farm tethered in a distant bay, the only inhabited-looking speck in sight.

It was one of those jaw-dropping, late September days, the water a dazzling mirror. I rapidly forgot about the awful road behind me, while Cross and I caught up.

For 20 years, Cross ran a consulting company called Aquametrix. His longest-running job was measuring the environmental effects of salmon-farm waste.

"Of all the criticisms of salmon farms, effluent is the one nobody can argue with," Cross shouted over the whine of the engine. We rounded a bright yellow remote sensing bouy anchored off the farm site. Cross shut the engine down and we nudged into a steel structure tethered a few hundred meters off Surprise Island.

"So the SEA system is the answer?" I asked, climbing out onto a nubbly galvanized deck that enclosed a 50-foot under-water cage.

"Not that simple, but definitely we're addressing the problem. And a few others too."

The SEA project confronts the salmon waste issue the way nature – or, for that matter, any decent manager – would: by handing it off to someone else.

Farmers in China have been growing carp for centuries in ponds fertilized by pig manure; in Asian rice-fish culture, fish graze the shallows of the paddy and provide a bonus harvest of protein.

CUTTING EDGE: Kyuquot SEAfoods Ltd. pilot-scale SEAfood System is based on a small salmon farm cage system. The lower, long row of cages support the fish, the parallel cages above them support the new SEA-Tram system that holds the shellfish (scallops, oysters, cockles, mussels) parallel; downstream of that are the large kelp grids.

These simple systems work because the different plants and animals occupy different "trophic levels" in the ecosystem; one makes use of the leavings of the other.

It's not rocket science, even if the formal name – integrated multi-trophic aquaculture (IMTA) – makes it sound that way. Later, I called Thierry Chopin, the ebullient University of New Brunswick biologist who's working with Cooke Aquaculture Ltd. to develop and promote the concept on the other side of the Canada.

"Why don't you just use the old name, call it polyculture?" I asked. "IMTA sounds a little academic to me."

"Maybe," said Chopin, "but IMTA conveys the idea of using more than one trophic level, and that's the key difference." In other words, you could grow three fish species in the same cage --which would technically be polyculture) -- but you wouldn't be handing off the waste problem.

Whatever you call it, growing several species at different trophic levels is still in the development phase. What I was seeing as Cross and I navigated around the gently heaving deck was definitely a beginning. By the time anyone bought one of the many end products, they wouldn't be buying a scientific-sounding name, they'd be buying branded, sustainably farmed seafood.

"It's probably a niche market, to start," said Cross. Once we get fully operational, there won't be much of an ecological footprint. That harvester there" – he pointed to a wheeled gantry spanning one of the cages – "will be wind-powered. People will be getting high-quality, farmed seafood according to ecosystem principles."

But farmed what?

"Right now we're testing four, make that five, species," said Cross, leading me around what looked like framed holes in the ocean.

"These are floating cages for sablefish – actually, they're second-hand salmon pens. There's 60,000 2-year-olds in there, getting close to market size. They're the only thing here that we actually feed. Then downstream from the fish cages, we've got trays of Japanese scallop. They feed on the fine particles from the sablefish." He knelt and pulled up what looked like a cylindrical, open-sided condo made of netting. The scallops were stacked inside like ashtrays.

"What do you mean, downstream?" I asked.

Photo: Steve Cross

"We've done the hydrology of the bay. The tidal currents go around in a circle. So, right here" – he pointed to the grid of scallop lines – "is actually downstream. Even further downstream, we've got kelp to pick up the soluble nutrients." He pointed to some polypropylene lines extending in the other direction.

"Kelp technology is pretty standard, so the big question is quality, which determines what market you sell into. We already know it grows faster if you plant it next to the fish cages."

"But what about the insolubles – the poop? I thought that went straight down."

"The heavy stuff does," said Cross. "So we need some animal that normally feeds on the bottom. Right now we're trying sea cucumber in trays underneath the sablefish, and they're growing a lot faster than without the fish waste. And we've got another experiment going with sea urchin. I've got two students working on that one now."

"And there are markets for all these species?"

"Excellent markets. Sablefish (black cod) is high-end local, and very big in Japan and Hong Kong. There may even be a live market for smaller fish. There are already fisheries for sea cucumber, and if the sea urchin are good quality, they go to Japan. Everybody knows scallops, and the kelp ends up in everything from pharmaceuticals to ice cream. "

"No alien species?"

"Nope. All local; in fact, we see juvenile sablefish around the house all the time, before they head out for deeper water."

"The house" sat on a concrete feed barge, another salmon farm cast-off - together with a roughed-in wet lab and kelp nursery room. We hopped back in the fire-sale Zodiac and puttered over.

"The MV Uchuck stops at Kyuquot Village every week, just around the corner, and they'll deliver most anything we need," said Cross, pointing to a wharf that ran along one side of the barge.

The house had rooms with bunk beds for visiting scientists and students; two of them were called the "black cot" and the "kelp bed", a satellite-connected office, kitchen and living area. You could almost step directly onto Surprise Island.

Two UVIC students were in residence when I visited; we found them out back, sewing together experimental net-bags for the sea urchin trials.

The surface they worked on was buoyed up with expensively embossed styrene floats from an early closed-container salmon farm; failed technology, salvaged and reborn.

But it's not all scrounged materials, not by a long shot. Governments have invested in the nonprofit Pacific SEA-lab Research Society, private individuals will, Cross already has. What will come of all this energy and money? Will integrated multi-trophic aquaculture work?

Undoubtedly it will, and in several forms. The SEA operation in Kyuquot is the only one on the west coast, but several experimental sites are up and running in New Brunswick.

Sixteen out of the 96 licensed aquaculture sites in the Bay of Fundy have an experimental IMTA component, and the

Turn to page 24

From page 23

first IMTA mussels from the Bay of Fundy are already being marketed.

A better question is "which model will work best?"

Cross envisions several, between small scale mom-and-pop outfits to modules that can be linked together or even added to an existing aquaculture lease, along with a species-specific hatchery.

Identifying the best target market has to take into consideration the layered character of IMTA: by emulating nature, the ultimate multi-tasker, IMTA farmers need to acquire more species permits - Cross has an impressive 11 - be aware of more environmental variables, and service more diverse markets than the guy who's only farming, say, rainbow trout or oysters.

That's the downside of diversification. The huge plus, of course, is the promise of a greener aquaculture, which should one day be rewarded with appropriate certification, and the "sustainability factor" Cross says counts more and more with today's consumers.

First Nations seem to think so; wary about some salmon farms, many have endorsed the IMTA experiment wholeheartedly.

New Brunswick's Chopin may put it best when he calls the concept a "convergence point" – a subject about which opponents and proponents of aquaculture can at least agree to talk.

"When David Suzuki visited New Brunswick in May," Chopin told me over the phone, "there was a great exchange between him and the people at Cooke Aquaculture. IMTA made that dialogue possible."

But what they're agreeing to talk about is still an experiment. The weekly work schedule at Kyuquot SEAfoods says it all: the "science shift," when research and field trials take priority, runs Sunday to Tuesday. The rest of the week belongs to the production crew. "The students don't want to leave," said Cross.

Step back a bit, though, and consider a second, more fundamental question: Why is all this going on, on both sides of the country?

My answer is, because there's room for it to happen. Commercial fisheries for most species are declining globally. The current system for farming fish in B.C. has challenges, but aquaculture is still a given. People are starting to demand organic, certified seafood. That looks to me like a big hole someone can jump through.

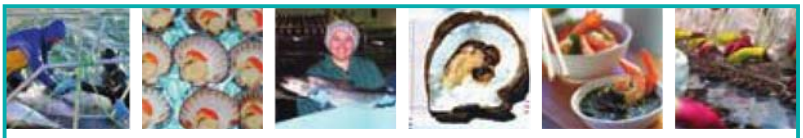
Of course, it helps if you're case-hardened, known to all the local players, exuberantly entrepreneurial and ready to go all out for your dream.

Look back through the history of salmon farming in B.C. and you'll find a dozen local visionaries who went way out ahead of the curve just because they felt like it.

Society enjoys the fruits of innovation, but rarely remembers the innovators themselves; in the seaweed-under-the-fingernails business of aquaculture, most consumers have never given such people a thought. But they existed for every farmed oyster, or basa fillet, or shrimp or salmon Canadians can buy now

Photo: Steve Cross

READY FOR MARKET: Black cod grown at the farm will eventually make its way to live markets in the Pacific Northwest.



DOWNSTREAM: Water flows from bottom to top in this view, ensuring organic wastes are moving from the fish to the extractive species downstream.

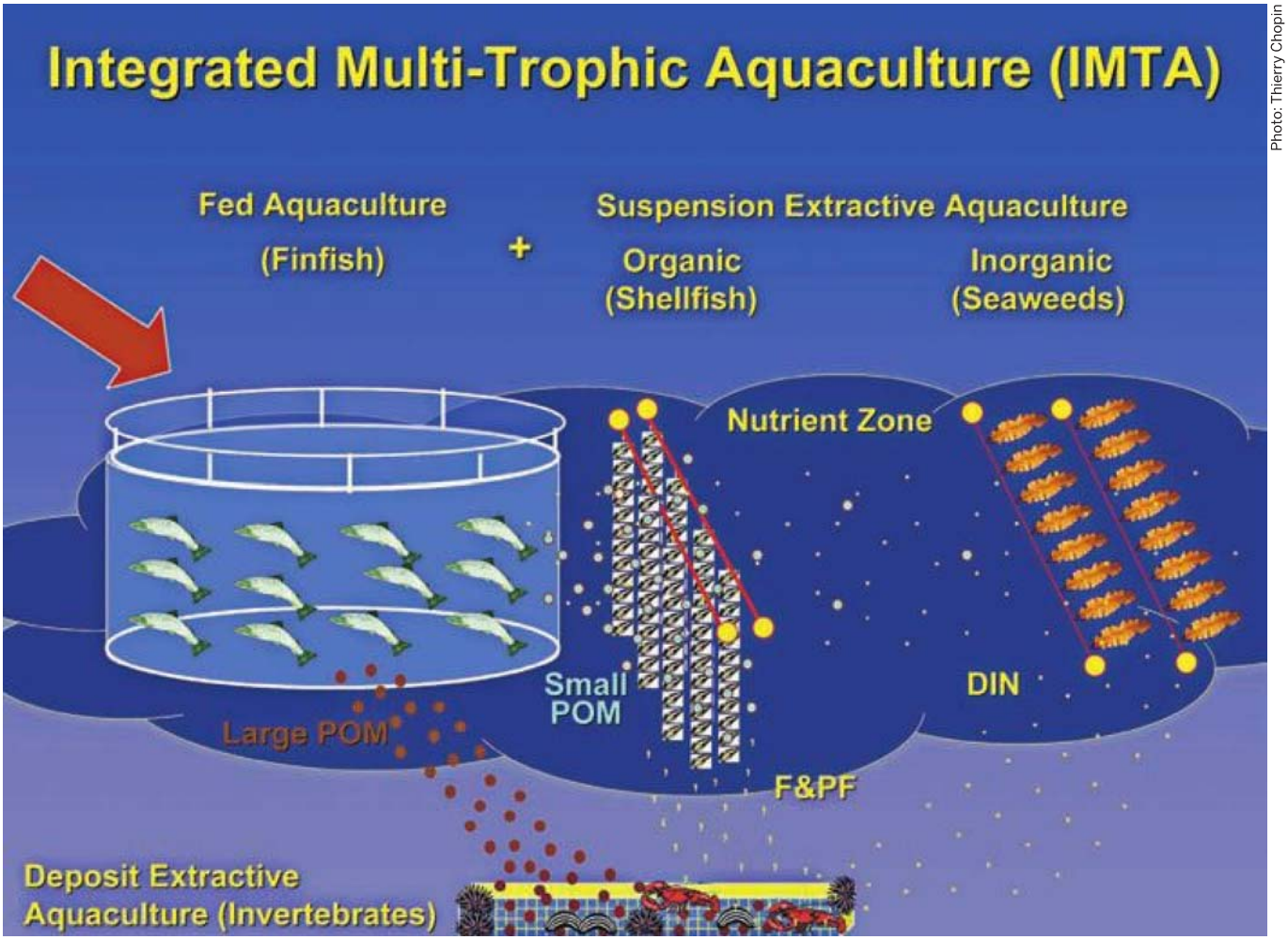


Photo: Thierry Chopin

HOW IT WORKS: This diagram shows the general concept of integrated multi-trophic aquaculture.

in the market.

When I'd seen all I could see, Cross took me on a lightning trip to the open Pacific, before dropping me at Fair Harbour again for the long, jolting ride back to the paved road.

We streaked straight west toward the mouth of Kyuquot Sound, past alarming black reefs appearing and disappearing in a swell that had come all the way from Japan.

The larger islets writhed with sea lions and the late afternoon sun beat down. We were both in T-shirts. Cross put the boat into a long U-turn and grinned broadly at the spectacle.

"Horrible, isn't it?"

"Very funny," I shouted back. "How often do you drive that road?"

"Every week," he said, as we closed in on the dock. "Pain for gain, right?"

Photo: Steve Cross

About the author

Brian Harvey is a Victoria, B.C.-based biologist, conservationist and global adventurer with a lifelong fascination with fish. His recent book, "The End of the River," was featured in the Globe Books 100 list.