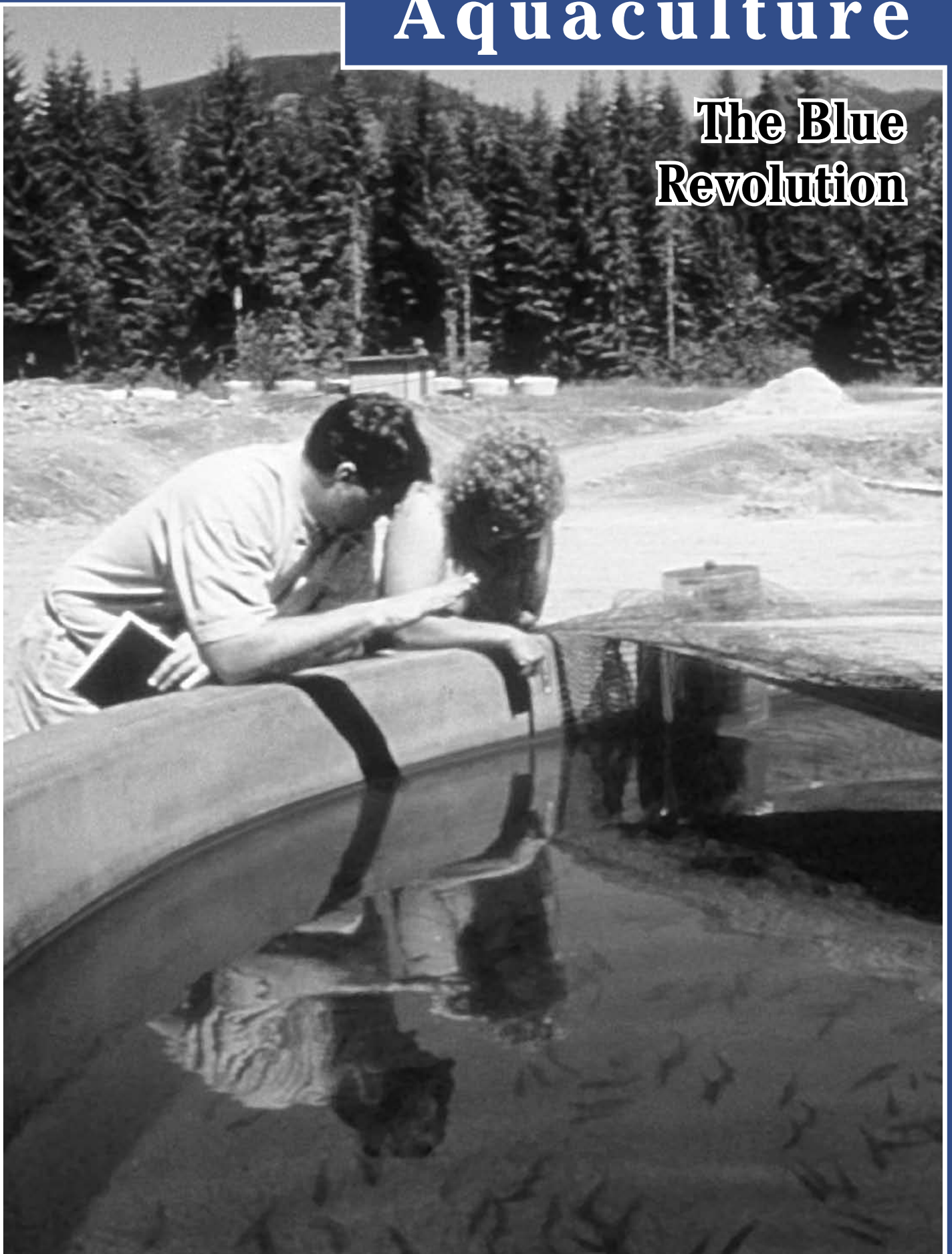


Aquaculture

The Blue Revolution



A Chronology of Collaboration: AIMS and the CAI

September 2000

AIMS and CAI host a PEI conference entitled *How to Farm the Seas*.

February 2001

AIMS and CAI host a BC conference entitled *How to Farm the Seas II*.

June 2002

AIMS President Brian Lee Crowley and head of CAI Gerry Johnson serve as series editors on *Canadian Aquaculture: Drowning in regulation*, conference paper No. 1. By Robin Neill and Brian Rogers.

September 2003

Series editors Crowley and Johnson release conference paper No. 2, entitled *Fencing the Last Frontier: The case for property rights in the Canadian aquaculture*. By Robin Neill.

June 2004

AIMS and CAI publish conference paper No. 3, *Framing the Fish Farmers: The impact of activists on media and public opinion about the aquaculture industry*. By Jeff Chatterton.

April 2006

AIMS and CAI publish conference paper No. 4, *It is FARMING, Not Fishing: Why bureaucrats and environmentalists miss the point of Canadian aquaculture*. By Robin Neill.



A Collaborative Effort

Fully one-fifth to one-quarter of the world's fish production now comes from aquaculture; the industry must continue rapid and sustainable increases in production to meet the demand for fish and shellfish in the next century. Countries such as Chile, Norway and Scotland have been at the forefront of these developments, creating large, successful and profitable industries in a very short time.

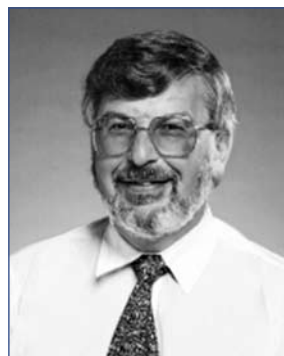
Ironically, while Canada has been a major source of scientific and technical expertise for the aquaculture industry worldwide, growth of aquaculture within Canada itself has been disappointing, especially given the underutilized potential of Canada's east and west coasts. Central to this failure of Canada to capitalize on aquaculture's opportunities has been the failure of government policy and regulation to understand and respond to the diverse needs of the fish-farming industry.

Such a void in public policy demanded a closer examination of this potentially profitable industry. The Atlantic Institute for Market Studies searched for just the right partner to undertake that detailed study. At the University of Prince Edward Island (UPEI), it found the Canadian Aquaculture Institute (CAI), which has been a leader in providing continuing education for the aquaculture industry and animal health professionals, particularly in the areas of fish health, production, technologies, and management.

The project leaders were Brian Lee Crowley and Gerry Johnson. Crowley is the founding president of AIMS and was the editor of *Taking Ownership: Property Rights and Fishery Management on the Atlantic Coast*, a volume on fishery management published in 1997. He also co-chaired, with Memorial University of Newfoundland President Art May, a major conference on property rights and fishery management held in St. John's in the same year. Gerry Johnson is a Veterinary Pathologist in the Faculty of Veterinary Medicine at UPEI, specializing in fish disease.



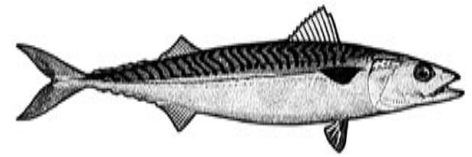
Brian Lee Crowley



Gerry Johnson

The project included two conferences: one on Prince Edward Island and the other in British Columbia. In addition, there were eight papers published by leading experts on the scientific, ecological, economic, regulatory, legal and public policy aspects of the aquaculture industry in Canada. The conference proceedings and the expert papers are available online on the AIMS website at www.aims.ca. ■

Blue Revolution



Although aquaculture is booming globally, in Canada the sector remains stunted

A revolution is underway off the world's coasts. In that revolution, the old "capture fishery" — hardy men in boats battling the elements and each other for an unpredictable share of the wild fish swimming by — is waning. In its place is emerging the technology and the expertise to farm the seas in a stable, predictable way. Not agriculture, the cultivation of the land, but aquaculture, the cultivation of the waters.

Overexploitation of the wild fishery, environmental degradation, poor property rights in wild fish, and a host of other factors have caused the collapse of whole stocks and the exhaustion of previously rich fishing grounds. The production of the wild fishery has levelled off, and is even declining at a time when the world's population continues to grow.

Aquaculture's production, on the other hand, has increased 17-fold in the past 50 years (as Peter Fenwick noted in his story starting on page 12 of the main section). The industry supplies a fifth of all the protein consumed from the sea. In the not-too-distant future, farmed fish, shellfish and algae will overtake the wild fishery, producing a vast array of domesticated fish species. Some are compar-

ing this Blue Revolution to the Green Revolution that boosted world food production in the past 30 years. Seven scientists at the American Association for the Advancement of Science argued recently that aquaculture is vital to world food security.

In many ways, this is an ideal industry for Atlantic Canada. It's based in coastal communities where jobs are scarce, it's not seasonal, it's high tech, it meets a growing market demand worldwide. And, indeed, the industry has established itself, to the tune of more than \$150 million annually in New Brunswick, for example. Ironically, our technology and expertise is in demand around the world, but the industry's local growth is slow compared to that of the global industry, representing huge lost opportunities for workers, investors and taxpayers in the region.

This slowness to capitalize on what should be a natural strength is due largely to outdated views of aquaculture and tendentious campaigns by the David Suzukis of the world. Yet the critics of aquaculture who care what the science says are seeing that peaceful coexistence is both necessary and positive. No one is more sensitive to water quality than the aquaculturist whose livelihood depends on his fish thriving there, making the industry a natural ally of those who want cleaner water. Escapes of cultured fish are a disaster to the business that owns them, resulting in significant investment to prevent escapes and a continuously improving industry record. Use of antibiotics is declining rapidly because of improved management of fish stocks.

The technology that the industry has developed is even being put in the service of restocking depleted wild salmon rivers in Atlantic Canada, according to the Atlantic Salmon Federation.

Steady incremental progress in cleaning up the industry's early problems will continue, because it makes good environmental and business sense to do so. But the main challenge that aquaculturists now face arises from governments. Dozens of federal and provincial departments must give separate approvals for an aquaculture operation to go ahead. Some of this is legitimate and necessary, to protect all legitimate uses of the ocean — recreation, sport fishing, navigation, and tourism as well as aquaculture. Much of it is unnecessary and damaging to the industry and coastal communities.

Just as seriously, the process for granting aquaculturists use of the water is capricious and arbitrary. Leases are often too short or too small for efficient operations, and this absence of high-quality property rights in the water hampers the development of aquaculture, just as the presence of private property on the prairie hastened the development of a rich agricultural society.

But then, if agriculture didn't already exist today, it's an open question whether we would be able to invent it. The same forces blocking aquaculture would oppose it for many of the same reasons. And humanity would be much poorer in both wealth and numbers as a result. ■

Excerpted from a column by Brian Lee Crowley that appeared in The Chronicle-Herald on Feb. 28, 2001.

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Bureaucrats and environmentalists are missing the point

The growth of aquaculture in Canada has not been as strong as one might expect, given the enormous length of this country's coastline and the world-class expertise in fish farming that exists here. The industry remains severely hampered by institutional obstacles, perhaps the most important of which is an antique system of property rights that makes no distinction between wild fish that are gathered in the open ocean and those that are farmed.

The second obstacle is the nature of government in Canada. The minister in charge of the department that oversees aquaculture is highly motivated by politi-

cal concerns and is vulnerable to pressure from special interest groups that do not necessarily have the interests of the aquaculture industry at heart.

The third serious obstacle is that aquaculture has expanded in an era when environmental activists, fearful of the possible exhaustion of the planet's resources through overuse, have acquired considerable influence on politicians as well as prominence in the media, with attendant effects on an otherwise uninformed public opinion.

The solution involves three strategies. First, establish the same private property rights in aquaculture that exist in agriculture. Second, separate government over-

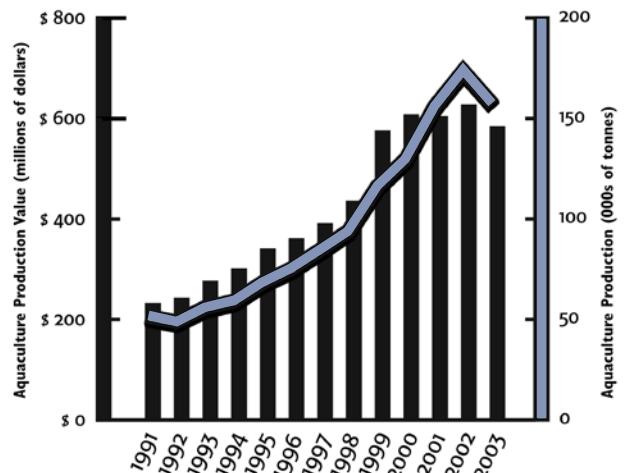
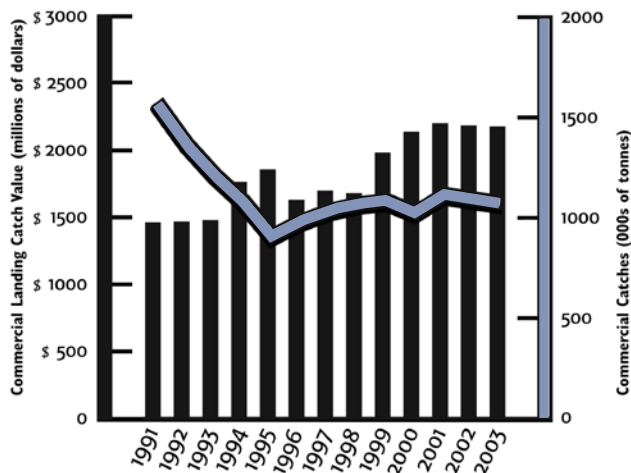
sight of aquaculture from that of the wild fisheries. Third, replace politicized decision making with objective cost-benefit analysis in disputes concerning aquaculture. An institutionalized, economics-based process, independent of any competing special interest, should objectively analyze and inform both the bureaucracy and the courts about the development effects of their decisions with respect to fish farming. ■

Excerpted from It is FARMING, Not Fishing, by Robin Neill. Published by AIMS in April 2006.



Aquaculture's Rising Fortunes

The traditional fishery may be on the wane, but aquaculture is not



Framing the Fish Farmers

The impact of activists on media and public opinion about the aquaculture industry

The rapid growth of aquaculture has brought with it increased focus on the industry, by both the media and environmental activists. Part of the problem is that, unlike farmers, aquaculturists are essentially unable to limit the effects of their operations to their own property. As a result, environmental activists, through their skilled use of the media, have assailed fish farmers about the supposed evils of their industry. Stories in the mainstream media detail the loss of native fish species or the invasion of non-native species, when such evidence is either easily explainable or anecdotal at best. Other headlines discuss the use of “harmful” colorants, when scientific opinion on artificial colorants is hardly decisive. A study proving that farmed salmon have six times as many pollutants in their system as wild salmon receives widespread media coverage. Greenpeace activists storm fish-production facilities lamenting the arrival of “Frankenfish,” even though genetically modified fish have yet to arrive on the marketplace.

The mainstream media are, in and of themselves, a neutral party, and would leave aquaculture alone provided environmental impacts are minimal and there are no adverse reactions to human health or marine life. Unfortunately, rather than simply report the news on the basis of facts, journalists are often handcuffed by the bounds of deadlines, and are forced to report storied narratives about the potential effects of scientific developments. Time constraints also mean that journalists tend to rely on environmental advocacy groups for information about aquaculture and its impact.

As with any industry, aquaculture must operate under appropriate regulations and with regard to due diligence. Yet, as is often the case when science and opinion collide, the result is too much passion and too little

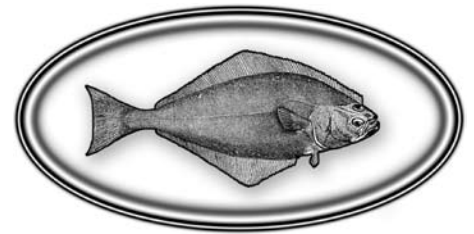
reason. Although many of its critics are properly concerned and well meaning, the battle against aquaculture has turned into an unwarranted campaign of vilification. Activists garner media attention through a wide array of publicity stunts. They then use that publicity and subsequent name recognition to obtain money for the cause.

Politicians and key decision makers are, in many ways, innocent bystanders to this spectacle. However, the activists promise to make life miserable for any politician who disagrees with their opinions. Faced with what they see as no real choice, politicians are quick to pass legislation and burdensome regulations overseeing the aquaculture industry.

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The industry, facing outspoken opposition, has attempted to address the concerns of advocacy groups that genuinely want to work to ensure that aquaculturists operate in environmentally sensitive ways. Other groups, however, merely wish to destroy the industry. Against such groups, the industry must learn to defend itself.

An important part of any defence is to



develop a science-based communications strategy consisting of: training in risk communication — that is, knowing when and how to respond to critics as problems arise; making industry representatives available to the media on a timely basis; being aware of the nature of the industry's adversaries; and thinking creatively, not only about how to present the industry favourably but also about how to “counterpunch” against the often spurious agendas of its adversaries.

It is important to understand that the industry's enemies will continue to attack no matter what aquaculturists do to become exemplary environmental citizens. But by understanding the motives of the attackers and preparing a defence in advance and in depth, the industry can gain control of the situation. When activist groups no longer control the message, it becomes increasingly difficult for them to attack the industry; when the industry no longer has an apparent need to be saddled with an excessive regulatory burden, the politicians and bureaucrats will find it difficult to justify adding to that burden. To achieve long-term business growth in Canada, the aquaculture industry must become not a target for its adversaries, but the source of answers and solutions to legitimate concerns. ■

Excerpted from Framing the Fish Farmers: The impact of activists on media and public opinion about the aquaculture industry, by Jeff Chatterton. Published by AIMS and the Canadian Aquaculture Institute in June 2004.

Safe Salmon

The
ChronicleHerald

Times & Transcript

Misinformation may be hazardous to your health

In the supermarket on Monday to buy some farmed Atlantic salmon, I came up empty-handed. Was demand outstripping the supply of one of the healthiest things you can eat?

Alas, no. I was told by a smug and self-righteous store manager that they were not going to carry it anymore. After all, he intoned, we have to show concern for our customers' health.

But a store truly concerned with our health would not merely carry farmed salmon; it would praise its health merits to the skies.

Charles Santerre, a professor of food and nutrition at Purdue University, said on ABC News a few days ago, "The nutritional benefits of salmon are pretty amazing. I strongly believe that all the data we have today suggests that everyone should be eating more farmed

salmon." Salmon is rich in omega-3 fatty acids, which help prevent heart attacks. They are also important for fetal brain development. Preliminary evidence even suggests Omega-3 fatty acids reduce the risk of premature births and help a child's cognitive abilities.

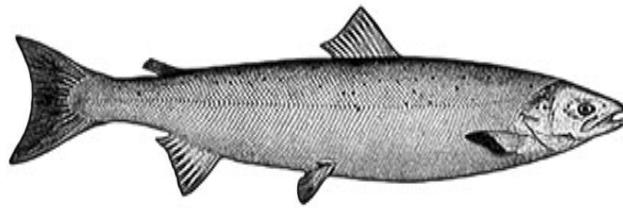
The Canadian Food Inspection Agency has repeatedly said farmed salmon is safe. Health Canada has been promoting fish as a healthy form of protein. The US Food and Drug Administration agrees, and says salmon is an excellent source of those Omega-3 fatty acids, vitamins and proteins. Britain's Food Standards Agency says there is good evidence that eating oily fish such as salmon reduces the risk of death from heart attacks.

And farmed salmon, which has all the same health benefits as wild salmon, is about a third of the price and available year round, while wild salmon is available for only a fraction of the year. Farmed salmon therefore makes major health benefits accessible to far more people than wild salmon.

So what's up with my sanctimonious supermarket manager? Like many people, he saw media reports about an article in *Science* magazine measuring the trace amounts of man-made chemicals (such as PCBs) in salmon. And unfortunately, again like many people, he came away with the impression that farmed salmon is bad for you.

But that's not at all what the evidence says. What the report says is that there are trace amounts of PCBs in both farmed and wild salmon, and that the amounts in farmed salmon are slightly higher than in their wild cousins. That was already widely known, including by health authorities.

What the *Science* article left out was that the amount of PCBs in farmed salmon has been declining for years, largely thanks to continuing industry efforts to improve the quality of their product.



In other words, this study documented a good news story about farmed salmon.

Farmed salmon are safe. The levels of PCBs in both kinds of salmon are well within the safe limits determined by health authorities around the world. Keep in mind, we are talking unimaginably tiny amounts.

The *Science* research found five parts per billion in wild salmon versus 30 parts per billion in the farmed stuff. That's a meaningless difference, says Michael Gallo of the Cancer Institute at the Robert Wood Johnson Medical School. Put in perspective, it's like the difference between a pinpoint-sized and a pin-head-sized drop in an Olympic-sized pool. Gallo helped develop the US Environmental Protection Agency's model for assessing cancer risk. He says both amounts are too tiny to pose any significant health risk. For practical health purposes, they are indistinguishable.

Milk, eggs and meats routinely contain the same or higher trace amounts of PCBs, yet all are quite safe to eat. So why single out farmed salmon? It may have something to do with who helped finance the study in the first place: the Pew Charitable Trust. Pew has donated many millions of dollars over the last decade to activist environmental groups dedicated to opposing aquaculture and is rated by Washington's Capital Research Center as being on the "radical left." And, perhaps unsurprisingly, one of the study's recommendations says you should shun farmed salmon, limiting yourself to only a few servings per year.

This alarmism has garnered major media attention despite the best efforts of expert after expert to show that the major benefits of eating farmed salmon hugely outweigh any hypothetical health risk.

What has happened here? The food supply isn't contaminated by PCBs; the science supply has been contaminated by politics. And putting science in the service of ideology truly is injurious to our health.

Fish farming has been the target of a concerted campaign of misinformation and innuendo for years. We cannot stop scientists from saying silly things not justified by their research, but we can demand of ourselves, our media and, yes, even our supermarket managers, a tougher standard of proof before subscribing to the moral panic *du jour*. ■

This column by Brian Lee Crowley originally appeared in The Chronicle-Herald in Halifax and Times & Transcript in Moncton on January 14, 2004.

Fencing the Last Frontier

Aquaculture faces the same main challenge as the wild fishery: property rights

Although aquaculture is poised to become a vigorous industry for Atlantic Canada, the sector is hampered by a property-rights system that has been developed for the wild fishery, rather than agriculture, which aquaculture more closely resembles.

As Peter Fenwick pointed out earlier (see his story on page 10 of the main section), there are two major hurdles to developing property rights for aquaculture. First, the land is not empty and to be had for the taking, as was the case with agriculture. Aquaculture faces prior ownership and usage rights — on the part of aboriginals, for example — in coastal waters.

Second, unlike in agriculture, where ownership of Crown land was transferred to the farmer, in aquaculture the Crown continues to own the seabed, the water column, and the water surface. The fish belong to the fish farmer but the farm does not. The fish farmer has obligations, while government imposes its will through decisions made by the relevant minister and bureaucrats, with all the pressures to bend to special interests and political expediency that such a relationship implies.

In law, the right to property flows from two basic sources: use and liberty. The arguments for property rights based on *use* are: the economic one that property is organized most efficiently when the individual is able to own both the means of production and the product itself; and the moral one that the person who is responsible for contributing the capital, labour, expertise, and other inputs and who bears the risk of failure should also be the one who reaps the

The industry needs a National Aquaculture Act that introduces secure property rights and is backed by the courts

rewards of success.

Modern North American agriculture is the outstanding example of such a property rights structure: the farmer owns the resource and receives the return from its husbandry and increased productivity.

Property rights based on *liberty* flow from the assertion that the individual is not free unless able to possess and dispose of property. Thus, for example, Canada's aboriginals lost their land and, hence, their freedom as they were displaced by European settlers.

In Canada, the spirit of the law has traditionally been defined by the sovereignty of Parliament and its associated discretionary power. Now, under the influence of the Charter of Rights and Freedoms, the administrative state has begun to decline. The courts have begun to reassert their authority and, with reference to ancient treaties and the common law, are now redressing the wrong done to aboriginals. This trend could presage a new attitude toward property rights elsewhere, but so far it has hardly touched the entrepreneurial fish farmer.

There are, in fact, no federal or provincial statutes pertaining solely to aquaculture. Even as recently as February 2003, "aquaculture" had not been defined in case law.

Accordingly, the fish farmer faces a situation in which there is no legal restraint on government and administrative discretion, no right to sue government in the courts, and no rights that government itself is duty bound to protect. (See the story on page 10 for more on this.)

Could Canada learn lessons from other countries? In the United States, our major trading partner, aquaculture shares most of the property rights problems of the Canadian industry. Though not generally applicable to aquaculture, many western US states use a property rights regime known as "appropriation," whereby rights are granted on a first-come, first-served basis on condition that the owner "beneficially employ" the resource. A modified version of this system might work well in Canada, though it would face strong opposition from those who have adapted themselves comfortably to the feudal bureaucracy of our system of administrative discretion.

If aquaculture is to grow and employ more Atlantic Canadians, the industry needs a National Aquaculture Act that introduces secure property rights to the foreshore, the water column, and the seabed, and is backed by the courts. It does not need more government economic incompetence and inefficiency, or arbitrary decision making by bureaucrats. ■

Excerpted from Fencing the Last Frontier: The case for property rights in Canadian aquaculture, by Robin Neill. Published September 2003.



How to Farm the Seas

The science, economics and politics of aquaculture

In 2000, AIMS brought together leading national and international experts to clarify both the strengths and weaknesses of aquaculture, and to lay down the basis for a sensible public policy framework to govern the industry. How to Farm the Seas, a three-day event held in PEI, was a joint initiative of AIMS and the Canadian Aquaculture Institute.

While the world aquaculture industry is growing rapidly in response to rising demand for quality seafood, its progress in Canada is dogged by environmental controversy, regulatory and jurisdictional confusion, and concerns over food safety. In How to Farm the Seas, we brought together a team of leading national and international experts to clarify both the strengths and weaknesses of aquaculture, and to lay down the basis for a sensible public policy framework to govern the industry.

The following is Yves Bastien's, then Canada's commissioner of aquaculture, account of the highlights from the event.

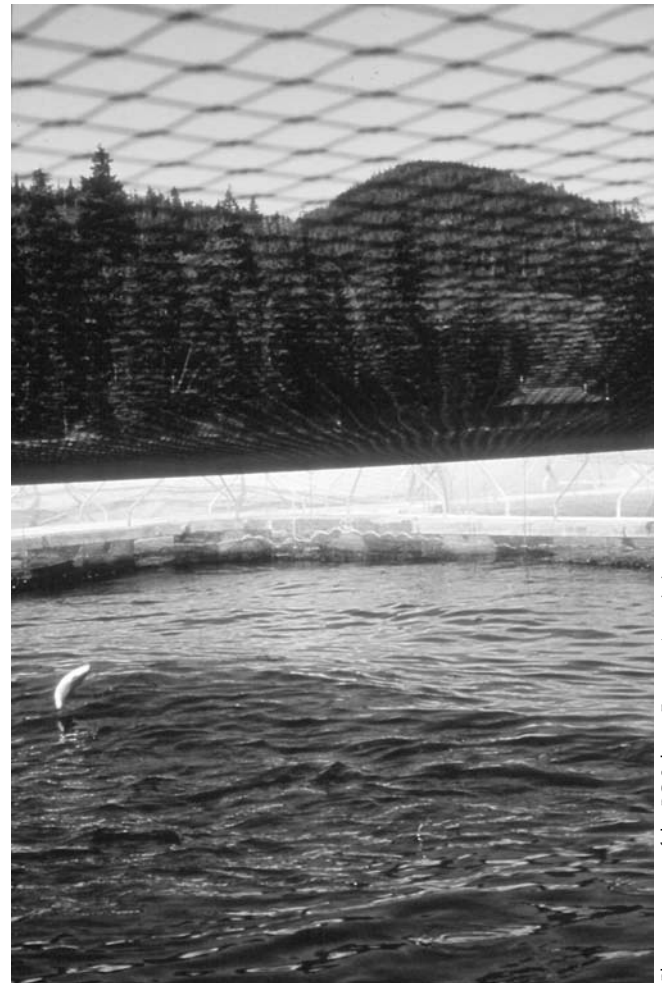


Photo courtesy of the BC Salmon Farmers Association

Key message No. 1: Science is essential

The first key message is that science is an essential component of sound decision making and must be better financed and coordinated. Science can be subjective and is regularly abused in the communication process. For that reason, science is not the end of the process but only one element of the decision-making process.

“Sustainability” and the “precautionary approach” are essentially buzzwords that will have as many definitions as the number of people sitting around a table. Debating such notions may increase misunderstanding, each party interpreting the notions differently. What becomes really important is what a community or a society defines as an acceptable or unacceptable level of environmental impact from a specific human activity. When well defined, this acceptable level can then be transformed into policies, guidelines, codes of practice, regulations, or legislation, and should be modified as information accumulates or conditions change.

But to do that properly and to provide confidence to the community that the level of acceptance is appropriate and will provide security for future generations requires good science, a great deal of information exchange and communication, and an obligation by everyone to work together.

What is really needed is risk assessment, risk management and risk communication. Regarding risk communication, confidence is a two-way process. Legitimacy and acceptance will bring more exchange of information. The example of Norway speaks for itself. The opposition in the late '80s and early '90s has evolved so that now people are working together. The legitimacy of aquaculture is not a question in Norway.

Key message No. 2: Canada's share of the aquaculture market is declining

As an exporter of seafood products, Canada is losing ground. At the inter-

national level, some countries are already experiencing a stabilization of their growth while we are still at the beginning of our potential growth curve. We also heard that investments by major companies could move elsewhere if conditions for business are not attractive in Canada.

At the same time, there was a consensus that Canada has the potential to be a world leader in aquaculture because of biophysical potential, expertise and know-how, and an existing strong industrial basis.

Key message No. 3: aquaculture needs strong producer organizations

There is a need for strong national, provincial and regional producer organizations. These organizations should develop protocols and codes of practice; communicate risks and industrial achievements; and adequately represent industry's interests.

Tor Horsberg commented that the environmentalists' focus on aquaculture has forced the industry to move fast on environmental concerns and to put in place measures that will contribute to making aquaculture a model of sustainable development. Aquaculture is already out-performing other sectors in terms of environmental performance.

There is also consensus that more work is needed to fully address issues like escapees, waste management/carrying capacity, and fish health and use of therapeutants/pesticides.

It is really a question of rolling up our sleeves and moving forward in collaboration with constructive partners. The key is working together to find solutions instead of debating extreme positions through the media. Extreme positions from either side are not defensible. I also noted that, overall, environmental performance of the aquaculture sector is viewed by many specialists as enviable and in many aspects better than other sectors.

Key message No. 4: User conflicts for aquatic space is a serious issue

This was clearly brought out by a number of speakers. My view is that there is an urgent need to establish a conflict resolution mechanism that will function both at the community level and at provincial or national levels. At one time I was convinced

that aquaculture zoning was the only way to resolve user conflicts and to provide legitimacy to the aquaculture sector. I now believe that a combination of both initiatives would be the best strategy, the conflict resolution mechanism being the number one priority.

Public policy

I heard many times that public policy for aquaculture was missing. This is both wrong and right. The Federal Aquaculture Development Strategy (FADS) exists and was reaffirmed recently as the Federal Aquaculture Policy when the federal government announced a program of \$75 million for aquaculture. The real problems are: lack of financial resources to implement FADS; lead federal agency is not staffed to implement FADS; lead agency does not have an aquaculture policy (FADS within DFO) and operational policies; need for a cultural shift within DFO.

But all of these require human resources that are willing to assume the challenges of rebuilding the DFO expertise and capacity in aquaculture. A cultural shift will not happen unless aquaculture expertise re-colonizes the department. Some employment opportunities will be created by the \$75-million program. It is important that aquaculture experts consider taking over those challenges to initiate changes from inside the organization.

Hope for the future

I would suggest that we now have a few fog lights in the toolbox. DFO is finally getting back on the job regarding aquaculture. In the last year-and-a-half, much progress has been made. Current and upcoming initiatives include the Office of the Commissioner for Aquaculture Development (OCAD), a communications strategy in the form of a series of fact sheets, and OCAD as a facilitator to help identify solutions and compromises for various conflicting situations with the department. Important DFO initiatives include an Office of Sustainable Aquaculture and a \$75-million investment. These are important steps forward and reflect a change.

We have all the ingredients to make aquaculture a huge success story, both in terms of environmental protection and

Conference Rings Alarm Bells

The conference of producers, scientists and policy-makers was told that while phenomenal growth exists in Canada, opportunities and investment are going elsewhere because of the impediments facing domestic expansion. "The question here is private-property resource versus public-property resource," said Brian Rogers, a leading consultant in the aquaculture and food sectors. "Aquaculture is accepted and promoted in Norway and Chile, but we're still debating whether this is an industry."

The two-day conference rang alarm bells over stalled development in the industry that already contributes about 21% of the value of all fishery products sold by Canada. But producers say the industry could grow tenfold in the next decade if government regulations stopped restricting the amount of sea-based leases handed out by the Department of Fisheries and Oceans.

Excerpted from an Oct. 3, 2000, article in The Guardian (Charlottetown) by Steve Sharratt.

economic development. It requires industry to be mature and act responsibly. That also means not waiting or counting on the government to do what is needed. It requires better organization through strong national, provincial and regional associations that will represent the interests of the aquaculture industry and present your priorities. It requires better communication with the public, other users, governments, and the like. And it requires governments to: confirm the legitimacy of aquaculture in policies and legislation; improve access to

sites; clearly define the rules under which aquaculture will operate and streamline all processes necessary to get an authorization, a license, a lease, or the right to use adequate pesticides and therapeutants; provide the support services that will insure aquaculture achieves its full potential in Canada; and move away from jurisdictional conflicts in order to give administrative responsibility to the level of government better suited to do the job.

In other words, work together to achieve this vision of a sustainable and profitable in-

dustry that will create economic activity that is very much needed in rural and coastal communities.

I would like to finish with the same conclusion that came out of a recent similar event, the June 1999 Round Table on Aquaculture that led to the \$75-million federal investment in aquaculture. The unanimous conclusion then was — Let's just do it! ■

Yves Bastien is the former Commissioner for Aquaculture Development, Fisheries and Oceans Canada

Politics, the Press, and Scientific Research: Some Problematic Features

Ancient Rome has several times been invoked at this conference, in particular, the gladiatorial arena has served as a vivid trope for our circumstance. If we consider, in comparison to other aspects of the process, the contribution of the political in determining aquaculture's fate, I invite you to remember that the single greatest instrument of death ever seen in the Coliseum was — the thumb. The emperor's up or down, as with the politician's approval or disapproval, was the final master of outcomes. Unlike Caligula, however, modern policy makers cannot see directly what's going on down there in the blood-soaked dust. Further, the action proceeds in a language that they do not command. So they depend upon various mediators, rather than gladiators, for edification. Ideally, such mediators will be scientific advisors.

More expediently, however, our modern policy emperor, just as did his predecessors, listens for the clamour of the crowd; that is, rather than navigating by the research results, he steers to the sound of applause, or the shouts of horror. After all, which is more important in the great scheme of things: that a particular policy rest upon a scientific

mistake, or that a great benefactor, a man of consequence, should fall from public grace? I'm sure we agree that the answer is obvious. Under this scenario, the emperor's most trusted mediators become even more powerful, only now they are rarely scientists, but rather the media themselves, who not only report but can manufacture that most precious commodity, public opinion. Their thumbs, I believe, are notoriously twitchy.

More policies are set or deflected by headlines and putative poll results than by scientific publications. Indeed, the gladiatorial arenas of history are littered with the carcasses of brilliant scientific and technical developments possessed of shining promise. Even though they might have benefited a desperate world they were condemned, not because they failed the test of facts but rather that of cultural fashion.

Talk to Dow Chemical, which was sufficiently right on the safety of silicone implants that it only cost them \$7 billion to lose, not only comprehensively but ignominiously, and not only in the court of public opinion but in a continued cloud of liability, even though exoneration after exoneration appeared

in the peer-reviewed literature.

Do not mistake my posture for a counsel of despair; rather, I am trying to forewarn you concerning the nature of the task your initiative will face. Put not all your fish eggs in the basket of sound science if you wish to survive. Science still matters in modern governance, as does establishing the balance of risks and benefits, of jobs created and human suffering alleviated, of national competitiveness enhanced. But none of these (nor indeed all taken together) should ever be thought of as dispositive. There are sharks in these waters, and they do not play by the rules of the white-coated laboratory set.

The scientific and economic arguments are never irrelevant to policy outcomes, but neither are they sufficient. For both science and economics, just as do the fish of our discussion, swim in a wider cultural and political sea upon which they ultimately depend. And not a few of them find themselves in cages not of their own making.

David Murray was Director of Research, Statistical Assessment Service, Washington, DC, at the time of this How to Farm the Seas I presentation.

Moving the Focus to the West Coast

(Still) drowning in regulation

In How to Farm the Seas II, AIMS and CAI built on the tremendous success of the first conference, held on the east coast in September of 2000. Again the two organizations assembled a team of leading national and international experts to clarify both the strengths and weaknesses of aquaculture, and to lay down the basis for a sensible public policy to govern the industry. This time, though, the focus was the Pacific Coast. What follows is a summary of discussions.

Canadian aquaculture is mired in a dysfunctional regulatory system. That is the main conclusion of the two aquaculture conferences co-organized by the Atlantic Institute for Market Studies and the Canadian Aquaculture Institute in 2000 and 2001 and sponsored by the Donner Canadian Foundation.

When regulation is working well, economic activity is regulated to achieve the greatest possible net social economic benefit without undue interference with the freedom of buyers and sellers in the marketplace. When the regulatory environment fails in its economic and political purposes, it is dysfunctional. And to the extent that it does not benefit the national economy,

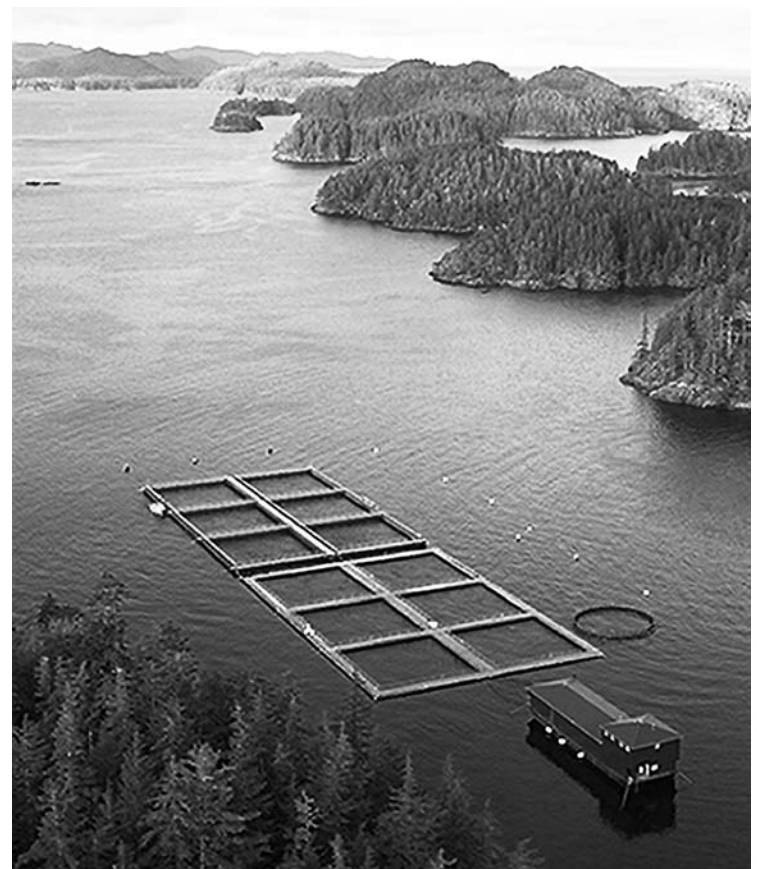


Photo courtesy of the BC Salmon Farmers Association

but reflects rather an unresolved political struggle between contending special interests, the industry and the economy suffer economic losses.

Aquaculture in Canada is subject to a complex of institutions, guidelines, and injunctions that forms the regulatory environment. The resulting hurdles to aquaculture businesses span transnational organizations, conventions, and accords; federal government agencies and legislation; provincial agencies and legislation; and a number of miscellaneous organizations and associations. In short, there is an absence of an overall rational model for the assessment of net social economic benefits in aquaculture. The current regulatory environment is dysfunctional.

Among presenters at the two conferences were the Federal Commissioner for Aquaculture Development and the Deputy Minister of the Department of Fisheries and Oceans (DFO). Between them they made a number of salient points:

1. There are unexplained administrative blocks preventing industry access to new sites for expansion and to new sources of wild fish for feed and for breeding purposes.
2. Policy (in the *Fisheries Act*) with respect to escape of penned fish, and with respect to water pollution caused by unconsumed feed and fecal residue, is not clear, and enforcement is not well organized.
3. The policy of the lead regulatory agency, the DFO, with respect to fish habitat has not been developed with aquaculture clearly in mind and, quite apart from that, is simply not clear.
4. The Navigable Waters Protection Act — which deals with site approval, length of leases, site layout, navigation channels, and site marking — was not developed with aquaculture clearly in focus and,



quite apart from that, is simply not clear.

5. There are conflicts and contradictions among the federal and provincial regulations dealing with aquaculture.

Because aquaculture is a relatively new industry, some time lag in development of new regulations is to be expected. A basic problem, perhaps the basic problem faced by aquaculture, however, is that regulators are having difficulty freeing themselves from thinking in terms of the property rights structure of aquaculture's predecessor, the wild fishery. The wild fishery is based on a common property resource. Aquaculture, by contrast, is based on private property with respect to the resource (the fish, shellfish, and other farmed products) and should be organized and regulated accordingly. Currently, the private property rights necessary for efficient market development are not in place, and negative externalities, untoward costs and regulations hobble the industry.

Throughout both conferences it was clear that vested interests in traditional fisheries, both within DFO and without, hold considerable sway over the regulatory environment — to the detriment of the aquaculture industry. It was also clear that many organizations see aquaculture not as a viable, complementary industry but as an irritant and potential threat to the established, but declining, traditional fisheries. Little of the anti-aquaculture rhetoric seems to be rooted in scientific or economic reality.

Reports from BC, PEI, and New Brunswick confirmed that serious regulatory dysfunction exists nationwide in site allocation and tenure of aquaculture licences, and in access to stock. Furthermore, administrative inefficiency is pervasive.

If any conclusion can be drawn from the conference

presentations, it must be that fundamental institutional change is required in the regulatory environment of Canadian aquaculture. We can look partly to other jurisdictions — such as the United States, Australia, and Norway — where aquaculture is considered an industry to be developed, not controlled, and where aquaculture-specific legislature exists. In its 2001 *Legislative and Regulatory Review of Aquaculture in Canada*, the Office of the Aquaculture Commissioner concluded that aquaculture is simply not included in the existing relevant legislation at both the federal and provincial levels.

The problems of the wild fishery all stem from its base in a common property resource. The solution to those problems is to establish well-defined private property rights. Agriculture had its own “tragedy of the commons,” which was overcome by the establishment of private property in the form of individual ownership of farms. Aquaculture makes this solution possible in the fisheries. The challenge ahead lies in applying this deceptively simple prescription to a complex industry in a highly politicized environment. Yet, apply it we must if aquaculture is to reach anything like its potential to generate prosperity in coastal communities and produce a major increment in world food supplies. ■

Excerpted from Canadian Aquaculture: Drowning in Regulation, by Robin Neill and Brian Rogers. Paper number one in the series, How to Farm the Seas, edited by Brian Lee Crowley and Gerry Johnson. Published by AIMS in June of 2002.

2000 Conference Coverage

“The Atlantic Institute for Market Studies and the Canadian Aquaculture Institute have launched a joint project to improve both public policy and public understanding with respect to aquaculture on the east coast and nationally.” – *The Guardian* (Charlottetown), June 20, 2000.

“...it was clear throughout the session here Friday that aquaculturists, who grow everything from salmon to shellfish, feel like a poor cousin to their land-based relatives. Numerous times the discussion focused on the inequity between the soil farmer and the water farmer when it came to the infrastructure of support and policy provided by the government.” – *The Guardian* (Charlottetown), Sept. 30, 2000

“The two-day conference rang alarm bells over stalled development in the industry which already contributes about 21 per cent of the value of all fishery products sold by Canada. But producers say the industry could grow tenfold in the next decade if government regulations stopped restricting the amount of sea-based leases handed out by the Department of Fisheries and Oceans.” – *The Guardian* (Charlottetown), Oct. 3, 2000.