Fisheries and Oceans
Pêches et Océans

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Your file *Votre référence*

Our file *Notre référence*

DEC 17 2009

[redacted]

Dear Mr. Madden:

Thank you for your correspondence, addressed to the Honourable Gail Shea, Minister of Fisheries and Oceans, regarding the impact of fish farming on wild salmon stocks. I have been asked to respond on the Minister's behalf.

I understand your concerns and assure you that the conservation of aquatic species is Fisheries and Oceans Canada's (DFO's) first priority.

You may be interested to know that the marine survival of the four-year-old sockeye salmon group returning to British Columbia this year has been low both for Fraser River sockeye, of which some populations migrated through areas that have salmon farms, and also for Skeena sockeye, whose migration route has no proximity to salmon farms.

DFO is committed to evaluating the causes of fluctuation in affected stocks, including interactions with fish farms, during annual reviews. The reviews will be based on the best available science.

Further, I believe the recently announced federal judicial inquiry into declining Pacific salmon stocks will allow the Department and our partners to better understand and move forward in restoring and conserving these fish populations.

The Department is committed to remaining at the forefront of scientific research and has conducted over $100 million in research in the last seven years. DFO recently initiated a new, five-year aquaculture regulatory research program to examine issues related to the regulation of finfish and shellfish aquaculture.

Regarding regulation of aquaculture in British Columbia, in accordance with Mr. Justice Hinkson's recent decision in *Alexandra Morton et al v. the A.G. of British Columbia and Marine Harvest Canada*, until February 2010, the Province of British Columbia will continue in its current role managing most aspects of aquaculture within the province. DFO is giving the implications of the decision full consideration, including discussions with the Province of B.C. and broad-based consultations.

DFO has studied closed-containment technologies and supports research into the development of innovative technologies that enhance the efficiency of production systems while reducing impacts to the environment. Important questions remain unanswered regarding the potential environmental implications of commercial-scale

salmon production in closed-containment systems, such as energy demands and other environmental impacts.

A 2008 workshop on closed containment held by the Canadian Science Advisory Secretariat (CSAS) highlighted that while there are no closed, confined systems currently being used exclusively for Atlantic salmon, there are potential technologies that show promise for improving Atlantic salmon production and for restricting and controlling interactions with wild stocks.

The next steps will be to use the knowledge contained in the science advisory report that arose from the 2008 CSAS workshop to help inform potential development of pilot projects in the future. To view the report, please visit DFO's website at < http://www.dfo-mpo.gc.ca/csas/Csas/Publications/SAR-AS/2008/2008_001_e.htm >.

DFO also offers grants and contributions under the Aquaculture Innovation and Market Access Program. The program aims to encourage innovation in the aquaculture industry, including improving its environmental performance, production, and species diversification; in addition, it supports the development and use of green technology.

Regarding your concerns about impacts to the surrounding environment, all new proposed facilities are sited to protect critical and sensitive fish habitat using science-based criteria that consider circulation and settling patterns.

In addition, existing aquaculture operations have monitoring requirements to ensure they meet environmental performance-based standards set for the sea floor. DFO also conducts ongoing research into aquaculture environmental interactions for continued understanding of the potential effects as a basis for adaptive management.

In answer to your question on fish feed, in Canada there are no directed fisheries where fish are caught for the purposes of fish meal or fish food. The majority of the fish meal used in commercial fish feed comes from fisheries in South America. The Department has invested in research to further reduce the use of fish oil in the production of fish feed. For example, studies were conducted with canola oil as a replacement for fish oil, and additional studies are planned.

If you would like to discuss aquaculture matters in detail, you may wish to contact Mr. Andrew Thomson, Director, Aquaculture Management Division, Pacific Region, at 604-666-3152, or < andrew.thomson@dfo-mpo.gc.ca >.

Thank you for taking the time to write. Please be assured that DFO will continue to work to conserve and protect salmon stocks for current and future generations.

Yours sincerely,

Susan Farlinger
Regional Director
Fisheries and Aquaculture
Pacific Region

JOHN C. MADDEN
3290 Cypress Street, Vancouver, B.C. V6J 3N6

November 15, 2009

BC Salmon Farmers Association
#302-871 Island Highway
Campbell River, BC
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Re: Commercial Net Pen Fishery in B.C.

Dear Sir or Madam,

Some months ago, prior to the last election in B.C., I received an interesting flyer from your organization, which, amongst other things, invited the reader to submit any questions to your office for reply.

Well, I have been slow to get around to it, but at last I have taken the trouble to get my questions down on paper. I have just sent them off to our Minister of Fisheries and Oceans, but I feel sure you have useful information on the subjects raised with her, (though few others seem to).

In the circumstances, I thought you might be interested both to read my letter to Mrs. Shea, and to offer a reply to the questions contained therein.

Thank you for your consideration of my request.

Yours sincerely,

John C. Madden

BC Salmon Farmers Association

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December 2, 2009

Mr. John Madden
3290 Cypress Street
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Dear Mr. Madden:

Thank you for your letter and the opportunity to answer your questions. Your heartfelt and rational approach in conveying your concerns is much appreciated. I'll do my best to answer.

1. Do you agree that closed container fish farming is an important goal for the industry?

Yes, I would agree that closed containment is an important area of research for salmon farmers; however, it is not an attainable goal at this time. Let me explain-

Even though there is a strong regulatory framework in place to ensure that any impacts from salmon farming are measured and monitored, salmon farmers recognize that the onus falls on us to continually look at improved technologies and management techniques that will further reduce environmental impact –closed containment is one such technology.

Closed containment is used for the freshwater stages of the production cycle: approximately 12 months until the fish reach 50-80 grams. The use of closed containment as a substitute for traditional net pen culture has received much media attention without a lot of understanding of the current state of knowledge. Currently, there are no closed containment systems operating anywhere in the world for full commercial-scale growout of adult Atlantic salmon. This was the conclusion of a Canadian Science Advisory Secretariat (CSAS) study which assessed all current and past closed containment systems for rearing salmon. CSAS coordinated this peer-reviewed report for Fisheries and Oceans Canada. The report can be viewed at http://www.salmonfarmers.org/attachments/061108_CSAS_ClosedContainmentReport2008.pdf.
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In BC we produce approx 80,000 metric tonnes annually. Because of the large production scale, the size and energy requirements of a land-based closed containment would be environmentally

and economically prohibitive. Saltwater closed containment systems have these same concerns as well as problems with structure weight, saltwater corrosion and conductivity, structure sturdiness and collection/disposal of high salt content waste. Additionally, with any closed containment system, part of the argument for economic feasibility is the ability to grow salmon at high densities. Long term high density culture raises concerns about fish welfare and health (as my background is in fish health, this is always a primary concern of mine).

The inherent problems with these systems can't be addressed with the current state of technology. Thus, if waste is not readily collected and disposed of, if escapes are still a possibility, if fish welfare is poor and if the cost of production is prohibitive, then we still have to look at whether these systems truly address concerns or just defer some concerns and raise new ones. Regardless, salmon farmers continue to look at what we can do to improve our operations and the use of open net pens. Maybe new technology/ideas will change the opportunities to use closed containment in the future.

2. Can you point me to a reputable report or other publication which sets out the respective cost structures of closed and open pen farm fishing?

I know that there is currently work being done in this area to try and ascertain the cost structures of closed versus tradition net pen farming. This economic performance model will be an important component for assessing closed containment trial work.

The only completed report that I am aware of is based on a trial conducted by Marine Harvest Canada in 2002 to test the use of the Future SEA Bag system (which you are familiar with). Information on economic performance for this trial can be found at http://www.agf.gov.bc.ca/fisheries/reports/MH_Economic_Performance_of_the_SEA_System.pdf. 404 Not found.

3. Can you point me to reports which will provide enlightenment on the severity of these problems and on steps contemplated to solve them, assuming they are real problems?

The following provides some background and links to additional information.

Regarding fish health and medication use-

- Antibiotics are only used when required for treating illness and all treatments are prescribed and monitored by a veterinarian.
- While antibiotic use by salmon farmers in BC is already low (less than 3% of feed produced), research into alternatives (such as vaccines) to antibiotics and other medicines is ongoing.

did find "Future Sea Closed Containment Units Feasibility Study" NOV 2002 At Marine Harvest

- Reliance on medication use is minimized by vaccinating all fish prior to saltwater transfer. This vaccination provides protection against bacteria and virus pathogens commonly found in the saltwater environment.
- Medication is always given to the salmon in their feed. Records of all treatments are maintained and this information is shared with government. On average, a salmon will receive less than one antibiotic treatment throughout its 18-24 months in saltwater. Once a fish population is treated, it can not be processed for human consumption for a prescribed number of days, this is known as the withdrawal period. The length of the withdrawal period allows for natural metabolism of the medicant so that no residues are present when the fish go to market.

Fish meal use in fish feed-

- Fishmeal and fish oil products in fish feed come from commercial fisheries for production of these products, not from human food fisheries. Still, the use of wild resources is a concern; therefore, much research goes into finding alternate protein and oil sources. The biggest part of this research and substitution is with vegetable-sourced proteins and oils. Currently, the production of 1 kg of farmed salmon weight requires 1.6 kg of wild fish. Research continues to further reduce this amount with a goal of being a net producer of fish. In 2008, one fish feed producer announced trial results that produced 1.2 kg of farmed salmon protein for each 1 kg of wild fish utilized to produce the feed (http://www.skretting.com/Internet/SkrettingGlobal/webInternet.nsf/wPrId/2E87B6CD87990BA7C12574D2006D1987?OpenDocument) with no changes to the nutritional value of the fish produced. This is a wonderful step forward to reducing reliance on wild resources and ensuring sustainability of salmon farming.
- Salmon are very efficient converters of feed to flesh compared to other food animals (chickens, pigs etc.). Being cold-blooded (their bodies don't have to utilize energy resources to generate heat) and neutrally-buoyant (energy is not required for maintenance in the water column), they do not require the same energy resources as land animals.
- Other food animal 'herbivore' production uses large amounts of fishmeal and fish oil even though neither the meal nor the oil is part of the natural diet of these animals.

As you will see from my responses, it is hard to provide simple answers without giving some context. Because of this, and since the answer to one question quite often leads to another question, salmon farm tours are the best way to learn about how we farm and what we do to minimize environmental impact. If you are able to travel to Campbell River, the association offers tours each Thursday morning from mid-June to mid-September. Otherwise, if you give me a call 1-800-661-7256 ext 224 or email pgalloway@salmonfarmers.org, I would be happy to provide additional information.

Once again, thank you for taking the time to write and for giving me the opportunity to respond to your concerns. My 16 years working with various aspects of the salmon farming has provided the opportunity to meet many different kinds of fish culturists, to see aquaculture and salmon farming throughout North America and the world and to recognize the many positive changes made by local industry. This puts me in the fortunate position of knowing what a good job BC salmon farmers do. It would be a pleasure to share some of this knowledge with you. I look forward to hearing from you.

Sincerely,

Paula Galloway

Paula Galloway, Member and Community Relations

CC: Honorable Gail Shea, P.C., M.P., Minister of Fisheries and Oceans

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May 5, 2010

Dear John Madden,

The objective of the workshop was to share perspectives and explore the viability of land– based, closed –containment salmon aquaculture. Its proposed goals were to examine the current status of land-based closed-containment salmon aquaculture, identify potential barriers to creating this new growth industry in B.C and develop an action plan to aid in moving this industry forward.

Worldwide technology development of RAS systems (re-circulating systems) were shown to be viable growing different species, such as eels and tilapia. It was generally accepted that the culture of salmon is possible in RAS systems. There were two mathematical RAS models, one freshwater and one saltwater model proposed.

The inputs into the models generated much debate about economic viability. Opinions differed on: land cost, species to be cultured, feed cost allocation, temperature regime, feed conversion rate, freshwater vs. saltwater, etc. It was accepted that more sensitivity testing was required since uncontrollable variables and controllable variables changed the economics greatly.

The economy of scale was shown to have great influence on the bottom line. A proposed pilot project must be at the scale to justify infrastructure cost and determine biological baseline data. Its scale must represent a potential for full commercial production. The waste stream utilization was key to economic viability and multi-trophic farming was key to success.

The future for RAS systems is going to be determined by funding of commercial scaled pilot projects. Industry recognizes the need for further study of this technology and is looking to initiate a project at this time. There are many issues to be addressed such as power consumption, carbon foot print, densities, location to market, financing, multi trophic streams of revenue, species to be cultured, depuration, animal welfare issues etc. The mathematical models must be tested in reality to determine the future of this technology in British Columbia.

John this is the current state of closed containment aquaculture in BC. Please feel free to contact me anytime and I can keep you updated on this process.

Regards

David Minato

Dave Minato
Member and Community Relations Coordinator