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Chair

Mr. Rodney Weston

Standing Committee on Fisheries and Oceans

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● (1535)

[*English*]

The Vice-Chair (Mr. Fin Donnelly (New Westminster—Coquitlam, NDP)): I would like to call this meeting of the Standing Committee on Fisheries and Oceans to order. Specifically, we're doing a study on closed containment aquaculture. We have two witnesses with us today by videoconference.

Thanks to both of you for joining us.

We have, from the T. Buck Suzuki Foundation, David Lane, who is the executive director. We also have the SOS Marine Conservation Foundation's technology adviser, Dr. Andrew Wright.

Gentlemen, you have 10 minutes each for your presentations. These will be followed by questions and comments by the members. Likely, we will have two rounds of questioning. The first round for us will be seven minutes, and the second will be a shorter round of five minutes each—that's for questions and answers.

Thank you for accepting the invitation to be with us today. I would like to turn the floor over to Mr. Lane, I guess.

Would you like to go first?

Mr. David Lane (Executive Director, T. Buck Suzuki Environmental Foundation): Actually, I think Andy Wright would be the one to go first.

The Vice-Chair (Mr. Fin Donnelly): All right.

Andy Wright, please.

Dr. Andrew Wright (Technology Advisor, SOS Marine Conservation Foundation): Thank you for the privilege and the invitation to speak with you today. I have provided a powerpoint presentation. Have you all been provisioned with it at your end?

The Vice-Chair (Mr. Fin Donnelly): We have it. Thank you.

Dr. Andrew Wright: If you recall, the last time I had the privilege to speak before you, we had just completed our technology report, “Technologies for Viable Salmon Aquaculture”. I encourage you to perhaps reread it. If you haven't and if you're new to the committee, I encourage you to perhaps consider reading it.

Since that time, we have also done a very preliminary comparison of the greenhouse gas emissions from closed containment and open ocean net-pen aquaculture procedures. Again, we would encourage you, in your own time, to read that.

Today I'm going to give you a synopsis of where we've come from, where we are, and where we're going. It draws upon the work in those two reports, as well as our work with the 'Namgis First Nation in Port McNeill, which is actually building the first RAS system in British Columbia.

I'm now turning to page 3 and some RAS design foundations.

For those who did read the report, you'll recall that as a foundation we were concerned primarily with the ecology of the environment, first and foremost, so we examined all technologies for salmon aquaculture—net pens, in-ocean technologies, and land-based technologies—from an array of two broad parameters: husbandry requirements of the fish and biological security requirements.

From that heuristic overview, we very quickly drilled into the fact that land-based full recirculation was the technology of choice for addressing our concerns. I press upon you to consider that the biosecurity issues that we were very concerned about have become truly pressing, because biosecurity truly equates to economic security for rural communities. That was graphically illustrated with the ISA outbreak in Chile, in which the entire workforce was laid off the moment the herds of fish were culled. That today seems very prevalent, particularly when you realize that closed containment, with each site being bio-isolated, ensures that your industry—plus your employment of the citizenry—is truly secure, because there is no vector by which disease can go from farm site to farm site. They are bio-isolated.

Moving on to page 4, where are we today? We've embarked with the 'Namgis nation and the SOS Marine Conservation Foundation upon building a farm—it is under the working partnership of K'udas—and we've looked at two things for you today that are of key importance.

The capital and the civil costs to build this system are coming in at between $6 million and $7 million. These are based on engineering drawings as we go into the construction phase, with PR Aqua being our design team. They have built fish farms all over the world.

The farm that we're building will produce approximately 400 tonnes of live-weight fish at 75 kilograms per m^3 densities, and the system is designed with headroom to reach 500 tonnes of production per annum. That puts you, if you do a little bit of back-of-the-envelope math, at 1,000 tonnes of production every two years.

So 2,000 tonnes of production every two years would put you at a cost of about $14 million, which is very close to the $12 million we had estimated in the 2009-10 timeframe and substantially lower than the $22 million estimated by DFO. These now are hard estimates, which we're going to use going into production or into construction. It is also appropriate to note that of that $6 million to $7 million, the civil costs are actually disproportionately large, because we are developing the entire site to be able to rapidly expand with more production modules.

Our operating costs are also important to focus upon. Labour is currently our least well-defined utilization, because we simply haven't built and operated a farm. But energy was the key driver in many of the discussions. Our energy costs were initially estimated at nine kilowatt hours per kilogram of each fish produced. That estimate has fallen by exactly 50%.

● (1540)

We still have some way to go, because Atlantic Sapphire is a 1,000-metric-tonne, land-based salmon closed-containment system in Denmark that has just come on line, and they're reporting power consumptions of just two kilowatt hours per kilogram of fish produced. Although our current estimates are substantially smaller than what we initially estimated, they are still bigger than the best in class in the world.

Nonetheless, it's important to remember that at nine kilowatt hours, profitability was previously assured in our analysis. We are truly in a position where we can see, with scale, that the operating expenses can be truly commensurate with those of net-pen.

I will turn to page 5. I want to illuminate where some of those operating costs come from. This is a very busy chart, but standard, off-the-shelf RAS design is pretty much equivalent to thinking about a bathtub with the plug undone: you're pouring warm water into it to keep the fish there at a healthy culture temperature, and you're running a heater to heat that cold water as it comes in. The cost to do that would be literally $2 million a year by burning propane for 1,000 metric tonnes of production. This is what the industry today is assessing as being the non-viable break point.

It is the diagram at the bottom of the page that should be used and it is the diagram that we will use in our farm. As that warm effluent flows out—and it comes from two sources, the air that is blown through to strip CO_2 and the warm water effluent—we extract, with passive heat exchangers, the bulk of that energy. Then, on the residual, we use active heat pumps to reclaim the remaining heat.

That pushes our energy costs down by literally a factor of 10. That is based on a very detailed analysis, assuming the full weather analysis from -2 degrees in the middle of the winter to +20 degrees in the summer. The work is being cross-checked by professional heat engineers from a company called GENIVAR. Lo and behold, Atlantic Sapphire, the company in Denmark that has built the first salmon RAS, is taking exactly the same approach.

That takes me to the next slide and the production of greenhouse gas emissions. This is preliminary work, and I want to stress the word “preliminary”. In that, I would like to solicit your help later in the discussion here.

We are seeing a large amount of discussion in the public forum about how RAS systems are power hogs and can't possibly be considered because of their huge GHG footprint. We took the analysis methodology by Peter Tyedmers, who's an expert in this area, and focused that methodology for the environment of British Columbia.

We did a comparative analysis where we assumed the impact of smolts and feed production was identical. We assumed that once the fish were taken to harvest, they were identical from that point forth. We simply compared the actual core production of fish in land-based production and fish in open-net production. On the next page, you'll see a dramatic analysis with two pie charts.

Open-net pen production has the potential to be substantially worse than land-based farms. The difference in the work is focused at two levels. The original work by Peter Tyedmers assumed electricity based on fossil fuels in central Canada and assumed what I would call an archaic RAS system design. If you strip those two, or account for those two variables, then land-based and ocean-based become equivalent in greenhouse gas production—with it slightly in the favour of land-based farms.

But what has not ever been accurately accounted for is the benthic fouling methane off-gassing. We assumed in this work, and it is a big assumption—and this speaks to the forthcoming ask—that when benthic fouling occurs, we monitor for a sulfate production in the anaerobic layer that forms on the base of the ocean floor. That layer also forms methane. To date, there has been no accurate accounting of that. If you assume that just 70% of that biomass rots in the appropriate manner, you have this huge disparity between land-based and ocean-farmed production.

● (1545)

So on our request, turning to page 8, is that the Department of Fisheries and Oceans are currently looking at a full—

The Vice-Chair (Mr. Fin Donnelly): I'm sorry to interrupt, but could you could just wrap up? Your 10 minutes are up. Could you come quickly to a close in less than a minute or so, Andy?

Dr. Andrew Wright: Yes, absolutely, Fin.

Our observation and request is that a full LCA is included that accounts for that effect, because it's important. As you turn to page 9, you'll see a huge number of industry opportunities and first-mover advantages for British Columbia. Specifically, if you can demonstrate that your new production method reduces greenhouse gases, there's a $25-per-tonne income stream that is available to help fuel the migration from ocean- to land-based technologies.

British Columbia is privileged with a huge number of first-mover advantages. Moving to my wrap-up on slide 10, those advantages are not permanent. Entrepreneurs closer to market will develop competitive solutions, and we are beginning to see this in Denmark with their first farm, Atlantic Sapphire, coming online this last summer. They built that farm for less than $10 million Canadian.

My point to you is that the opportunity here to secure a vibrant, economic, and secure aquaculture industry in British Columbia, serving the rural communities, is at risk if we don't catalyze the change in the current timeframe.

Thank you, Fin.

The Vice-Chair (Mr. Fin Donnelly): Thank you very much, Mr. Wright.

We will go right into the next presentation.

Mr. Lane, you'll have 10 minutes to give the committee a presentation before we go to questions and comments.

Mr. David Lane: Thank you very much. I appreciate the chance to be called to give further information to the committee at this time.

I represent an organization called the T. Buck Suzuki Environmental Foundation. We've been in existence for more than 20 years. As an environmental group, we're based very much on people who work in the commercial fishing industry on fish boats or in fish plants. Our stated mandate is to work to protect wild salmon and other fisheries in the Province of British Columbia.

We're also active in a coalition of four organizations that have banded together and been working for 10 years on looking at impacts from open-net salmon farms. It's called the Coastal Alliance for Aquaculture Reform. We're not about closing down open-net farms; we're about finding solutions to the environmental problems.

We have always said that closed containment is the way to eliminate those environmental impacts specifically. The things that closed containment are able to do and are proven to have done.... The two top issues for the environmental community in British Columbia are the impact from sea lice and the impact from diseases that are generated and amplified on open-net salmon farms that are on salmon migration routes and can transfer to wild juvenile salmon. Those impacts have been well documented in scientific studies showing that the more sea lice you have on fish farms, the more you have on juvenile migration routes with wild juvenile salmon. We believe the same to be true as far as disease is concerned.

If you move salmon farms onto land in closed containment, you virtually eliminate that possibility of sea lice transfer and disease transfer. As a matter of fact, the proponents of closed containment technologies believe that you can operate a farm with no disease whatsoever and even without the use of antibiotics.

As Andy Wright mentioned, the waste from open-net fish farms floats to the bottom and can cause smothering of the ocean floor. That's eliminated entirely by having closed containment, where the water is circulated, filtered, and treated, and all solid waste is removed and can be used as a resource, as fertilizer. It can be used for a lot of different products.

There have been increasing incidents of marine mammals being killed by open-net salmon farm operators. There were 141 California sea lions shot just in the first three months of this year, according to Department of Fisheries and Oceans statistics. That, of course, is not a problem at all with closed containment. You're removing those fish —the target—from the open environment and that problem is virtually eliminated.

With those impacts being zero with closed containment, there still remain a few issues. I want to touch on three that have been brought up to the committee by the salmon farming industry in British Columbia.

The first is that it would take a huge footprint of land to move fish farms from open nets to closed containment. The second is that there's a huge water use. Thirdly, rural jobs where there are currently open-net fish farms would be lost, presumably to urban centres. All three, we believe, are incorrect statements. I'll go through them one by one.

First of all, as far as the huge land footprint is concerned, the spokesperson for the Canadian Aquaculture Industry Alliance, Ruth Salmon, spoke to you on November 1 and said that she believed that in New Brunswick, for example, it would take the equivalent of 18,000 football fields to house closed containment, as opposed to the current net-pen operations. That number is out by more than 200 times. It's actually 200 times less than that.

The amount of land required to move to closed containment actually is about identical to the amount of ocean being used by open-net pens right now. The structure of a net pen.... I'm sure you've seen it visually in some demonstrations. A building needed for closed containment to produce about the same amount of fish needs about the same space.

● (1550)

There's a bit of space around it, about equal to the amount of anchoring for a fish farm in the ocean. There would really be no different footprint on land than on ocean. The difference is simply that it's on private property, on land, and we have more than enough land in British Columbia. To house the same production on land would take about 140 hectares.

If you put that into perspective, agriculture is a huge economic boon in British Columbia, and there are four million hectares in our agriculture land reserve. This would be .001% of that required to have a viable and new economy through closed containment in British Columbia. Also, to put it in perspective, it's about the same space as the largest blueberry farm in the Fraser Valley in British Columbia—one farm.

With respect to water use, it takes a fair bit of water to run the system and to have multiple tanks in a commercial-scale facility, but this is not much different than the water needed for a major food-processing plant or a major fish-processing plant. We have a lot of water in British Columbia. The biggest uses of water are hydroelectricity and agriculture irrigation. This would be a small fraction of those uses. It's a matter of the source and the sustainability of that source.

Finally, I want to touch on the issue of rural communities and jobs moving from where open nets currently are. As a matter of fact, all of the proposals for closed containment operations are in rural communities. They're in the communities on our coast. Good possibilities would be Port Hardy, Campbell River, and even further up in northern Vancouver Island. It helps to be near a fish-processing plant. It's suited to rural communities and it's particularly good for first nations communities.

We believe that the current jobs in open-net operations could be immediately transferred to land-based closed containment. There would be two added bonuses.

First, there are more jobs created through closed containment. It takes more people to run a closed containment operation. This was verified in a Department of Fisheries and Oceans study which found that at least 50% more people are needed to run a closed containment farm. That's a boon for local rural economies.

Second, it's often forgotten that open-net fish farms aren't actually in communities. They're often an hour or so away by boat, in remote locations where somebody goes for a week or more, away from his family and away from his community. If closed containment were in the local community, they would be able to drive to work, just like for a regular job. This, we believe, would be a significant boost for rural economies and first nations in British Columbia and elsewhere in Canada.

Thank you.

● (1555)

The Vice-Chair (Mr. Fin Donnelly): That's great. Thanks to both of you for your presentations.

We'll open it up for questions and comments now. We'll go to Ms. Davidson.

Mrs. Patricia Davidson (Sarnia—Lambton, CPC): Thanks, Mr. Chair.

My thanks to you gentlemen for your presentation to us this afternoon. It has been interesting and informative.

We've been studying this for a while. Although I'm new to this committee, I'm finding it very interesting and we are hearing a lot of good testimony from a lot of different people on both sides of the country.

We heard, for instance, that there were three areas in the Maritimes where aquaculture was in high concentration, and it was felt that aquaculture was the primary threat to wild salmon runs. That was stated by one of the organizations that spoke to us. Do you share that point of view?

Mr. Lane, do you find that on the west coast?

Mr. David Lane: British Columbians, and certainly those in the environment sector, believe that this is the number one issue. Sea lice and disease can magnify on farms and be transmitted to wild salmon migration routes. The juveniles are the most susceptible. All the scientific studies show that the more farms you have, the more you have sea lice and the more sea lice will be transferred to wild salmon. We believe that could be a dangerous threat to our wild salmon stocks in British Columbia.

Mrs. Patricia Davidson: One of the other things that we heard from previous testimony was the issue of escapes from the open-net systems, that being a threat to the wild salmon runs. Do you have any information on that or can you give us any comments on that?

Mr. David Lane: There have been studies done on escapes. The end result of a major escape would be that farmed salmon, which are a different species—they are Atlantic salmon, which doesn't belong on our Pacific coast—could injure our local streams, potentially breed, and take over.

There is no evidence that it has happened so far. On the list of impacts, we're concerned about that. We're concerned about it in the long term, but at the moment it's further down on the list of impacts that we're immediately concerned about. It's eliminated entirely if you move to closed containment.

Mrs. Patricia Davidson: You have different regulations on the west coast than they do on the east coast. It's my understanding that on the east coast they must have a native species, and on the west coast you don't. Is that what you're telling me?

Mr. David Lane: It has been a curiosity for a long time. The fish-farm industry in British Columbia is predominantly Atlantic salmon, which is not a species that lives on the Pacific coast. It's odd that it was allowed originally. The original provincial biologist, when this was being put forward 15 years ago, said that should never happen, but that is in fact what most of our salmon farms in British Columbia are raising.

Mrs. Patricia Davidson: I now want to go on and ask you about the three remaining issues you identified. You talked about the huge footprint, the large amount of water use, and the loss of employment to urban centres. Maybe I'll start with the third one first.

I don't subscribe to the thought that it's going to be developed in urban centres. If we're talking about the land mass that we've been told about by previous presenters, I think it's still going to be in rural areas. It may not be in coastal areas, but it is going to have to be in rural areas. That ties in directly to your comments about the land mass, and if you're saying that they don't need a large land mass, I'm going to have to rethink whether it's going to be able to be closer to urban centres.

Could you comment on that, please?

● (1600)

Mr. David Lane: First of all, it was an illusion by the salmon farming industry that the current rural jobs would move to urban centres. We believe that won't be the case, for a number of reasons.

First of all, it is very suited to rural communities, and it's in rural communities now that you have less expensive land. You would never want to be dealing with urban land prices, so small centres are more amenable. Also, there is a skilled workforce, including those who are working in wild salmon fish-processing in the rural coastal communities. But as another option for development, we also have the ability to expand beyond the coast to other places that aren't immediately on the ocean.

Mrs. Patricia Davidson: When you were talking about the footprint, I believe you said that there wouldn't be a difference in size of the footprint on land or in open nets, that it would be roughly the same amount of footprint that would be required. Is the density the same?

Mr. David Lane: The density in a closed containment farm is greater. You can grow salmon in closed containment with more density and thereby get more production, but still, the actual physical area of an open-net pen in the ocean is almost the same as putting it on land, for the same number of fish.

I think Andy has a comment on that as well.

Dr. Andrew Wright: Patricia, if you pull down my first report, you will see that we've nailed down full engineering diagrams for the construction that we're going to build. We're building a farm. We've raised the money. We're rolling.

In my original report two years ago, I did full-scale drawings then. They are accurate to 5%, and I did a full assessment on what it would take to rebuild the entire industry on land and on the footprint required for that. It is substantively smaller than the proponents of net-pen would have you believe. I'd encourage you to take 10 minutes to read it. If you can read only one section, perhaps read that section.

Mrs. Patricia Davidson: Thank you.

I want to go back to your third remaining issue. That was water use.

Can you relay to me what type of water use and how much water use we're talking about? Is it recirculated? Is it fresh use each time?

The Vice-Chair (Mr. Fin Donnelly): We have about 30 seconds left.

Mrs. Patricia Davidson: Okay.

We're running out of time.

Mr. David Lane: I can be brief. The beauty of closed containment is that the water is recirculated, so only 1% needs to be made up again. This is usually from a well-water supply. It's an amount that is not a huge amount of water in the scale of economic activity and agriculture.

To put it in perspective, if you took the amount of water needed to have the same production on land as in the ocean, it would be about the same amount of water use as one pulp mill.

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Ms. Doré Lefebvre.

[*Translation*]

Ms. Rosane Doré Lefebvre (Alfred-Pellan, NDP): Thank you, Mr. Chairman.

I also want to thank our two witnesses, Mr. Lane and Dr. Wright, for coming here today. Your presence before our committee is greatly appreciated.

I would like to address my first question to Dr. Wright, of the SOS Marine Conservation Foundation.

The financial study you did about recirculating aquaculture systems and the feasibility study done by the Department of Fisheries and Oceans led to somewhat different results. Some are even quite different. Can you comment on that?

[*English*]

Dr. Andrew Wright: I'm happy to comment on that.

We've been through two processes. The first was our initial work in 2009-10. We did the design work and then sized the equipment and got quotes from the supplying industry. We have now raised the money to build the farm. We now have firm quotes because we have construction drawings. We're about to go. We very much know the true cost of what we want to build.

The process that DFO went through was a different process. It was a collective process of advised inputs from the industry and many of those numbers, to my belief—and I was part of that process—were not supported by quoted numbers.

I'm not surprised that there's a difference. The proof is in the pudding, so to speak: go build one and add up the numbers. That's exactly what we're doing.

● (1605)

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much.

As we can read on page 29 of the department's feasibility study, experts in the field presume that the fish produced in these recirculating aquaculture systems will be worth more because these systems are considered biologically safer.

In your study, you say that the fish produced with these technologies will be worth 25% more, and you say maybe more in a footnote. Yet, in the department's study there is no mention of such a premium.

As organic products usually cost more, is it justified to say that the fish produced with these technologies has more value?

[*English*]

Dr. Andrew Wright: My answer to that question is that the higher price is very justified. We have good evidence to support that.

I would encourage you to call Kelly Roebuck from Living Oceans as a witness. She has studied this extensively over the last two years. We have qualified input from Per Heggelund, the CEO of AquaSeed, who already sells close-contained fish in the marketplace. He gets the premium that we aspire to get.

So the answer to that is an unqualified yes: we believe that is supportable in the marketplace.

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much.

Your study is about smaller facilities, with a capacity of approximately 1,000 metric tonnes, but you also include early harvesting of fish at 3.5, 4 and 4.5 kg, for an additional 500-750 MT harvest each year in order to maximize the amount of time the farm is running at peak biomass. DFO's study however does not include early harvesting.

Can you comment on this, and explain what would be the biological and environmental impacts of early harvesting?

[*English*]

Dr. Andrew Wright: I can speak to that directly. The current production method the industry uses is a batch process, whereby all your fish go into the ocean and two years later they all come out. With closed containment, if you are going to maximize your return on your capital, you have the luxury of being able to use and build your equipment so that when all the fish reach maximum size after two years—or in our case, one year, because they grow faster in warm water—then the equipment is running at maximum utility just at that point. But for most of the year, it's not running at maximum utility.

So to boost your return on your investment, when you stock the tanks with the little fry you deliberately overstock, so that when you hit the three-kilogram mark your tanks are full. Your equipment is running at maximum now for a much longer period of time, but because the tanks are full you have to take out a large percentage of the fish to allow the remaining fish to grow to full five-kilogram fish. This, then, allows your equipment to produce two harvests: three-kilogram fish and five-kilogram fish.

If you're really clever, you grade that to harvest three-, four- and five-kilogram fish, maximizing the utility out of the equipment. This is actually being demonstrated at the Freshwater Institute, which I believe you as a committee will be visiting shortly, where they have just harvested their first cohort of five-kilogram fish grown in closed containment, disease-free, vaccine-free, and chemical therapeutant-free fish, in a biosecure facility. Because the water quality is so much higher than the ocean quality, the flesh was firmer, and the condition factor of the fish showing good husbandry was superior to ocean-grown fish, too.

That's sort of a broad answer to your question, I think.

● (1610)

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much,

Do I have any time left?

[*English*]

The Vice-Chair (Mr. Fin Donnelly): You have about 30 seconds for the question.

[*Translation*]

Ms. Rosane Doré Lefebvre: DFO's analysis assumes that an investor will have to borrow two thirds of the cost of the investment at a rate of 7%. Are depreciation costs and interest expenses included in your analysis?

[*English*]

Dr. Andrew Wright: For the work we're currently doing, we have been supported by federal, provincial, Canadian philanthropic, and private philanthropic endeavours, so I personally have not looked at that in any depth. We have no borrowing costs at all for our first endeavour. Indeed, the land was donated to us by the 'Namgis nation, which comes back to David's earlier point that the land in rural areas is substantively cheaper than the costs that were calculated in DFO.

Our project is a project in which we're doing open transparency so that we can really nail down the true costs of getting down to business in this manner. When we're done, we'll be able to say that you need $6 million, $7 million, $10 million, or $15 million. We'll have an accurate number for which the true depreciation costs can then be calculated with some level of certainty, rather than guessing at what the initial number is. Because if you put $22 million in and depreciate it, you end up in a non-feasible position, but if you put in $12 million and depreciate it, you do.... Well, both of those were estimates based on work. As our projects are going forward, we will try to nail economic security down. That's the purpose of our project.

The Vice-Chair (Mr. Fin Donnelly): Thank you.

I turn it over to Mr. Kamp.

Mr. Randy Kamp (Pitt Meadows—Maple Ridge—Mission, CPC): Thank you, Mr. Chair.

Thank you, gentlemen, for appearing. I appreciate the good information, and of course we certainly wish you well on the 'Namgis project. We're looking forward to real information and not just estimates. We'll stay tuned for that.

I think both of you were involved in the aquaculture innovation workshop held a month or so ago.

Were you, Andrew?

Dr. Andrew Wright: Yes, I was a presenter. I was presenting my greenhouse gas analysis and David was an attendee.

Is that correct, David?

Mr. David Lane: That is correct.

Mr. Randy Kamp: I know that there was a lot of focus on recirculating systems and their potential. Was it your sense that there was a widespread optimism or a sense of positivity that this would be something that would replace the current open-net pens that we have? I recall reading an article written about the workshop in the Campbell River newspaper, and you seemed quite positive about the Atlantic Sapphire results so far—and I hope they are positive.

The article referred to a conversation with Mr. Holm, the CEO of Atlantic Sapphire, who was a presenter. He said that the recirculation system he was developing there is a niche product. A small-scale facility such as his, he said, can't compete directly with the main farmed-salmon market.

This is where I'm having a little bit of trouble with your analysis. You're saying that it's organic so you're going to extract a premium on the sale of the item of perhaps 25%. Whether that's accurate or not, I don't know, but let's say it is. You would extract that because it is a niche product, but if it becomes the way everyone does it everywhere, for example, if that were possible, then would you get that premium? Also, in the transition of going from where we are to this, how do we stay competitive with the rest of the world that's likely going to continue farming in open-net pens?

● (1615)

Dr. Andrew Wright: There are two questions there.

The first point is this. I also read that article in the Campbell River newspaper and walked away quite annoyed, because I felt that it was a very biased synopsis of the meeting. At that meeting, we had several projects from around the world present their designs for closed containment, the economic analysis behind their systems, and the performance they expected.

There was indeed a wide range. In China, the cost to produce the closed-containment system was unbelievably low, and they didn't care too much about the energy costs on those systems. Atlantic Sapphire, which, as I said, was built for less than $10 million, which was the break point.... A net pen costs you about $8 million for the same level of production, so let's be clear here, and the operating costs would be similar.

So Thue Holm, the CEO at Atlantic Sapphire, is at a point where he can compete, but he is also very astute. Although he uses the word “niche”, as you have identified, he's demanding and getting a premium in the marketplace because of that.

Now, I agree if the entire industry moves towards that, then you commoditize that.

One of the other facts that's failing to be monetized here is this one. Because we capture the waste stream, which is both liquid nutrient and solid waste, alongside each of these farms there is the potential to directly inject that into high-end vegetable production and to boost the bottom line. Today, our open-net pens are throwing away a huge amount of revenue by dumping that valuable waste stream into the ocean, and the amount of opportunity there was captured in our original work.

Our CEOs today are rewarded by maniacally focusing on a single product and optimizing for the production of that product. It's done on the back of cheap energy, essentially. Going forward into the future, the waste streams of one industrial activity have to become the feedstock of the next industrial activity. The nutrient flow off the back of these farms is phenomenal.

Today we spray water all over the fields with chemical fertilizer injected into it, but the fertilizer in these farms is already there. We can grow tomatoes and peppers, for instance, straight on the back of these farms. Again, it expands rural economies. Again, it expands economic diversification and, again, secures a broader infrastructure in our rural communities.

Your questions are very valid. Your concerns are very valid. But I think the very purpose of the project that we're doing is to spearhead the solutions around escaping those conundrums.

Mr. Randy Kamp: I appreciate that, and I think there is a ways to go on how we use these waste products and so on. In your analysis, though, how did you treat the waste products? Was it as something that would reduce operating costs on the income side or...?

Fire away.

Dr. Andrew Wright: If you look to our original work, you will see that we provided both analyses: with and without a revenue stream from those products.

The first phase of our project analysis does not account for a revenue stream from those waste products. We are counting on a premium in the marketplace, and that premium has been qualified directly with suppliers. Today if you go to Safeway, you will pay $20 a kilo for your salmon, which was purchased from the farm at $6 a kilo, if they're lucky. The middle ground is eaten up with multiple distributors.

We've secured direct-to-marketplace contracts. That margin, the difference between $20 to the consumer and $6 at the farm gate, is shared between the end supplier and.... Why would we want to pay a bunch of middlemen the bulk of our profit for our endeavours?

So the Sobeys stores of the world and the Whole Foods of the world are coming to the table with contracts that say that if we guarantee a thousand tonnes of production per annum, they'll take it off our hands at much higher prices, because they're still making more money than they would have when they bought commodity salmon.

That's our vehicle to get started. I agree with you that in the long term we have the potential to commoditize, but the fish quality is higher. This has been demonstrated, and you'll see this on your visit to Freshwater. It's a premium product that is measurably premium; it's not premium because it has been labelled something nice, but because consumers and chefs have tested it. It always comes back that the closed containment fish is optimally exercised, it is grown in clean water, and so on. I pay a premium for grass-fed organic steak, and it's a massive premium. I will do the same for the fish that I feed my family.

● (1620)

The Vice-Chair (Mr. Fin Donnelly): Thank you.

We'll go to Ms. Murray.

Ms. Joyce Murray (Vancouver Quadra, Lib.): Thank you, Mr. Chair.

I want to thank our presenters for being here. It's good to see you again. It has been about eight months since I was on this committee. Many tides have flowed in those eight months. I'm sure there's information that has come forward to the committee of which I'm not aware, but I would like to focus on some of the details in your presentation just to understand it better.

Andy, you talked about net-pen aquaculture done on the back of cheap energy. I have a lot of appreciation for the way the aquaculture industry has been working with conservation groups to find sustainable ways of doing what they do, but I would say that it's also done on the back of externalizing waste and risk. When the waste from the net pens falls to the benthic layer, in British Columbia.... A lot of the industrial pollution in British Columbia—this end-of-pipe pollution—has a price attached to it; that's our regulatory mechanism. But I don't think there is such a price attached to the waste produced in the net-pen farms.

When you were doing your calculations of cost comparisons, did you do any calculation of the volume of waste produced? If it were to have a cost attached to it, as much of our industrial pollution has, what would that do to your cost comparisons?

Dr. Andrew Wright: I can answer that in part, Joyce, and it's nice to see you again.

The first part is that we absolutely calculated the volumes. For every tonne of fish that is produced, approximately a quarter of a tonne of solid wastes is produced. I can't give you a number off the top of my head, but a substantive level of nitrates and phosphates goes into the liquid waste stream. We have not costed those. You are correct: it is an end-of-pipe sewage issue. It's as simple as that.

What we have costed, on the land-based side, is what we could do with that waste to turn it into a value-added product. For every tonne of solid waste that is produced, you can produce about 500 to 1,000 kilowatt hours of energy. That is well documented for anaerobic decomposition.

We looked at energy with this as a source, and it would account for about 5% of the energy costs of the farm. It's quite modest, but nonetheless, you could burn it to heat a co-located greenhouse very comfortably.

Then, the liquid nitrate stream is very important, because it is very dense in nitrates. The opportunity to grow fruits and vegetables is there.

We costed it from the opportunity side. We did not put a price on the end-of-tailpipe, and it's a very valid point that you make. Again, if that were to occur, it would again make closed containment even more favourable.

Ms. Joyce Murray: I put that out as a possibility in your discussions with the provincial government, because I think what you're trying to do is have a transparent costing of the two alternatives all in, and that externalizing of pollution for free is a disadvantage for you in the calculations. British Columbia, in my experience, has had an appetite to price pollution.

As an aside, when I was the environment minister, I was successful in increasing the price of the compounds that were being regulated and charged for by 48% over three years. Industry accepted that as a reasonable part of being a corporate citizen. They actually are paying for the cost of their pollution. To translate that into this industry, even on a theoretical basis, is very legitimate.

This is a bit of a detailed question. You were talking about your power savings. You showed the model in which you excluded the smolts, the feed, and the harvest-to-market for greenhouse gas emission calculations. Did you also exclude those parts of your value chain when you made your energy calculations, the 90% savings calculation?

● (1625)

Dr. Andrew Wright: I'm not sure as to the clarity of your question. Perhaps a little illumination on my end could help.

When we did the greenhouse gas emissions comparison, it was a fair apples-to-apples comparison. We interviewed the former farm manager at length, for every detail from the generators used on site to how the feed was delivered to open-net pens. We did a very detailed assessment of every energy-consumptive point, from when smolts or feed were delivered to the farm, and from when those fish were handed off to the production.... Beyond that boundary, we got no window into how much energy they used. We assumed it would be the same for both. It was just the difference between the net-pen production and the closed containment production that we were seeking to ascertain.

While I have the floor here, I would like to be clear that the level of methane off-gassing from the net pens is currently a very unknown parameter. I know that DFO is doing a life-cycle assessment. I would like that information to be accurately assessed by the experts on that subject, because fundamentally there isn't enough public domain knowledge about that process at the moment.

Ms. Joyce Murray: Thank you.

I have another point for clarification.

David, I heard you talk about where the land would need to be and I heard you say that it doesn't need to be on the coast. When I was with the committee and travelling to look at closed containment, one of the concerns was where to find flat enough and affordable land, with fresh water, land that is owned by the private sector or is accessible.

What I was hearing is that this could be anywhere in a rural community, that it doesn't have to be on the coast in British Columbia. Is that correct?

The Vice-Chair (Mr. Fin Donnelly): Just a short response, please, David.

Mr. David Lane: Yes, it opens up new opportunities.

A number of developers on the coast want to use saline water; they want a salt component. There are others who want to do it with just fresh water, and that can be done in any part of the province or any part of Canada.

The Vice-Chair (Mr. Fin Donnelly): Thank you very much.

That concludes our first round. We're now going to shift to a second round of shorter questions. We have five minutes.

We'll begin with Ms. Doré Lefebvre.

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much, Mr. Chair.

This is more a question for Mr. Lane, but I would like to hear Dr. Wright's opinion as well, if possible.

Concerning open-net production, there are many potential impacts, particularly on the environment. There is a lot of concern. For example, there is an added risk of disease for wild salmon and there is the presence of pollutants like pesticides, antibiotics and food preservatives.

Last Tuesday, we heard representatives of the aquaculture industry, namely Cooke Aquaculture, which is presently facing 11 charges concerning the use, in the Bay of Fundy, of a pesticide which is illegal in Canada. In this case, the pesticide was used to prevent sea lice. It was devastating. Evidence proved that this pesticide had a negative impact on the nervous system of lobsters, causing paralysis and even death of thousands of lobsters.

With open-net facilities, is it possible to use more biological tools to prevent this kind of disease? Is it possible to do without those pesticides which destroy other forms of life in the ocean?

● (1630)

[*English*]

Mr. David Lane: There are two comments I would have on that.

First of all, this is why we believe that moving to closed containment is a real solution, because it eliminates the problem of disease and sea lice.

Second, as far as open-net pens are concerned, when they're using various pesticides in British Columbia, it's a product called Slice. Pesticides are known throughout the agricultural community to eventually become ineffective through resistance from the disease or pests and, in all cases, with New Brunswick being the prime example at the moment, other chemicals have to be used: more toxic chemicals have to be used and unproven chemicals have to used.

Again, we say that the best thing possible is to get these out of the ocean, to not have fish in concentrated circumstances in the ocean, but to instead keep them on land where these are not problems.

[*Translation*]

Ms. Rosane Doré Lefebvre: Dr. Wright, do you have a comment?

[*English*]

Dr. Andrew Wright: I'll make a very quick one and say that when you put a million animals in a very tight space, with no biosecurity in the ocean, you will get rapid development of bugs, pathogens, disease, and whatever. By going to closed containment, we are afforded an additional benefit. We treat all our water on an hourly basis as it recirculates, with ozone and UV, so any parasite that would perhaps come in by accident—and you have to be prepared for that to happen—is immediately killed and not allowed to propagate.

Furthermore, because of the environment being so contained, salt —and you'll hear this when you visit the Freshwater Institute—can be readily utilized as a very good therapeutant, and salt is as natural as it comes.

[*Translation*]

Ms. Rosane Doré Lefebvre: In your opinion, then, it is impossible to use biological tools to prevent that kind of disease in open-net facilities, so one has to use pesticides, antibiotics, those type of things?

[*English*]

Mr. David Lane: That has been the case. It is certainly a major disaster as far as disease is concerned in Chile. It crippled that industry for a number of years.

In terms of the sea lice issue on the east coast of Canada, in every jurisdiction where fish are in the ocean, there have been these kinds of problems.

It actually is the stated purpose of those who are developing closed containment. Those who want to farm that way see this as a way to get away from those problems.

[*Translation*]

Ms. Rosane Doré Lefebvre: In your opinion, this kind of problem does not and cannot happen in a recirculating aquaculture system.

[*English*]

Mr. David Lane: No, they would be using disease-free eggs or smolts, depending on what stage was being introduced. There is no ability for disease or parasites to come onto the site.

As Andy said, it's a biosecure site, so it's a completely different circumstance, and the operators that we know have been completely disease-free.

Dr. Andrew Wright: I would like to clarify that. I'm an engineer and a mathematician. I'm not a biologist.

The Vice-Chair (Mr. Fin Donnelly): Very briefly.

Dr. Andrew Wright: What I would like you to think about is this: in the ocean, every farm is inextricably connected by the water to every other farm, so when there is a disease outbreak it has the potential to run through the entire industry.

But if I have 100 farms that are absolutely isolated from each other, I could get a disease at one farm, and it is limited to that farm; therefore, the economic security of the country is far higher.

● (1635)

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Mr. Leef.

Mr. Ryan Leef (Yukon, CPC): Thank you very much, Mr. Lane and Mr. Wright, for your information so far.

Like Mr. Kamp said, we are very interested in seeing how this progresses and translates from theory and some of the assumptions into practical application and the hard results. I see some impressive technology and the fact that you're able to operate with no borrowing costs, and there may be some differences between Atlantic Canada and Pacific Canada in land access. Those would be interesting variables to look at when we try to link to the secondary opportunities you noted. I think that's a fantastic way to approach this.

It does link into one of my questions. Would you characterize the open-net farming right now as a lucrative business? That's a question for whoever is more comfortable answering.

Dr. Andrew Wright: Commodity pricing has made that not a lucrative business. In British Columbia, the production unit of Marine Harvest this year is currently barely breaking a profit, if not taking a loss. That operating margin is so skinny because of production issues around kudoa and disease, and also, a broad glut of fish, particularly as Chile comes back online, has pushed the current price to below $3 a pound at the Seattle market.

I believe closed containment is a way to escape that conundrum, because kudoa is a massive issue on this coast. For those who don't know, it's a parasite you can't escape. It's in the ocean and it causes the flesh to go mushy and soft very quickly post-harvest or post-cull.

The other issue we need to explore is the true nature of how these companies are orchestrated, because it is $20 a kilo in the marketplace and $6 a kilo at the farm gate, yet these companies globally are making a profit. Like all multinationals, they're usually organized to secure their largest profit margin in the lowest tax jurisdiction, and that then causes us to reflect on how much value we are truly getting for leasing our environment to these companies. That is an important issue we need to look through carefully: the whole value chain and where profits are actually retained.

Mr. Ryan Leef: Thank you.

Earlier in testimony, you mentioned the waste stream ending up on the ocean floor. At the last committee meeting we had, we heard that the lobster fishery in Atlantic Canada actually surrounds the net pens and is doing quite well.

Obviously B.C. has an ocean floor fishery, so are you seeing any change in that around these areas? Is there already a direct impact from that waste stream that you know of?

Mr. David Lane: I'll just speak in regard to the commercial prawn fishermen with whom we have contact. The extra waste on the floor can give more prawn abundance, but whenever there is an application of this pesticide called Slice, they're reporting that the prawns are not there at all. There are studies being done to see what the actual implications of these pesticides are on our prawns and crabs, but it is of great concern to commercial fishermen whether those chemicals are going to reduce their catches near farms.

Mr. Ryan Leef: So minus the chemicals, they're actually somewhat of a benefit from that waste stream in terms of prawn enhancement. That's interesting.

Now, going way back—and this is maybe just getting muddied in details—I was interested when you were talking about the sea lion kills. I certainly know this isn't a palatable justification for it, but just out of curiosity I'm wondering if there is any benefit to the Pacific wild salmon from the predators being shot.

Mr. David Lane: The issue there would simply be how many sea lions and seals we're talking about. There is a large population of sea lions and seals in British Columbia and they do eat a lot of wild salmon. The public in British Columbia has quite an aversion to marine mammals being shot. When news came out as to the degree of marine mammal kills earlier this year, it got quite major headlines. I don't think the public sentiment would agree with that level of destruction of marine mammals at all.

● (1640)

Dr. Andrew Wright: I would like to ask the committee to also take into account the work of Professor Andrew Trites at UBC, who has researched the diet of sea lions in particular. They also prey extensively on the prey of salmon. So there's a very fine ecosystem balance there: if you take the top predator away, then the predators that prey on the salmon, in terms of smaller fish that prey on salmon fry, will then explode. He is the expert on this matter. I would counsel you to talk to him.

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Monsieur Tremblay.

[*Translation*]

Mr. Jonathan Tremblay (Montmorency—Charlevoix—Haute-Côte-Nord, NDP): Thank you, Mr. Chair.

I have some questions about GHG. I see that Dr. Wright's analysis leads to findings which are different from Dr. Tyedmers's—I'm not sure I pronounce his name properly—who did a life-cycle analysis of salmon aquaculture systems.

Can you comment on this difference? Are there specific variables, measurements or assumptions in Dr. Tyedmers' model that may be different or unjustified? Thank you.

[*English*]

Dr. Andrew Wright: I would be delighted to. I've actually walked Peter through our discussions and we have spent time going over his paper. I wouldn't say they're discrepancies. I think it's an area of focus.

Our electricity in British Columbia is largely fossil fuel-free: it comes from hydro dams. The work that Peter Tyedmers did was specifically focused on central Canada, where the energy is predominantly coal-powered, so that was a huge discrepancy straight out of the gate.

The other area that he did not account for.... It's not really a case of accounting for, as we both accounted for it similarly, but we're doing it now in the context of British Columbia. That makes a very important difference. Our numbers are pretty much the same in terms of utilization of various factors, whether it be tugs to move barges of feed or whether it be trucks. We all come out as a wash there. It's just the hydro component that makes a big difference.

The other factor that was not and has not yet been accurately accounted for—and I want to stress that it's not accurately being accounted for—is that we have no data on how much of the benthic fouling does methane off-gases. That is really important. If we argue from a societal perspective, we should be making decisions from a scientific, fact-based perspective, where we get the details and make the right decision. We don't yet have the data to clarify.

What I can tell you is that if you don't account for methane off-gassing, net pens and land-based farms are equivalent in their GHG footprint. If there is even just 10% of off-gassing from the benthic fouling, there is a revenue stream from the Pacific Carbon Trust to be had to facilitate the transition from net pens to closed containment. I think that's a very exciting opportunity. We just need to be able to audit the exact improvement.

[*Translation*]

Mr. Jonathan Tremblay: Thank you.

Let's stick with your analysis and the energy cost. In your analysis, Dr. Wright, you say that even if we don't consider the emissions created from the waste stream, land-based closed-containment aquaculture still produces less GHG emissions than open-net aquaculture facilities. As closed-containment aquaculture facilities have higher energy needs, I would like to know why they still produce less GHG emissions than open-net facilities.

[*English*]

Dr. Andrew Wright: Let me be very clear. The land-based farms are significantly lower in GHGs and energy consumption.

Net-pen farms are not free. They run generators to run the lighting systems that illuminate the nets for photoperiod manipulation. They run generators to blow feed into the nets, and they run generators to support the services of the residential areas on the farms. They're all diesel-powered, low-efficiency generators in the middle of nowhere.

We, on the land-based side, will be using hydro, which is GHG-free. Only 5% of electricity in British Columbia is produced from fossil fuel. It is 95% dam hydro power. When you do a fair, accurate audit of a closed-containment farm in British Columbia versus a net-pen farm in the Broughton Archipelago, using the comparative analysis work that we showed, the farms have identical...with 200 metric tonnes in the favour of land-based, not including methane production. If you include methane production from the ocean floor, then the net-pen becomes appropriately worse, by the amount that you would apportion to being methane off-gas.

Let me be very clear. Using modern technology with a modern design, land-based farms have a lower footprint, period. How much lower needs to be accurately assessed.

● (1645)

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Mr. Sopuck.

Mr. Robert Sopuck (Dauphin—Swan River—Marquette, CPC): Thank you, Mr. Chairman.

I have a comment regarding the rural issue. While closed-containment aquaculture will likely remain a rural enterprise, I think you will definitely see a migration—if it went far enough—to other rural areas that have lower hydroelectric costs. Indeed, I was just informed that in Montana, two Hutterite colonies are already using closed containment to raise coho stocks. Where I come from in Manitoba, we have the lowest hydroelectric rates in North America. Once closed containment becomes really viable and if it were ever mandated, I think you would see a migration away from coastal communities.

Regarding the comment about production via closed containment for a niche market, there is the notion that you will be getting higher prices for this niche product, as my colleague Mr. Kamp called it, based on a report. What you're basically doing with closed containment is producing a luxury item for high-income consumers. Is that correct?

Dr. Andrew Wright: That is where we will essentially start our business so that we're profitable from the beginning.

There's also another market pressure. Again, I encourage you to call Kelly Roebuck, from Living Oceans, who studied the marketing perspectives deeply. By 2015, market pressure will be demanding that the Safeways of the world.... In fact, Safeway has committed to removing Atlantic salmon, as currently produced, from their shelves. We have another pressure point on the industry that is forcing the change to a higher standard of production. I think that is a global initiative. I think you will see that, sir, become ubiquitous.

Again, we can get ahead of the curve by moving to closed containment earlier rather than later, because we'll begin to command more of that end market as that market shift rolls through.

But please don't take my testimony here too accurately; I believe that to be the case. I know Kelly Roebuck to be the market expert, and perhaps David might have a—

Mr. Robert Sopuck: I would just like to continue. My time is very limited and I have a number of areas I'd like to cover.

In terms of calling people up, my recommendation is that you call up low-income people and ask them how they feel about higher food prices.

Regarding the issue of workers, net-pen aquaculture generates some 6,000 full-time jobs in coastal communities right now.

Mr. Lane, you made the comment about how inconvenient it must be for workers to travel to these remote sites, stay for a week, and then go back home. Have you spoken to any workers who are dissatisfied with that? Have you asked them why they chose that way of life?

Mr. David Lane: Those jobs certainly are creating employment right now in coastal communities, but I certainly have talked to people who would prefer to live in their own community and go home every night to their families.

It's not one or the other. What we're saying is that it could be produced on land, have more jobs than what there is currently for the same amount of production, and perhaps be better for communities and families.

● (1650)

Mr. Robert Sopuck: Well, again, that's a presumption, and I need to see data before I'll accept that.

Given that off the coast of British Columbia net-pen aquaculture has been going on for between 20 and 25 years, Mr. Lane, you made the comment—and I'm paraphrasing—that all scientific studies that have been done show an effect on wild stocks. You made the other point that when escapes happen, they—quote, unquote—breed and take over. Can you substantiate both those claims?

Mr. David Lane: What I was saying was about the weight of evidence of the science. There has always been quite a controversy on the B.C. coast with regard to the scientific studies, but when you look at the vast majority of studies—those looking at the impact of sea lice in particular, which has been most studied, while disease has had very little study—the weight of evidence to date shows that when there are more sea lice on farms, there are more sea lice on wild juvenile salmon. Small salmon are very susceptible to the effects of both pests and disease. That has been the big concern.

As far as escapes go, the evidence is not there at the moment to show that there is a major impact on wild streams; it's just that the escapes have happened and farmed salmon have gotten into streams.

Mr. Robert Sopuck: So your “breed and take over” statement is a bit of hyperbole.

The Vice-Chair (Mr. Fin Donnelly): Thank you. We've reached five minutes.

Ms. Murray.

Ms. Joyce Murray: Thank you, Mr. Chair.

I want to make a comment in this debate about the impact of the waste from salmon production on benthic organisms. It's certainly not my understanding that the impact on the benthic is a net positive just because there are more prawns. In fact, the industry has done a very good job of reducing the waste falling onto the benthic.

That was big, and it was due to a provincial regulation requiring that. That regulation was needed because some of the areas were being permanently damaged. There was essentially no life on the seabed floor in places where there was too much waste falling in areas that didn't have a strong current. This is something the industry has been working to manage over the last 10 years. They've been cooperating with the regulations of the provincial governments. That's just a note that this should not be dismissed as one of the costs, one of the prices, and one of the risk factors of net-pen salmon farming.

I'm interested in what you see as a potential transition towards land-based farming that would include the current investors and the companies producing salmon through open-net pen. I think that the British Columbians who have those 6,000 jobs, the business community, and certainly all of us who are interested in the economy of British Columbia are not looking to put out of business companies that are doing their best to manage, mitigate, and limit negative impacts.

At the same time, there are some factors that aren't priced in yet, and it looks as though an industry is developing that is going to show a real positive alternative.

Dr. Wright, you were saying that we need to get on this to have first-mover advantage, so how far behind are we now? What are you suggesting the government do to assist with the transition to a lower-risk means of raising our salmon in a way that can still be economically viable? How does one do that without subsidizing individual businesses? Also, have you thought to the next step about what you would be advising provincial and federal governments to have in terms of a regime in order to have a win-win transition?

Mr. David Lane: I could start with that.

First of all, most of the closed containment developers to date have been smaller companies that are not part of the traditional net-pen industry. We were very pleased to see that Marine Harvest Canada took a different route and did a full engineering study of a potential closed containment farm that they are considering. They don't have the financial arrangements to pursue that at the moment, but they're hoping with some change in the price of fish that it might be a possibility. We were very pleased to see the largest net-pen operator wanting to pursue this as an option.

As for what we believe the government could be doing, there are two good federal government programs that have been of assistance to a number of the closed containment developers that are moving forward with their plans. I think access to capital is a problem, so some kind of a loan program in addition to that would be helpful for those that are starting out and aren't huge companies.

● (1655)

Dr. Andrew Wright: I also think you could get very creative around a five-year migration window, for instance, from net-pen to on-land industry. I think you could be creative about how you use the first few farms, because instead of growing your smolts to 100 or 200 grams and placing them in the ocean, one closed-containment farm could grow the same amount of fish to just a simple one-kilogram mark, and then stock the farms in the ocean. This would allow big fallow windows during the out-migration of the wild salmon.

So you could get very clever about how you use your first investments to ease the pressure on the wild salmon and develop the technology to a cookie-cutter level, where your costs are one-half of what they are today, as you slowly scale towards moving this industry from the ocean to land. I don't know how we'd get it going, but perhaps an all-stakeholder, brainstorming, creative session with legislative recommendations coming out of this that all parties could buy into in terms of a solution process....

Ms. Joyce Murray: Thank you.

Dr. Wright, you talked about the 'Namgis partnership, where the land was free. Is that inherent in your costing model that there is not capital and there is not a mortgage to pay for land? If so, does that make it inherently a partnership with first nations? I know that many of the jobs in the industry now are first nations jobs in remote areas, and it's very important to those communities. I'm wondering if that's the model you're envisioning.

The Vice-Chair (Mr. Fin Donnelly): A very brief answer, please.

Dr. Andrew Wright: No, it's not. We did cost the price of land and we also have the luxury that hasn't been explored here. In British Columbia we have a huge amount of crown land that is available for low-lease consideration.

The former deputy minister for agriculture and lands in British Columbia said they would be delighted to facilitate that discussion. It is a huge national asset that we can put to work, just like we put forest tenures to work.

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Ms. Doré Lefebvre.

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much, Mr. Chair.

Right now, in Canada and around the world, many fish farms use open-net facilities to produce fish. Very few of them use closed-containment facilities during all phases of production.

In your opinion, what is currently the most important obstacle to the development and the implementation on a larger scale of close-containment technologies for salmon farming?

[*English*]

Mr. David Lane: I will give one answer first and then pass it to Andy.

In fact, land-based aquaculture is a huge industry around the world right now, but it has only newly moved to the opportunities with salmon. There are other species—tilapia and barramundi are examples—that have been well developed and are in huge production around the world.

What we're testing out now is salmon. Technically, it works very well. Salmon are grown in closed containment on land and, in the first part of their life stage, in hatcheries, so there's nothing new there. What's new is making sure that with the current price of salmon and the markets this all fits together. It may take a few years for that to develop in a way that gives a full opportunity.

Dr. Andrew Wright: From a hardcore engineering perspective, I would say the barrier to entry at the moment is true lack of knowledge of how to build these farms. One of the things I'm proud about in the 'Namgis project is that the package of information we're going to develop—all of the intellectual property, the knowledge of how to do this—is going to be made open and transparent, so that any community in British Columbia, or in the world, for that matter, can come and take our knowledge and cookie-cutter their own farm. There's a lack of knowledge and there's a dogma around the notion that it can't be done.

● (1700)

[*Translation*]

Ms. Rosane Doré Lefebvre: Thank you very much.

In the past decades, wild salmon stocks in the Atlantic have declined by more than 75%, from 1.8 million in 1973 to 418,000 in 2001. This is a huge decline, by all means.

In your opinion, what is the most important thing the government could do to protect wild salmon?

[*English*]

Mr. David Lane: That's a complicated question, because there are multiple reasons for the decline. But if I were to list them.... I'm sorry that I don't know them beyond the British Columbia circumstances, but here it's a matter of protecting our wild salmon streams from agriculture and logging near streamsides. It's a matter of ensuring there aren't major pollution sources that are detrimental to wild juvenile salmon. It's about making sure that fisheries are sustainable: commercial fisheries, recreational fisheries, and first nations fisheries. Finally, it's a matter of making sure that there aren't impacts from salmon farms in the British Columbia context.

I wish I had answers for the east coast, but that's not my experience.

Dr. Andrew Wright: I would counsel you to look carefully at the Cohen commission. This has been a very difficult area and it is probably inappropriate for me to weigh in on it, but Judge Cohen has done a very thorough job of looking at all the aspects, and at all the disease impacts in particular. I suspect that the outcome of the commission will be very important to watch.

[*Translation*]

Ms. Rosane Doré Lefebvre: That's all for now.

[*English*]

The Vice-Chair (Mr. Fin Donnelly): We're almost out of time, so I'll turn it over to Mr. Allen.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you very much, Mr. Chair.

Thank you to the gentlemen for being here today. It's been interesting, and a little bit on the different side of some of the issues from what we've heard, but that's always good.

I have a couple of questions.

Mr. Wright, I've been looking at table 3 of the cost estimates in the DFO report. There is quite a list of equipment going into the RAS system. You've indicated that for a facility of 2,000 metric tonnes you're estimating an order of magnitude of $14 million, but this table indicates $22.6 million. What are the major pieces of equipment that you're seeing you would get savings on, as opposed to what's published in this study?

Dr. Andrew Wright: It's not so much a matter of savings. It's the difference between it being estimated by committee without commercial quotes, versus commercial quotes, which is what we did.

Mr. Mike Allen: Okay.

Have you done any sensitivities on some of your analysis to determine the profitability of this? The reason I ask is that I'm looking at different things. As you're very familiar with, the sensitivity table that was done in the report talked about water temperature, biomass density, and other types of things. Have you done any of those types of projections for the pilot project? What have your numbers shown?

Dr. Andrew Wright: We are doing that as we speak for our specific design, which we've just tabled.

What I would say to you is that the model developed by DFO, which you have sort of tabulated there in that report, is actually an excellent model in terms of being able to explore all those sensitivities. You just need to plug in the numbers to explore the sensitivities. So if you plug in $12 million for the capital cost, the outcome currently shown in that report—that closed containment was barely profitable, including depreciation, at $22 million—becomes quite profitable at $12 million.

Please don't get me wrong: that was an excellent piece of work in terms of the full package. There was a lot of work done by DFO to construct that model. What you feed into it is very useful, so pick your starting point and explore. We are going through that very exercise now for our project, and we'd be delighted to report on that in due course.

● (1705)

Mr. Mike Allen: Did I hear you correctly? Did you say that from the operational cost standpoint you really didn't have a good feel for the labour numbers for the RAS system yet? Did I hear that correctly?

Dr. Andrew Wright: I would say that we believe we have a very good number, because we've produced a bio-plan and determined the number of people needed to support that bio-plan.

Unlike in the case of engineering energy, for instance, where you can compute how many pumps you need to shift so many cubic metres of water per second, and it's a very accurate calculation, until you've actually run a farm and tripped over the fact that twice a week you have to sweep this place out, for instance.... The probability of unexpected activity is high. We do have a very good appreciation of what we think our labour will be, but until we've gone through that exercise we won't know, whereas you can compute precisely how much energy you're going to need because you know the amount of water and the pumps, etc.

I was putting out a note of caution there, but we have actually very carefully costed what we believe it will be. We believe we'll be in a profitable situation.

The question is, how profitable? That's the argument. Also, how susceptible will our premium pricing be to commodity variation in the marketplace? You have the price at the top wandering up and down. At the moment, the current price at Seattle, fresh on board, head on, gutted, is $2.9 per pound. That historically has peaked above $5. There is a highly volatile market on the commodity side.

Luckily, since we have gone to electricity on land, our electricity costs are very stable. They're not linked to propane, which follows oil in price.

So these are all variables we have to consider. The DFO model did a really good job of providing a tool through which you can enter numbers to explore all that. So I'm really confident that we'll be—

Mr. Mike Allen: Sorry, but I'm starting to run out of time.

On your funding sources, you have assumed there's no financing in this, which is probably not the case in the long term when you talk about commercial operations. It is probably not a reasonable assumption that you will not have to finance. What are the funding sources for the pilot project? What assumptions would you make going forward about a level of financing that would be required for a commercial operation?

Dr. Andrew Wright: In our modelling and assessment work and the DFO work, financing was assumed to occur at commercial rates. That's all factored in.

On this particular project—and I'm not familiar with the deep numbers, because there's a team and I'm not the financial guy—I think we're supported about 60% by a federal program, 20% to 30% by American philanthropic support, and 10% by private Canadian philanthropic support. For instance, a substantive amount of my net worth has been donated into this program.

We're building a system in which the costs are accurately articulated and transparent: the hard costs, the costs to dig the hole to put the concrete in, the costs to run the thing, and the costs of the labour. At the end of this exercise, within a year we will know, and we will not be guessing about our decision-making going into the future. That is the key issue. The DFO study was an excellent first pass, but until you get real quotes and you've dug real holes, those numbers are all still extremely subjective.

Mr. Mike Allen: Thank you, Mr. Chair.

The Vice-Chair (Mr. Fin Donnelly): Thank you.

Mr. Hayes.

Mr. Bryan Hayes (Sault Ste. Marie, CPC): Thank you very much, Mr. Chair. I appreciate it.

This question is for Mr. Lane. I'm looking at the work of your committee; it says that it's to protect wild salmon and other fisheries in B.C. You said in your opening comments that it's not about closing open-net technology. I could be mistaken, but I think you alluded to the possibility that open-net technology can actually be fixed or repaired.

I do want to understand this. Is it possible to fix or repair open-net technology? What might those costs be? I'm trying to do a comparative analysis here that says we can fix open-net technology, and we can address those concerns, at a certain cost. What is that cost in relationship to actually constructing the closed-pen technology? Can you enlighten me on that, please?

● (1710)

Mr. David Lane: To answer your question, at the moment the jury is out as to whether net pens can be brought to a level of not having an impact on wild salmon in particular or on other parts of the environment. The fundamental issue there is disease transfer. There has not been enough research at all to determine the long-term impact of diseases that come from fish farms on wild fish stocks, wild salmon stocks. Until we know what that is, the question is to some extent unanswerable.

We know that some farms and series of farms are placed on particularly important wild salmon migration routes. In theory, you could say to move them off those routes as a first interim measure, and there are costs to that, of course. If it's found that disease is far more widespread or could spread much more easily than sea lice does, for example, then the problem we have on our hands is whether or not there is an appropriate place in the ocean to put net pens.

We're calling for more research into those issues of disease and sea lice and for a longer-term transition into closed containment. That may take some time, but we believe that it has to happen and that the research has to be done to determine the long-term impact on wild salmon stocks.

Dr. Andrew Wright: It might be appropriate to draw a comparison with the chicken industry, with the outbreak of avian flu, which meant that you very quickly had to bio-isolate flocks by keeping them indoors.

Mr. Bryan Hayes: That's a fair comparison.

Mr. Lane, I believe you mentioned that in your estimation open-net jobs could be transferred to closed-containment jobs. Mr. Wright stated that labour utilization is the least well-defined cost variable.

Gentlemen, there seems to be a little differentiation between your two lines of thought in terms of labour. It was touched on earlier. I'm trying to get a clear understanding of what the impact in terms of a labour shift would be if open-net technology closed and whether it would be equitable.

Dr. Andrew Wright: I can speak to that. I'm speaking as a mathematician. When I talk about undefined or less defined, we know quite well that it might be six versus seven employees per 10,000 metric tonnes of production. A net pen is less than four notionally. So there's definitely an increase in jobs. The question is whether you are able to squeeze that to six jobs or whether it is eight jobs. That's the kind of variation I'm thinking about.

Mr. David Lane: To be more precise, the DFO study estimate was that it took 18 full-time people to run a closed containment farm, versus 10 for a net pen. I thought the numbers would be closer together, actually, but when I've talked to anybody who's in the net-pen industry they've told me that, yes, it does take more to run a closed containment farm.

Mr. Bryan Hayes: My final question is for Mr. Wright. I'm looking at your presentation. It speaks to next steps. You speak about the full life-cycle analysis over a 25-year production plan. Are you suggesting that we not move forward with promoting the development of closed containment aquaculture until we do a full life-cycle analysis over a 25-year period? Is that what you're suggesting?

Dr. Andrew Wright: No, not at all, sir. I'm suggesting that if you take the full academic work of Peter Tyedmers, which would suggest that you do a full LCA.... There's a list of all the attributes, from human toxicity potential to eutrophication, and if you account for all those effects and get into the work on what a net pen produces and what a closed containment farm produces and then, for a fair comparison, look at 25 years of operation—and that's theoretically, because you don't have to wait that time—it is very hard to imagine that closed containment is worse. Because closed containment offers you the opportunity to capture everything and process everything—waste included—appropriately.

In an open-net pen, everything gets flushed away. Well, I ask you, where is away? It's still our ecosystem. It's still the fisheries, the wild fisheries, the prawn beds, and the clam beds. There is no such place as away.

You can do the analysis. What I'm trying to do is to get people to think about physicist Richard Feynman's question: how do you get to the answer quickly to make the decision that you're making the right work...? If you think about it in those terms, you know what the answer from the LCA should be going in. Let's go and do that work. Let's do it accurately, but let's not get in the way of progress, because common sense tells us what the answer should be.

Mr. Brian Hayes: Thank you, Mr. Chairman.

● (1715)

The Vice-Chair (Mr. Fin Donnelly): Thank you. That concludes our second round.

I thank both of you, Mr. Lane and Mr. Wright, for your presentations and for your attendance today at the committee in providing the information, and I thank our members for their questions and comments.

I'd also like to thank our staff who helped out with the teleconference and the technical aspects of making this happen, with you on the west coast, gentlemen, and us here in Ottawa. We appreciate their help in making this happen and I guess keeping our footprint down and our tax dollars low, as well as getting this presentation made.

I certainly appreciate your time. I would like to thank everyone. We will adjourn this committee meeting.

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