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Chair

Mr. Rodney Weston

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● (1535)

[*English*]

The Chair (Mr. Rodney Weston (Saint John, CPC)): I call this meeting to order.

Gentlemen, welcome to the Standing Committee on Fisheries and Oceans. We really appreciate your taking time out of your busy schedules to appear before the committee today to offer your views and to answer questions the committee members might have following a presentation from each of you.

I'll outline it a little bit here. We generally allow about 10 minutes for presentations to the committee. You'll hear a beeping noise in the background. It's a timer the clerk has. If you hear that beeping noise, I'd ask that you try to bring your comments to a conclusion. I generally try not to cut off our guests, but our committee members are well aware of the time constraints they work within, and they try to get in as many questions and answers as possible during that time. I'd ask that you try to adhere as closely as possible to the timer.

Your mikes are turned on automatically. There's no need to try to turn them on.

If there are no questions, I'd ask Mr. MacDonald to lead off with his opening comments. He will be followed by Mr. Dill.

Go ahead, Mr. Byrne, on a point of order.

Hon. Gerry Byrne (Humber—St. Barbe—Baie Verte, Lib.): I would ask our leading witness from Wild Canadian Sablefish Ltd. to ensure that he understands that he's on this side of the table, and not, as a former chair of the Standing Committee on Fisheries and Oceans, on that side of the table.

The Chair: I recognized Mr. MacDonald nodding his head as I was explaining the timer and the time constraints. I understand that he's fully aware.

Hon. Gerry Byrne: That said, I think it behooves us all to welcome a former colleague, a former member of this committee, and a former chair of this committee.

I welcome Mr. MacDonald, through you, Mr. Chair.

Some hon. members: Hear, hear!

The Chair: That's a very good point.

Thank you for taking the time, Mr. MacDonald. It's nice to see a former parliamentarian here with us.

Mr. MacDonald, the floor is yours at this point in time. Would you like to begin with some opening comments?

Mr. Ron MacDonald (President, Wild Canadian Sablefish Ltd.): Thank you very much, Mr. Chairman and members of the committee. It is a real pleasure for me to be here to talk a little bit about my experience as president of Wild Canadian Sablefish and executive director of the Canadian Sablefish Association, and about the issue that has seized the committee, which is aquaculture and aquaculture policy.

I will give you a brief overview so that you're all aware of why sablefish would be here. There are two finfish on the west coast of British Columbia that are farmed by aquaculture. One is salmon, which is much the subject of controversy and currently is the subject of a federal inquiry, and the other is sablefish.

Sablefish are often not really understood very well by consumers. They are also known as Alaskan black cod. In Canada we call them sablefish because, number one, it's the proper name, and number two, it helps denote the quality difference in the marketplace where we sell it.

There are about 47 licences in the fishery in British Columbia. The fishery has been operating for about 45 years. It was an experimental fishery initially. The Japanese had developed the fishery before the 200-mile economic limit; as a result of that, pretty much all of the market up until three years ago had been in Japan, so it's an export product primarily. People in Canada, even in Vancouver and Coquitlam, find it very difficult to find, except in five-star restaurants.

The fishery itself has over $350 million invested. We have over 300 people who are employed annually and we have a total allowable catch this year of 2,400 tons. Historically, it would be between 3,600 tons and 4,900 tons, but we've taken substantial cuts in our TAC over the last number of years out of concern for conservation. Indeed, we've been cited as one of the best-managed fisheries, not just in Canada but globally.

We were probably the first fishery, or maybe among the first one or two, that went into co-management agreements with the Department of Fisheries and Oceans. That has been very successful for us. We are partners in the management of the stock.

We invest anywhere from $750,000 to $1.5 million a year in doing surveys so that we understand the stock as well as we can. We make sure that we only take what can be sustained, and we work both with departmental scientists and our own scientists on staff.

All of the catch comes from either longline or trap. The trap fishery takes most of the TAC, and we're pretty proud of how clean this fishery is. The Bowie Seamount is, I think, a marine protected area in British Columbia—I think it was the first one—and it took a lot of years for the negotiation to get everybody on side about what the management plan would be for it. We were pretty pleased when we had an environmental group such as the Suzuki foundation agree that the trap fishery was so clean that even in a marine park or protected area we could still have a limited fishery. We have very little bycatch on the trap fishery and very little on the longline fishery as well.

We have issues. We have issues with the MPAs. There's one under way for Haida Gwaii, Queen Charlotte Island. Having these processes under way lends a lot of uncertainty for fishermen about their future access. We're impacted by treaty settlements that are very active in British Columbia, because in many cases the treaty settlements also take fish.

We have issues with integration. I should mention that the ground fishery in British Columbia is the first fully integrated ground fishery in the world. Sablefish is one of the six fisheries that are fully integrated. It's not really an issue, but it gives us some management problems because we're now fully accountable and responsible for every fish that's taken, so if we catch a rockfish, we have to make sure that we can lease quota from a quota holder. We're fully responsible and accountable for that fish.

Even DFO, on the licence transfer programs for the native or communal fisheries, is presenting us with some challenges. The reason is that all of our licence-holders pay a small fee for us to be able to have the association, to do the co-management agreements, and to undertake the surveys, but in terms of the quota that's bought and the licences for those programs, the department normally holds them, and they don't pay any fees.

As a result, we're not as pressured as some other fisheries, but over time, unless a solution is found at the legislative level to set conditions of licence, the federal department's ability to co-manage in a whole number of species is going to be undermined. Halibut would probably be before us, but it is still a problem.

● (1540)

These are long-lived fish in deep waters. The fish itself is reared in inlets. The fishermen, the licence holders, have voluntarily closed the inlets to fishing for a number of years, because we see those as the nursery and the incubator for the fish. The market is usually for three- to seven-pound fish.

We've undertaken a different approach to the development of this fishery over the last three years. We knew that the volume would have to go down, so we switched over to a value fishery. We switched over to creating new markets for this fish and diversifying beyond Japan. As a result, I can tell you that three years ago the fish was selling at the dock for about $4.23 per pound. Last week, on auction, it got $7.94 per pound, so even with a significantly reduced quota, the value is still there in this fishery, and will continue to be as we diversify into other product forms.

On the issue of aquaculture, our association has taken the position that we support aquaculture as long as it is properly regulated and as long as a precautionary approach is taken in establishing finfish farms, in particular when government decides that they can do it in open pens in the ocean.

We have concerns about the health of our stock. There are parasites, such as lice, that can be transferred from other species such as salmon. We are very concerned about some of the diseases. There's a weird disease called furunculosis and vibriosis, which can be deadly. When these outbreaks happen in a volume in a closed containment, they can kill the entire volume in that containment. Indeed, we've seen that happen in one of the few sablefish farms that are currently operating in British Columbia. It happened last year. There was an outbreak of furunculosis, and the entire brood stock was killed. We're concerned that those types of outbreaks not get into our wild stocks because, simply, we just don't have enough science to tell us what would happen if indeed there was a significant outbreak.

We've carefully watched the salmon situation evolve, and I think everybody around this table would say that if we could do it again, we certainly would do it differently. There is huge controversy out there about the open-penned salmon farms and their impact on wild salmon. You've heard from Dr. Alexandra Morton, with whom we work closely; she certainly has evidence and a view about how the open-penned system could have had an impact on some of the wild species, the stocks that are currently in decline and that are the subject of a judicial inquiry.

The issue we've had is that there is a need for a gap analysis on the science around sablefish, just as should have been done before there was widespread licensing of salmon farms. This is in its infancy. I think we have one hatchery, and probably three or four operations under way. We don't really have good information. When this industry was being regulated by the provincial government, it was very difficult to get our hands on numbers. We think there are between 40 and 50 licences out there. Three are operational; the others, to become operational, will have to be approved.

We quite simply don't know where this fishery is going. We do know we've built value in our fishery. We do know that parasitic transmission has happened in other species. It's happened in ours. We urged the provincial government, when they were still in charge of aquaculture licensing in the waters of British Columbia, to, number one, do a gap analysis; number two, not license any more open-penned farms for sablefish; and number three, do closed-containment studies. We offered to participate fully in the financing of it and to provide any data that were necessary so that we could build a database that would allow for the proper development of sablefish farming, if indeed the economics, the biology, and the science were all there for it.

I have a number of other things, but I'm really conscious of your time. If anybody has questions on them, there are some other areas I would like to get into. These include such things as the transfer and the court case of September 2, 2009, involving Justice Hinkson, which basically indicated that the 1988 agreement transferring licensing responsibility to the Province of British Columbia was not constitutional. The federal Department of Fisheries and Oceans is currently developing rules and regulations to take over the administration of aquaculture in Canada for our situation in British Columbia. There is also the potential impact that improper regulations could have on the future of the wild Canadian sablefish industry.

● (1545)

The Chair: Thank you very much, Mr. MacDonald.

Please go ahead, Mr. Dill.

Dr. Lawrence Dill (Professor Emeritus, Department of Biological Sciences, Simon Fraser University): First of all, thank you for the opportunity to appear before you this afternoon, if only on television. I appreciate the amount of trouble some people have gone to to arrange this.

I'm a professor of ecology at Simon Fraser University in Vancouver, and I've been doing research on salmon and other marine species for over 40 years. I've published over 140 scientific papers, and my work has been recognized through my election as a fellow of the Royal Society of Canada.

Together with my graduate students I've written several scientific papers on sea lice. I've also served as a member of the BC Pacific Salmon Forum's scientific advisory committee, and I helped to design their Broughton ecosystem research program. I also co-wrote a major report on sea lice and aquaculture for the World Wildlife Fund. I think I can be called a credible scientist, a point I will return to a little later.

In the ongoing debate about the effect of sea lice on wild salmon, it's easy to be confused by the claims and counterclaims, especially when the press reports them as being equally valid. However, some of these claims—mainly those by credible independent scientists—are far more likely to be true than the opinions and half-truths you hear from spokesmen for the aquaculture industry, with their clearly vested interests, or from scientists who work for agencies, whether provincial or federal, that are mandated to support aquaculture.

If I may be excused for a moment for sounding like a professor giving a lecture, I think it's important to explain just what is meant by science. The best definition I've heard is that science is a way of knowing. It's a process by which we come to understand the natural world. A scientist is someone who uses the scientific method to gain this understanding. Incidentally, one doesn't have to have a doctorate, honorary or otherwise, to be able to do that.

The basic scientific method involves proposing a hypothesis to explain a phenomenon and then seeking information to refute it. This might come from observation or, in the best-case scenario, from an experiment. If we cannot refute it, we feel more confident that our hypothesis is true, but we don't say that it's proven. We accept it and continue to try to refute it with new tests. If all the results of all our tests and observations agree, then we become pretty confident that our hypothesis is true.

We then have to communicate this new knowledge to other scientists, and that's where it becomes difficult. We write it up as a paper, and we send it to a journal. They assign anonymous referees, who pick our work apart and try to find reasons not to publish it. If we're lucky, we may have to make only a few minor changes before the paper is accepted. If not, they may require major changes, or they may reject it outright. The better the journal, the more difficult it is to get a paper published and the more confidence other scientists can have in its conclusions.

Now, I mentioned that in an ideal world, the best way to test a hypothesis is by experiment. For example, if we think that effect A is related to some putative cause B, we remove cause B and see what happens. This is easy to do in a laboratory but is very difficult to do in the field. Fortunately, in the Broughton Archipelago, experiments of this sort have actually been done twice. In 2003 there was a provincially mandated fallow of the farms, and the adult pink salmon returns the following year rebounded. From 2006 to 2008, the farms started treating their fish just prior to the out-migration period of the wild fry. Again, this caused fewer lice on the juveniles and dramatically increased adult returns. This is actually very strong evidence for a farm effect.

That's where we are with sea lice and wild salmon. All the information we have supports the hypothesis that sea lice are produced in large numbers in open-net salmon farms, that in their infective stages they attack the juvenile wild salmon swimming by, often in high enough numbers to kill them, and that this causes the wild stock of salmon to decline.

This is my assessment. It is based on my own work and that of others, including, especially, Dr. Martin Krkosek, whom you heard from last week. His work, it's worth noting, has been published in the very best journals in the field, those with the highest reviewing standards. His conclusions and those of others, including mine and Alexandra Morton's, should not come as any surprise. Exactly the same thing has happened virtually everywhere in the world where salmon farming in open-net cages has been practised, whether in Norway or Ireland or Scotland, so contrary to the absolute nonsense claimed by provincial veterinarian Mark Sheppard, there are a rather large number of credible scientists, me included, who disagree with him when he says that there is insufficient information to suggest that lice on farms is affecting Pacific salmon in a detrimental way.

● (1550)

I said earlier that science never proves anything absolutely. There is always a small element of uncertainty; it may be very small, but no matter how small, it's inappropriate to seize on this uncertainty to discredit the work. Seizing on uncertainty is a common tactic of people who don't want to believe the results, from those who deny climate change to tobacco companies. It's a bogus argument. The conclusions that scientists are coming to are more than strongly enough supported that DFO should be invoking the precautionary principle and getting the salmon farms out of the migration routes of wild salmon.

Thank you very much.

● (1555)

The Chair: Thank you, Mr. Dill.

Go ahead, Mr. MacAulay.

Hon. Lawrence MacAulay (Cardigan, Lib.): Thank you very much.

Welcome, both of you. It's a pleasure to have you here. We certainly have heard a lot of information on this issue, and as Mr. Dill has indicated, we've heard a lot of conflicting information.

Mr. MacDonald, you were talking about NPAs, national protected areas. I would like you to elaborate a bit on that as well as the transfers, the court cases, and the federal regulations that have been put in place because of the court case. I suspect that's what you were talking about.

Mr. Dill, if you have time, we've heard conflicting reports on sea lice. Nobody has said that sea lice do not come from the wild, but the lice reproduce so much in confined areas. That needs to be explained a bit more clearly.

I think that's enough for right now.

Mr. Ron MacDonald: Thank you, Mr. MacAulay.

I cannot overstate my support for Mr. Dill, the work that he's done, the work that other credible scientists have done. I think it's very unfortunate that some scientists from the Department of Fisheries and Oceans have basically gone out to undermine the credibility of these very credible individuals. It does nothing to add to the debate; what it does is divide good people from finding the right solutions. I just wanted to say that about Mr. Dill's commentary.

Hon. Lawrence MacAulay: Mr. MacDonald, if you could add, on the 1.7 million pieces that returned instead of the 10 million or 11 million, how do you think sea lice might have affected that?

Mr. Ron MacDonald: Thank you, Mr. Chairman.

I manage a wild fishery. We have a lot of regulations, and they're there for good reason. The regulations are there to ensure the health of the stock and to ensure that we don't take more than what the stock can sustain. We're trying to develop these fisheries for the economic benefit of Canadians. This is a public fishery. As a former member of this place, a former chairman of this committee, and now as someone who works in the industry, I don't think my view is biased. I read everything I can, but I can tell you that the way the department has handled the wild fishery and the way they have handled the aquaculture industry are completely different.

I don't know if you heard from Alexandra Morton when she was here, because I didn't have the chance to read her testimony, but last year I took her to Ottawa. We visited the minister and a lot of people who are at this table. She was seeking the federal government's action to do something as this tragedy unfolded.

What really struck me was how one department can be so inconsistent in the application of the law. We can't go out on a vessel and turn our lights on. It's called pit-lamping. You can't do that at night because it attracts all the food. It attracts the fish. Everything in the water is attracted to the lights.

These fish farms have lights on in the pens all night. They're there to try to force growth, or whatever the biology is, but they are attracting wild fish, both as feed and to find feed. They're attracting them into the pens where there is a hyperabundance of sea lice and disease, if there is any.

We can't do it, so when we came to Ottawa, we asked the department to invoke the regulations in the same way they do with the wild fishery. We also said that dockside monitoring was needed. We have to count and measure every single fish, but there isn't the same dockside monitoring for the aquaculture industry. It's illegal for you to catch a sablefish and sell it unless you have a licence, but we know from individuals who have worked in the aquaculture sector that other species are landed when they fish out their farmed salmon, but they are not accounted for. If you did it, Mr. Chairman, you would face a charge under the Fisheries Act, but it seems that when it's over on the aquaculture side, the farmed side, they get away without anything happening.

As somebody who believes in ecosystem-based management and looks after an association that puts a million dollars a year into science, it is aggravating as hell to see that another part of our industry does not operate under the same terms and conditions. It's one of the fundamental things that hopefully your committee will be able to get to.

The other thing deals with the judgment from September last year that the 1988 agreement transferring responsibility for licensing for aquaculture to the province was indeed unconstitutional. Here's my concern. If anybody is going to regulate aquaculture, I want it to be the federal government. I've made that clear from the get-go, because the provincial government had no responsibility for wild stocks. The only responsibility they had until that judgment was for aquaculture.

I know of many instances, some of which I've raised directly with the provincial minister, in which there was a conflict. Clearly they would always go where their jurisdiction was, and that was to protect aquaculture and not the wild stock. The federal minister has a fiduciary responsibility to protect the public fishery, to protect that wild stock; if there is an inconsistency in demand or application, I want to make sure that somebody who's accountable to Parliament will be looking after their responsibilities in managing these wild stocks.

My concern is that it's been over a year since that ruling. The decision is under appeal, but what's under appeal isn't whether or not the jurisdictional decision was right—nobody's appealing that—it's who owns the fish in the pens. Is this a wild fish? Does it belong to the farms?

The fundamental problem I have with this issue raging in British Columbia, and potentially coming to a pen with sablefish in it pretty soon, is that nobody in my sector has been consulted. The department is out there putting together new rules to take over aquaculture, which I think is appropriate, but there has been no consultation. To have bad rules and regulations for the feds to take over will just make the situation worse.

● (1600)

I hope this committee will see that as an oversight and that it can deal with the department as these rules are developed, so that all stakeholders, be they farmers or be they recreational or commercial fishermen, would have some input through the committee.

Dr. Lawrence Dill: Could I respond to the question that was put?

First of all, there seemed to be some confusion about lice and where they came from, so let me try to clarify that no one denies that lice are a natural parasite of salmon and always have been. As a kid, I'd catch an adult salmon, and it would have lice on it. There is no question about that.

The problem is that we've put fish farms in the middle of a migratory path that wild salmon pass by on their way in, in the summer and fall, and the juvenile salmon pass on their way out, in the spring. In the meantime, these lice build up to large levels on the farmed fish. This is not part of the normal system. In the normal system that cycle would be broken, because the lice would die when the adult fish return to fresh water, so it's not a question of whether they come ultimately from the wild or from the farm. Yes, they ultimately come from the wild, but the farm is basically having a multiplier effect in the system.

Could I also respond to the comment about the controversy, which I began my talk with? I think I may still have a couple of minutes left of that.

You frequently hear people say that DFO studies show that when you put salmon in a tank and you challenge them with sea lice, if the salmon are over 0.7 grams, they seem to mount an effective immune response and they're just fine, so we don't have anything to worry about. My problem with that point of view is that the science involved is not as much wrong as it is totally irrelevant.

Let me do a thought experiment to maybe clarify this for you. Imagine suddenly being deprived of your eyes and your ears. You're blind and you're deaf and you're placed in a room where someone brings you food every day and takes care of all your other needs. You would survive for a good long period of time. Now let's imagine that you are put outdoors, still blind and still deaf, and no one feeds you. There are freeways running back and forth and you have to cross those freeways to get your food. I don't think you would survive for very long.

That's exactly what I think is going on in the wild. We have considerable evidence that juvenile fish that are parasitized by sea lice are far more vulnerable to predation by trout and larger salmonids. These fish don't have time to mount an immune response; they get eaten and removed from the population.

That, I think, is the difference between a laboratory-based approach looking at immune responses and a field ecological approach looking at the actual impacts on the fish in a wild system where there are predators, diseases, competition, and so on.

Thank you.

Hon. Lawrence MacAulay: Mr. Dill, are those fish farms in the wrong place? Could they be situated in places that wouldn't cost so much? If they're not in the migratory path, would that solve some of the problem, or is just basically the case that fish farms cause a problem no matter where they are?

● (1605)

Dr. Lawrence Dill: I believe that if they were located farther seaward they would cause less of a problem, because when the juvenile fish reached there, they would be somewhat larger and perhaps less vulnerable. However, I don't think you could ever move them far enough away that they wouldn't be on the migratory path of some salmon population, unless you went out to the open ocean.

The Chair: Thank you, Mr. Dill.

Go ahead, Monsieur Blais.

[*Translation*]

Mr. Raynald Blais (Gaspésie—Îles-de-la-Madeleine, BQ): Thank you, Mr. Chair.

Good day, Mr. Dill.

Good day, Mr. MacDonald.

I will be directing my comments and questions primarily to Mr. Dill, as they are somewhat related to what Lawrence just talked about. When issues come up for discussion, or when there are contradicting opinions like those we have heard so far, it usually means that we have touched upon the most important element to consider when making sense of the issue at hand. In other words, laboratory studies are one thing; and field studies are, or can be, quite another.

Aside from that, are there any other elements we should closely consider in order to put things in perspective? I hope that you understand that when I hear from two scientists with two contrary or greatly dissenting opinions, I wonder what parameters—aside from plain old common sense—I should consider to get a better grasp of the issue.

[*English*]

Dr. Lawrence Dill: That's a very good question. I would say that you look at the source as part of it. You see who's saying that and whether they're independent or working for an aquaculture company or some agency that has a vested interest in continuing with salmon aquaculture in the way it's currently practised. That's one way to look at it.

No matter what scientific question is asked, it's not uncommon for scientists to have dissenting opinions. The way science works is by a back-and-forth and a winnowing of the evidence until eventually the weight of evidence builds up strongly enough on one side that the hypothesis of interest is accepted.

I've looked at some of the testimonies given before this committee, and one of the things I don't think has come across clearly enough is that.... People have criticized the work, for example, of Dr. Krkosek. They have written commentaries saying why they think he's wrong. What has not come across clearly enough is that Krkosek and others have written counter-critiques showing why those criticisms are wrong. You never hear about that from the people who write the original criticisms.

Science is a process in which there is a lot of back-and-forth, but eventually the weight of evidence comes down on the one side or the other. This is an issue you will have to deal with when you believe the weight of evidence is strong enough to support the hypothesis that I believe to be true.

[*Translation*]

Mr. Raynald Blais: I can reassure you somewhat, since the testimony I heard from Mr. Krkosek, in my opinion—and I have a feeling that it won't change—is the testimony that shed the most light on the issue thus far.

In addition, as far as the type of containment we might eventually use, I understand that if we have a containment set up in the high seas, in fresh water, or in salt water, and it can hold a certain number of fish, especially salmon, the environment is somewhat different from that in the wild. So, there are various problems that must be either noted, avoided, or verified. Is there an ideal type of containment we should go with? Is there an ideal type of farming we should practice?

[*English*]

Dr. Lawrence Dill: From my perspective, the best thing to do is to get the fish into a system where there's not a free exchange of water, parasites, and diseases between the farmed and the wild fish. That could be on land or it could be bags in the ocean, but there needs to be a physical separation between them. I'm very much in support of closed containment because it would solve many of the problems of aquaculture. Those problems are not restricted to sea lice, of course.

● (1610)

Mr. Ron MacDonald: I want to support that idea. Unfortunately the debate gets to be very heated about being either for or against aquaculture. The debate should really be on what kind of aquaculture will give the benefits we need. The one thing I do know is that the wild stocks are declining, the world demand for high-quality protein is growing, and when it's done right it can address all those needs and create economic activity.

One of the problems, Mr. Blais, is that as the aquaculture industry developed, there was no real environmental impact study done; it was developed on the assumption that it would have no impact. By the time the rules were put in place, companies—mostly foreign companies—had put hundreds of millions of dollars into developing these operations. Now they have an economic argument saying the economics don't work on closed containment. Well, if you had an operation in which your costs were fixed at 40% of income and somebody said that you now had to do something different and that it was going up to 50%, you would fight that tooth and nail because it's money out of your pocket.

The question should be whether there is a way to do this. My answer would be yes, and it's closed containment. Make sure, as Mr. Dill has said, that there is no interaction between the wild stocks and the farm stocks. It is being done economically in some places. Mr. Dill might know more about this, but I know I've received some emails in the last few weeks about it.

When you go over to my fish, sablefish, we're not $1.50-a-pound fish; we're an $8-a-pound fish. If you can't do closed containment on sablefish, you can't do it on any fish. We're one of the priciest fish in the world.

So closed containment is the option. To the provincial government we've even offered to put money into a closed-containment study for our stocks. Quite frankly, we don't want the disaster and the controversy of salmon to be visited on a healthy stock that we get more per pound for every year and that we fish sustainably.

The Chair: Thank you.

Go ahead, Mr. Donnelly.

Mr. Fin Donnelly (New Westminster—Coquitlam, NDP): Thank you, Mr. Chair.

I would like to thank Mr. MacDonald and Dr. Dill for making your presentations. I could say that you both have provided very clear testimony and made very strong statements linking sea lice from fish farms to wild salmon.

When I've even suggested that, I've been called irresponsible. In fact, I presented a private member's bill just recently looking to move to closed containment for aquaculture, so I certainly appreciate what you're both saying and hearing your information.

I do have a few questions. Perhaps I could start with Dr. Dill.

We've heard a lot about how sea lice can impact wild salmon. Could you just walk me through how lice actually kill wild salmon? How does that happen?

Dr. Lawrence Dill: There are three possibilities. The first is through a direct route. If you can imagine yourself having a couple of critters the size of dinner plates sucking the blood out of your body, you might imagine how there might be direct consequences of that through essentially physiological breakdown and death resulting. That's what probably happens to the very smallest fish.

The second is through diseases that might be vectored either by the sea lice—that is, transferred from farmed to wild fish by the sea lice themselves—or just through opening up lesions on the skin that allow diseases to get in, so the ultimate cause of death might actually be a secondary disease.

The third possibility is what I mentioned before: increased vulnerability to other mortality agents, such as predation and starvation.

Those would be the three routes.

Mr. Fin Donnelly: Thank you.

Are there any broader effects that sea lice could have on the ecosystem?

Dr. Lawrence Dill: That is also really important to keep in mind. The possibility of transmitting these to groundfish has already been mentioned, and that was quite an interesting discussion from Mr. MacDonald.

What we know in the Broughton, where one of my students has been studying this for the last few years, is that when coho salmon smolts eat infected pink salmon, the sea lice actually transfer to the coho salmon. What we have now been able to show is that the coho in the Broughton are also heavily infected by lice, even though they are considerably larger, and if you do the same sort of analysis that Dr. Krkosek did for pink salmon, you find the same signal in the populations of the coho salmon—that is, when fish farms began in the Broughton, coho populations began to decline; when they were fallowed, they bounced back up again. When the fallow ended, they declined again. You're getting exactly the same signal there, and there seem to be these consequences up the food chain for other species of fish.

The other way in which there can be broader effects is through reduced food availability for other species. If the wild salmon populations decline, you can expect a decline in populations of bears, dolphins, eagles, and other sea birds that feed on the fish. That will happen even in the forest, the riparian zones, where a lot of the nitrogen that feeds those riparian zones comes from the bodies of the salmon when they return and die in the fall. The ecosystem effects can be dramatic, and I don't think we spend enough time thinking about them.

● (1615)

Mr. Fin Donnelly: Thank you.

We've had expert professionals in front this committee who have said essentially that sea lice are not a problem on the west coast with respect to aquaculture and wild salmon. I even asked about the potential of developing resistance to SLICE. I'm wondering if you could comment on either of those.

Dr. Lawrence Dill: I will comment on the resistance to SLICE first. I felt that Dr. Sheppard's commentary on that was highly irresponsible and very unscientific when he said there was no evidence for it and that he would put it at number 20 on the list of possibilities, or something like that.

Resistance to SLICE has happened elsewhere. It has happened in Chile. It has happened in Norway. It has happened in eastern Canada, and there was a report yesterday that came out of the 2010 sea lice 2010 congress going on here in Victoria that it is highly likely in B.C. In fact, there are some signs in B.C. that the process may have already started. There is certainly no evidence to the contrary, because no one has done experiments, so it's inappropriate to discuss that possibility without studying it first.

The Chair: Thank you.

Mr. Kamp is next.

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

Welcome, Mr. MacDonald and Dr. Dill. We appreciate the information you've provided so far.

Let me start with Mr. MacDonald and then move on to Dr. Dill.

I think you mentioned, or you certainly gave the impression, that the aquaculture companies were fighting "tooth and nail"—I think those are the words you used—the prospect of going to some kind of closed containment. That's actually not the testimony we've heard in this committee so far; in fact, we've heard some openness to that. We've only heard from Marine Harvest so far, as I recall, but I didn't hear them resisting that idea. In fact, I understand they are also working with one of the groups that we're going to hear from in a subsequent hour here. I thought it might be important to say that for the record.

In terms of sablefish farming, did you say there are a few operations now?

Mr. Ron MacDonald: Yes.

Mr. Randy Kamp: Where are they located in relation to where the wild fishing is taking place?

Mr. Ron MacDonald: I can give you a list of locations. It's on my phone. I will give it to you before the end of the hearing.

They are close to the inlets, and the inlets are where our juveniles are. We leave them alone so that they can grow big, get sexually mature, and go out and spawn. As they go out into the deep, over the edge, there could be an interception.

Our biggest concern isn't with the three operations, but with the fact that there could be 47 more of them. If you look at the proliferation of the open-pen salmon farms over the years, there is a possibility that the same thing could happen here.

With respect to your first comment, I hope the testimony you heard that they want to move towards it was correct. Closed containment has been an option for years to these companies as this debate raged on. Every comment I've read from them about closed containment is that it's not economical to do, number one, and that there's no reason to do it, number two, so if they don't believe the current practices are having an impact, then why would they put money into changing their location?

Mr. Randy Kamp: In fairness, I think they understand the concept of a social licence as well as all the other factors. I'm not saying they're committed to moving towards that, but I think my comment was that I don't think they're fighting it tooth and nail.

Is it important, though, that the farms be in the same vicinity as the wild sablefish?

● (1620)

Mr. Ron MacDonald: No, I don't think so. We don't get a lot of information from the farms. We don't know where they file their information. We would like a registry. We asked for a registry from the provincial government.

What I will tell you, Mr. Kamp, is the fish doesn't look the same. The fish is not as dense. The oil content doesn't seem to be as high. It's a very tasty fish, but it doesn't taste like wild sablefish.

One of the major concerns we have as we try to be an example and move from a volume fishery of 4,900 tonnes down to a sustainable 2,400 is that we are doing it by going out and promoting our good practices. We're going out and promoting it by way of flavour, taste, and desirability by chefs. If you've got a product that comes in and has the same name but effectively is not the same fish, it's going to have a significant market impact. We are the success story for fisheries on both coasts with respect to sustainability and leading on value-added increase in pricing.

I want to underline again that 90% our market is offshore, so we are an export industry. We're bringing in dollars that otherwise would not be brought in.

I am not anti-aquaculture, and if you do go back, Mr. Chairman, you will find that I've actually written a report while I was sitting in your chair that supported aquaculture development. We just want everybody to take a deep breath, look at the evidence, and take the precautionary approach. I don't understand why the department—and it's not just under your government; it was the same under previous governments—just doesn't look and say this doesn't smell right. If we can't prove it doesn't have an impact, let's slow it down and gather the information before we make decisions.

I think it's one of the reasons that the Prime Minister has announced this inquiry: it's because we need to get the information sorted out, we need good scientists such as Dr. Dill and others to put their theses forward, and we need to make some decision to save these wild stocks.

I don't want my stock to go the way of the Fraser River sockeye.

Mr. Randy Kamp: It becomes fairly clear from your website that you're opposed to, or certainly cautious about, the growing sablefish farming industry. How much is based on science and the possible effects on wild fish, and how much is based on the market, as you've mentioned, either because of the price going down as a result of increased supply or the lower quality affecting the price you might get?

Mr. Ron MacDonald: The number one concern is on the biology and the health of the wild species, but we'd be disingenuous if we said we didn't think it would have an impact on the economy of the fishery, because it will.

We have 2,400 tonnes now, sustainably harvested, sought after in every five-star restaurant and any market that we've tried to penetrate, and they reward our good practices with $8 a pound. If you go in with an inferior quality product, which we believe farmed fish will be, and they try to capture the same price in the marketplace, you know what will happen: the price will go down.

However, I will tell you something. This argument that it's really all about price has come from some people, but our own members have indicated that they would be prepared to invest in closed containment.

We don't have any licences. I'm talking about our own members. My members are entrepreneurs. This is a commercial fishery on the Pacific coast, and if there is a way they can at the same time protect the requirement for protecting the wild stocks and find a business opportunity in closed containment on salmon or on other species, some of my members would probably invest, but you would not have one of them invest one penny in any of the open-pen operations in B.C. today.

Mr. Randy Kamp: Okay. Thank you for your testimony.

Let me turn quickly to Dr. Dill.

I'm not sure where to start, but let me ask this question: are there any credible scientists, in your opinion, who disagree with you on aquaculture in terms of the interaction of wild and farmed salmon?

Dr. Lawrence Dill: There are some people with DFO who would disagree in part. I don't think they would disagree with where the lice are coming from. They wouldn't disagree with the impact that has on individual juveniles. They might disagree on the population consequences of that.

Mr. Randy Kamp: They reach a different conclusion than you. Does that make them not credible?

● (1625)

Dr. Lawrence Dill: No. I think I made it clear earlier that reasonable people can have disagreements about the way they interpret evidence. I can only tell you that in my opinion, the weight of evidence supports the hypothesis that I put forward.

Mr. Randy Kamp: I saw you on a video that's available online. In it you said about DFO scientists, and I quote: “They're one of three things: extremely ignorant, misinformed, or they're lying to us.” Is that still your position?

Dr. Lawrence Dill: I didn't think I made that reference to DFO scientists. I think I made it to DFO managers. I'd have to check that. I remember the statement.

Mr. Randy Kamp: Okay. Let's leave that one for now.

Some voices: Oh! oh!

Dr. Lawrence Dill: I actually have quite a bit of respect for DFO scientists. I think they're put in a position in which it's very difficult for them to do their jobs, because they have two mandates that do not seem consistent with one another. One is protection of wild fish and the second is support for aquaculture, a position in which they basically find themselves in an almost untenable situation.

Mr. Randy Kamp: We've heard that position before, and I appreciate that.

With respect to Dr. Martin Krkosek's work, I've actually read pretty much all of what Dr. Harvey would call the thrust and parry and all of the papers flying back and forth there.

Let me ask a couple of questions, and then I'll run out of time. What did you think of his paper, in which he said that by 2010 the pink salmon would be extinct? Clearly, they will not.

Also, when he appeared before us, he didn't seem to be reaching the conclusions that you're reaching. In other words, he said pretty clearly that he's not opposed to aquaculture. He thinks it needs to be managed in an effective way. In fact, I think he was certainly suggesting that it had improved significantly, along the lines of what Dr. Sheppard was saying.

Can you comment on these things, please?

Dr. Lawrence Dill: Well, you have to keep in mind that his prediction about the extinction—and I think he meant the commercial extinction of these fish—was based on information at the time he wrote the paper. Since then, there have been changes in the way the farms manage sea lice.

I referred to those earlier as an experiment. They are treating the fish at a different time and in a coordinated way, and that has had a very positive effect. In fact, I know he's rerun those models with current data and he doesn't come to quite as dramatic a conclusion. However, I think what you have to realize is that we now have an industry whose existence and whose impact on wild salmon populations is based on using a chemical for which we are almost certain that resistance will evolve, and when it does, there's nothing left in the toolbox. We're putting ourselves in an extremely vulnerable position.

The Chair: Thank you very much.

Gentlemen, on behalf of the committee, I'd like to thank you once again for taking the time out of your busy schedules to meet with us, hear our concerns and questions, and attempt to answer our questions. Thank you on behalf of the committee.

We'll take a short break while we prepare for our next witnesses.

● _____ (Pause) _____ ●

● (1635)

The Chair: Ladies and gentlemen, on behalf of the committee, thank you for taking the time to meet with us today to share your thoughts and to try to answer any questions that committee members might have.

I believe most of you heard my comments earlier about the timeframes that committee members are constrained by so that we can try to get as many questions and answers in as possible. We generally allow 10 minutes per presentation, and committee members know the time constraints they work within.

Mr. Hobson, I believe you will begin. The floor is yours, Mr. Hobson.

Mr. Eric Hobson (President, Save Our Salmon Marine Conservation Foundation): Mr. Chair, committee members, thank you for the opportunity to speak with you today. My name is Eric Hobson. I'm president of the SOS Marine Conservation Foundation. I hold a bachelor's degree in engineering from Carleton University.

I am co-founder of Northridge Petroleum Marketing, which was sold to TransCanada Corporation, and MetroNet Communications, which ultimately merged with AT&T Canada. I am a founding shareholder of over 50 companies. My success in business has allowed me to establish the SOS foundation. My love of the ocean comes from many childhood summers fishing near Vancouver Island with my father and grandfather.

For the record, I have no financial interest in the aquaculture industry or the development of closed containment.

With me today is Dr. Andrew Wright. Andrew, would you please introduce yourself?

Dr. Andrew Wright (Representative, Save Our Salmon Marine Conservation Foundation): Hello. My name is Andrew Wright. I have a PhD in engineering from the University of Hullin England. I have over 50 patents to my name, and I'm a published peer-reviewed scientist.

I've been working on closed-containment aquaculture for the Save Our Salmon campaign for over two years now, approaching this as a working product every day. We have come to the conclusion that closed containment is economically and technically viable.

Mr. Eric Hobson: Catherine, would you please introduce yourself?

Ms. Catherine Emrick (Senior Associate, Aquaculture Innovation, Tides Canada, Save Our Salmon Marine Conservation Foundation): My name is Catherine Emrick. I'm a senior associate in aquaculture innovation with Tides Canada, a charitable foundation that provides financial and project management services to philanthropists and others. Essentially we pool ideas and resources to help solve complex social and environmental problems.

I hold a bachelor of laws degree and a MBA from the University of Calgary, and I'm a fellow of the Certified General Accountants Association. I've worked with Eric on the aquaculture issue for three years. When I'm not working on this issue, I practise regulatory law in Nunavut with Miller Thomson LLP.

Mr. Eric Hobson: Dr. Wright and Ms. Emrick are both members of the SOS foundation's solutions advisory committee.

I hope you have the handout; I thought maybe we could follow along on that.

On page 2, slide 2, if you'd flip to that, SOS is a charitable foundation that funds economic, scientific, and legal research, as well as public education. The solutions advisory committee is a broad coalition of business leaders, entrepreneurs, and professionals. We look for solutions to resolve marine conservation challenges. In doing so, we work collaboratively with scientists, first nations, salmon farmers, and environmental groups.

On slide 3, we are committed to working collaboratively with the federal and B.C. governments to achieve two fundamental goals: first, to protect B.C.'s wild salmon stocks and all that depends on them; second, to establish B.C. as a leader in creating a globally renowned, stable, and viable aquaculture industry.

I know that you've heard from a number of witnesses, including Dr. Krkosek, about the science around the impacts of open-net aquaculture. There is certainly a lot of debate.

It is our belief that there is sufficient peer-reviewed and published research in independent journals to support taking action. More importantly for the purpose of my presentation today, it is clear that there is a lack of public confidence in the regulation of open-net salmon aquaculture in B.C., and there cannot be growth in that industry until public confidence is restored. The shift in jurisdiction from B.C. to DFO has created a window of opportunity to rebuild public confidence and establish a viable aquaculture industry.

On slide 4, SOS proposes a three-point strategy to do this. In the short term, develop and implement a workable fallow and farm management plan to protect the most critical and threatened wild salmon. In the medium term, create a more transparent and accountable regulatory regime for finfish aquaculture. In the long term, catalyze a made-in-Canada, world-class, closed-containment aquaculture industry.

More specifically, to provide immediate relief to the Fraser River sockeye and begin restoring public confidence in the regulation of aquaculture in B.C., we recommend that DFO work with salmon farmers to expand the existing Broughton area management plan to protect the next generation of Fraser River salmon migrating through a high density of open-net cage salmon farms in the northern Georgia Strait.

We understand the key farms for removal of adult farm fish—and I'm talking about harvest, not permanent removal—are believed to be Venture Point, Cyrus Rocks, and the Okesola Sonora farm. However, this is subject to confirmation of the current stocking of these farms. This is information that is not currently publicly available, yet key to the risk management strategy. This should be accompanied by an independent sea lice monitoring program modelled after the program in the Broughton, which monitors both farmed and wild fish.

Regarding the creation of a transparent and accountable regulatory regime, SOS participated in DFO's formal process. A summary of our written recommendations is provided in our brief to you.

In short, the core elements of an effective new regulatory regime include, first, giving express priority to DFO's statutory obligation to protect and conserve fish and fish habitat over the growth of the aquaculture industry. It is essential to separate the functions of protection of wild fish and the promotion of aquaculture.

One mechanism to do this is the creation of an independent aquaculture licensing board and monitoring body. The second one is establishing science-based siting criteria, thresholds, and limits for effects outside the farm, and related monitoring, including on the wild salmon and other exposed marine life. The third one is addressing the prevention and monitoring of bycatch and impacts on predators, consistent with the approaches used in the commercial fisheries. The fourth mechanism is mandatory, timely, public reporting requirements for disease, parasites, and therapeutant use when entering the marine environment.

● (1640)

We will move to slide 6. The longer-term solution is to embrace the technological innovation that will lead to a sustainable aquaculture industry capable of supporting the growth goals set out in DFO's national aquaculture strategic planning initiative.

To move this forward, SOS funded, with the help of DFO and the B.C. government, a report by Dr. Wright on the feasibility of land-based closed-containment technology. Essentially, Dr. Wright's report concludes that it is technically and economically feasible.

In April, in collaboration with Simon Fraser University, we hosted a workshop to further explore the viability of this technology. Over 60 people from DFO, the B.C. government, first nations, industry, investors, environmental and conservation foundations, and academics participated. At the workshop, DFO presented a consultation draft of their study into the economic feasibility of this technology. While the results are not as favourable as Dr. Wright's, overall there's a convergence of views that it is now time to at least explore land-based closed-containment aquaculture as a more biosecure alternative to open-net technology.

To take the next step, the SOS foundation is working with the Namgis First Nation to develop a demonstration project to prove that salmon can be grown to full size at commercial densities and to validate the assumptions necessary to assess the potential for commercial-scale viability. We know that there are other similar projects under development. To ensure these projects are properly funded, Tides Canada is working to bring together funders and a governance framework through the creation of an innovation fund. To date, $5 million of philanthropic funding has been committed, provided that matching funds from government and industry are found. We encourage you to recommend that government work with Tides Canada to coordinate philanthropic and government funding for closed-containment demonstration projects.

Slide 7 summarizes what we are asking the committee to recommend. First is the immediate emergency removal of adult fish on a key migratory route of the Fraser River sockeye. Second is the development of a transparent and accountable regulatory regime with clear priority on the protection and conservation of wild fish and fish habitat. Third is taking leadership to catalyze the closed-containment industry by coordinating government funding programs to match philanthropic and private investment, and working with B. C. to prioritize the development of a regulatory regime specific to land-based closed containment.

In closing, there are a number of benefits that will flow from this approach. B.C., with its advantages of clean water, low-cost hydroelectricity with low greenhouse gas emissions, crown land, and an existing workforce skilled in salmon farming techniques, could start expanding the use of off-the-shelf systems. The aquaculture industry will have more certainty in decision-making.

Most importantly, priority will be properly placed on the protection of B.C.'s wild salmon, and public confidence will be restored in the regulation of aquaculture in B.C.

Thank you again for the opportunity to present our recommendations. We would be pleased to answer any questions you may have.

● (1645)

The Chair: Thank you, Mr. Hobson.

Mr. Orr is next.

Mr. Craig Orr (Executive Director, Watershed Watch Salmon Society): Thank you very much for the time. I apologize that I don't have a lot of prepared notes. I've been at a sea lice workshop here in Victoria, at which there was a lot of talk about resistance of sea lice to chemical treatments. I don't really have a lot of notes prepared, but I do have a couple comments.

My training is in biology. I have a Master of Science in wildlife ecology and a PhD in behavioural ecology. I'm the executive director of Watershed Watch Salmon Society and also the science coordinator for the Coastal Alliance for Aquaculture Reform.

My involvement in the interactions of wild and farmed salmon goes back to about 1999, but in particular it geared up quite a bit in 2001 when we saw the first-ever sea lice outbreaks on juvenile Pacific salmon on the coast of British Columbia.

Since that time my major focus has been on aquaculture and aquaculture interactions between wild and farmed fish. I've helped to organize seven international workshops as the associate director for the Centre for Coastal Studies at Simon Fraser University and as the executive director of Watershed Watch. We brought in scientists from around the world to share their experiences and their science concerning the impacts of sea lice.

In 2004 we began working with the largest salmon farming company in Canada—and in the world, actually—Stolt Sea Farm, now Marine Harvest Canada. The goals of that work were to improve the understanding of and transparency around the data from salmon farms and the interactions between wild and farmed fish, and to undertake management actions that would reduce infection pressures on wild fish.

In 2006 part of that work involved monitoring lice on some of the Marine Harvest farms on a weekly basis during the out-migration of juvenile fish and also looking at the effects of biocides on those lice. The results of that research will be coming out in a paper shortly.

I have also published several other papers on the interactions of farmed and wild salmon, and in particular I have looked at the production of lice on salmon farms.

In that work, and in particular in the workshops that we've hosted with Simon Fraser, we've built up a considerable weight of evidence and reviewed the science around the impacts of salmon farms around the world. What we know from that science—you may have already heard some of this, and I apologize if it's redundant—is that 95% of the lice in coastal waters around the world come from salmon farms. They are actually manufacturing lots of lice because of the high density of farmed fish.

You have to understand that our salmon farms on this coast are extremely large. A typical farm is about 725,000 farmed salmon, which is much larger than the farms in Europe. To put that in perspective, that's a mass equivalent of about 500 Asian bull elephants swimming around in a farm.

We've looked at that science. We've looked at the fact that we've altered the natural ecology of our coastal oceans. In particular what we've done is reverse the natural laws of what's called migration allopatry. That means simply that juvenile fish leaving rivers typically did not encounter, over historic times, large numbers of adult lice-bearing salmon in coastal waters.

They're quite small when they leave the rivers. The juvenile pink and chum salmon weigh less than a gram when they emerge from the gravel and go to sea. The adult salmon were in the high seas feeding at the time, and although they may have hosted several lice per fish, they weren't shedding those lice eggs while the juveniles were going by, so there was a separation—migration allopatry—between the wild juvenile fish and the adult fish when we had a natural ecology on this coast.

Right now we cultivate farm fish, and the evidence suggests that they are producing substantial numbers of lice. I published a paper in 2007 in the *North American Journal of Fisheries Management* looking at production patterns on marine harvest farms. We waited several years, prodding Fisheries and Oceans Canada, which had that data, to publish the information. They did not, so we undertook that ourselves.

What I showed in this paper was that these farms—we were looking at just eight of them—were producing billions of lice eggs and infectious larvae every year. In particular, they were producing very large spikes of lice just before the juvenile fish migrated past the farms, and we're still seeing this pattern to this day in western Canada.

Some of the other science backs me up on the fact that we're seeing large production of lice from these farms.

● (1650)

In 2009 Mark Costello, a leading researcher in New Zealand, said "There's no doubt that salmon farms are the major source of sea lice epizootics observed in wild fish around the world."

All the scientists came together in 2007 at a workshop in Alert Bay in British Columbia and said there was no doubt that salmon farms cause impacts around the world. That was true from Ireland, Scotland, Norway. The statement of expectation, which is printed in the workshop proceedings, also said it's time to act, to deal with these impacts. The situation in British Columbia is exacerbated by the small size and vulnerability of the pink salmon and chum salmon, in particular, but we have seen lice on all species of Pacific salmon, all six, including steelhead.

There are also papers out there that show population levels of effect. Several papers have looked at the effects of lice on individual fish. It's a little harder to translate those into population level impacts. In particular, I draw your attention to a paper done by Jennifer Ford and the late Ransom Myers, of Dalhousie University, published in 2009, in which they did a paired bay comparison of salmon farms around the world. What that means is they looked at areas in Ireland, Scotland, Norway, and British Columbia. They looked at one bay where there were no salmon farms and they looked at one bay where there were salmon farms, and that way they were able to control for all sources of mortality. What they said very conclusively in this peer-reviewed paper was that salmon farms are the major source of declines of wild fish around the world. Their meta-analysis left no doubt of that. In fact, they found that on average, wherever there was salmon farming, there was a 50% decline in wild fish survival, around the world. British Columbia is simply the latest place where this is happening.

Unfortunately, although there are papers like this out there, there is also a recent one by Dr. Martin Krkosek in one of the pre-eminent science journals in the world, showing rapid declines in survival of pink salmon in the Broughton Archipelago. We have a very large amount of debate still happening in British Columbia. In fact, I just saw that debate rear its ugly head again at the workshop where we had the senior scientist from DFO, Dr. Dick Beamish, refusing to answer any questions whatsoever at a sea lice workshop on whether sea lice were causing impacts on wild fish. It's a debate that's been going on for far too long. The science on this coast has been ignored and distorted, in particular by management agencies, to a point where it's embarrassing to be a Canadian at times, to see the kind of science that is coming out of our federal government. In fact, some resource ecologists studying these problems around the world call this resource management pathology, and it's a recurring situation around the world.

Let me just sum it up. I can't sum it up any more eloquently than the great Buzz Holling, a pre-eminent Canadian ecologist who lives in Nanaimo. He says: “While science uses uncertainty to drive the engine of inquiry, vested interest groups use and foster uncertainty to maintain a status quo policy.”

This is clearly demonstrated probably more so in the sea lice communications plan that came out a few years ago in which the communications branch of the Department of Fisheries and Oceans urged its scientists, when they were talking about this situation in public, to extol a complexity of ecosystems and the need for more research before we can definitively ascribe these losses of wild fish to salmon farms. This was again carried to heights that were absolutely absurd.

The last piece of evidence I'll bring before I bring this to a conclusion is a recent criticism of Dr. Dick Beamish, who published a paper called “A proposed life history strategy for the salmon louse, Lepeophtheirus salmonis, in the subarctic Pacific“. He published this in a journal called *Aquaculture*, which is not a well-known ecology journal, in which he normally publishes papers. He talked about alternate life history strategies where these sea lice are coming from. Of course we heard from DFO back in the mid-2000s that sea lice were coming from wild fish, they were coming from sticklebacks, they were coming from everywhere except salmon farms. An academic, Dr. Dill, whom I believe you just heard from, wrote a review of Beamish's paper, and I'll just cite a couple of lines and I'll finish off on that:

> Beamish's paper is curious in failing to mention farm salmon host in the Broughton Archipelago

—and this is in a paper that looks at alternate life history strategies of sea lice—

> despite this being the only place on the coast where newly emerged wild fry are heavily parasitized. ...Beamish's errors of omission and their selective use of their own and others' data lead the naive reader to a conclusion that cannot be substantiated. Their “conclusion” that the “transport of sea lice in the coastal areas is an evolutionary adaptation” is unwarranted and, indeed, is not a conclusion at all. In fact, the presence of farmed salmon along the migration routes of very young wild salmon represents an anthropogenic or human perturbation to a natural host-parasite system....

● (1655)

You know, these are pretty strong statements from an academic. Unfortunately, we still don't seem to have our federal government onside. We have had, of course, our Auditor General twice cite the Department of Fisheries and Oceans as being in a conflict of interest because they're simultaneously trying to promote salmon farming and protect wild salmon.

Unfortunately, we've had a lot of problems getting the clear science out there, which is probably why we're at this session right now. But there is really no doubt that salmon farms are exacerbating the problems with wild salmon around the world, mainly through sea lice, but also through disease, and I haven't touched on the other issues of escaped fish, and pollutants. We did publish a paper, as well, looking at how mercury is transported through the feed, then bio-magnified back up through the food chain, and it appears in rockfish around the salmon farms. So there are other problems with salmon farms.

All the researchers we talked to suggest that sea lice are a major problem around the world and the treatments for those sea lice are starting to fail. We just heard from researcher after researcher, from Norway, Scotland, and Ireland, saying their treatments for sea lice are failing, and we can expect the same to happen here.

Thank you.

The Chair: Thank you, Mr. Orr.

Mr. Andrews.

Mr. Scott Andrews (Avalon, Lib.): Thank you, Mr. Chair.

I've got three questions and I'll see if we can get through them.

Mr. Wright, when we talk about a world-class closed containment aquaculture industry, we haven't really seen any of it here in Canada right now. I'd like for you to give me a little bit of background of why we haven't seen it, and more importantly, the economics behind this that were alluded to. I'm curious to know the economics behind the closed containment type of system and why we haven't seen it. How come some of the companies aren't embracing this?

● (1700)

Dr. Andrew Wright: I can't speak to why you haven't seen it. What I would speak to is that closed containment technology has been demonstrated successfully in many other species worldwide. The United States department of aquaculture has been running a recirculating closed containment research program for 30 years, and all the components you might need to build a closed containment farm are commercially available as off-the-shelf pieces of equipment from multiple vendors.

So we can go and build a closed containment farm today without any access or technology barriers, and you can do that economically. We can get into that if you wish. Why it hasn't happened in Canada, I can't speak to specifically. My work was focused 100% on whether it is technically and economically viable, and I believe that has been proven. But as the previous gentleman from the sablefish industry said, if your costs are lower because the services of the environment are being provided to you for free—oxygenated water and waste removal—why would you pay for them? There's no need to up your costs. However, that free operating environment comes, as we've heard extensively, at the expense of wild fish.

Mr. Scott Andrews: But I still haven't got a grasp on how the economics of it works, because if it worked, why aren't people doing it?

Dr. Andrew Wright: Because it's cheaper, not economically impossible to do it in the ocean today, that doesn't mean to say that all costs are fairly articulated. In other words, you've got to pay for oxygenated water, and you've got to pay to deal with the waste that the farm would produce on land. So your operating costs would be higher than they would be in ocean. That doesn't mean to say that you're economically infeasible to do it.

We can get into the economics. Let me share some of them with you. To build a 1,000-tonne farm would cost you about $12 million, and it would take you about $6 million a year to run that farm. The revenue from it from fish alone would be about $11 million. If you utilize the waste stream—and this is incredibly important for everybody to understand—when you take fish from the open ocean, you're capturing nutrients from the open oceans, and you're exploiting them to build and grow fish. But a huge amount of that waste, the ammonia gets turned into nitrates, and the solid waste is actually feedstock. If you use that and capture that with associated aquaponics, you can put another $4 million on the bottom line of your numbers every year by growing lettuce, tomatoes, peppers. Two hundred kilograms of living fish will support 3,000 head of lettuce every six weeks. Today that economic benefit is being just dumped in the ocean.

So to net it out, you can be in the business, if you only do fish, of making $5 million a year profit on an investment of $12 million. If you do hydroponics and capture that waste, you can push that to $9 million. If you charge a premium for your chemical and therapeutant-free fish that you're capable of delivering now, you can get up to almost $19 million a year in revenue, which will leave you with $13 million a year after costs, pre-tax.

Mr. Scott Andrews: I just find it strange that no company has found it economically viable for a private operation to do it.

Dr. Andrew Wright: Let me counter that. So you say, "Well, who is this chap out in nowhere who knows how to design silicon chips, coming in and telling us how to run a fish farm and build a fish farm?"

First of all, don't take my word for it. All my numbers are comparable and work within the mathematics that the U.S. department of aquaculture has worked on for 20 years.

Secondly, there are multiple companies globally, one called AKVA in Norway, one called AquaMaof in Israel, and our own consultant on our own coast, John Holder, who design and deliver turn-key closed containment farms for a living. All my numbers have been checked by those gentlemen of those companies, and they're comparable to those companies.

But if your bottom line is 10% cheaper by doing it in ocean, why would you be motivated to move on land? You wouldn't do it. If your only drivers and reward are profit and loss—and you don't have a need to increase your bottom-line cost because you're not forced to or required to—then you wouldn't do it, and that is the only reason.

We now have had our first example of successful closed containment salmon farming coming to the fore. Domsea aquafarms, run by Per Heggelund in Washington State, is now delivering 90 tonnes of artesian coho to Overwaitea, who are reimporting it into Canada.

To be fair, Rick Thompson has looked at this work too, and said, "Andy, you're right on the money," because we've looked at that farm in detail.

So please do not have any doubt that it's technically or economically feasible.

● (1705)

Mr. Scott Andrews: Okay. Thank you.

I'm going to come back, but I want to get a question in to Mr. Orr regarding sea lice resistance. I know you touched on it near the end of your testimony, but I just have two questions for you on sea lice, one on sea lice resistance. That question is whether there is any scientific evidence to see it in Canada. We've heard about places like Norway, Chile, and that. They've seen sea lice resistance there. Is there any evidence that it's in Canada right now?

Mr. Craig Orr: We've been working with Dr. Crawford Revie, who's an expert on farm-salmon dynamics. He's been coordinating our monitoring programs for the coordinate area management that we've been doing in the Broughton, and they are starting to see some evidence in New Brunswick, where salmon has been farmed longer. We think that it's only a matter of time before it happens here.

In particular, we saw a huge problem in Norway in 2009. We just heard a talk where they had to resort to a slew of old chemicals, very dangerous chemicals, to control the situation this year. We've heard from lots of sea lice experts at this workshop too on how incredibly adaptable sea lice are to chemical therapeutants.

So it's only a matter of time before we see it definitively in B.C. What we need to do is run bioassays of the resistance of lice to these chemicals. That has not been done on this coast, but it is being done on the east coast.

Mr. Scott Andrews: This committee has been given evidence that it's not likely to happen in our waters or in our operations because we don't use it as much as some other operations, where SLICE has been applied more frequently than in Canada.

Mr. Craig Orr: It's only a matter of rate until we catch up to the rest of the world. We are using it now. One of the things that is reducing infection pressures in the Broughton is the earlier application of SLICE, emamectin benzoate, which is a neuro-disruptor. There is absolutely no doubt that we'll catch up to the rest of the world. Unfortunately, it will probably be fairly soon.

Mr. Scott Andrews: The second question is regarding juvenile fish leaving, and that it applies to the application of SLICE. Some of the companies have told us they apply SLICE to get the levels of sea lice down when juvenile salmon leave the river. You said you've experienced some of that in a one-week period when this was going on. Could you please elaborate on that a little further?

Mr. Craig Orr: Yes, as part of our agreement with Marine Harvest, the Coastal Alliance for Aquaculture Reform put some researchers on two of their farms in the Broughton Archipelago in the spring of 2006. We stood beside the louse counters and monitored their counts. We examined the efficacy of SLICE on the number of lice on the adult salmon in the farms. We found that it was very good and killed most of the lice. It kept them down for about eight weeks before the numbers started coming up again. It works quite well for a short period of time.

We were able to look at the dynamics of biocides on two of their farms—Sargeaunt Pass, and Humphrey Rock—during the spring of 2006. Those data are now being put together in a manuscript.

Mr. Scott Andrews: I have a question for Mr. Hobson or Mr. Orr on the migratory paths of the Fraser sockeye. We've been told there are four migratory paths, two of which have no aquaculture farms on them. Is that correct?

Mr. Craig Orr: Again, we're just putting together a paper. We've been examining sockeye and sea lice on this coast, along with Mike Price and some other colleagues. We presented the preliminary results at Sea Lice 2010 here in Victoria just two days ago.

Sockeye come out of the Fraser. They go north through the Strait of Georgia and encounter the large concentration of salmon farms around the Campbell River, Discovery Islands areas. They make it up there relatively quickly. There's a small sub-population of Harrison Rapids sockeye that go out through the Strait of Juan de Fuca, and they don't go up the east coast of Vancouver Island. They do not encounter salmon farms. Curiously, their survival is quite good compared to the rest of the Fraser sockeye.

As you probably heard, the productivity of Fraser sockeye has gone down steadily since the mid-nineties in particular, to the point where they're barely able to replace themselves.

The other major populations of sockeye come out of the Skeena River. There are no salmon farms there. We have been working with Allen Gottesfeld at the Skeena Fisheries Commission. He's a biologist there for the first nations. We've compared the number of lice on sockeye coming out of the Skeena with those coming out of the Fraser. We have the DNA evidence, so we know those stocks. The numbers are a couple of orders of magnitude less of sea lice on the Skeena sockeye that do not migrate past salmon farms. But the ones from the Fraser that migrate past salmon farms have elevated levels of lice, in particular downstream of salmon farms. That means that before they get to the salmon farms we've been sampling them and they don't have a lot of lice, but once they get past the salmon farms the louse levels are elevated.

● (1710)

The Chair: Thank you very much.

Monsieur Blais.

[*Translation*]

Mr. Raynald Blais: Thank you very much, Mr. Chair.

Mr. Hobson, I would like to talk about the recommendations found in your document. As for your last point, you seem to express a preference for land-based closed containment, that is, containment on land, if my understanding is correct. There are many types of containment: open cages, nets, closed containments of various sizes, and land containment.

Did I understand correctly that this is your preference in terms of containment methods?

[*English*]

Mr. Eric Hobson: If I got the translation properly, I would support the land-based, closed containment technologies. There are ocean-based technologies. I think you heard from Agrimarine earlier in one of your hearings. I'm sure they addressed their systems for ocean-based tanks. We feel that land-based tanks have the biosecurity you need to have an industry that can thrive and grow in British Columbia.

We're talking about full recirculated farms, where you actually treat the water. You take your first load of water into the farm. The replenishment rate every day is somewhere between 2% and 5%. So you're taking water and reusing it. You're treating it and filtering it.

[*Translation*]

Mr. Raynald Blais: If I am not mistaken, the tests have already been conducted elsewhere, and land-based containment is, in a way, more economically challenging. In addition, there is another element to consider: temperatures can vary enormously in land-based containment. There are all kinds of factors to consider.

I was wondering if you have conducted an economic analysis of this issue. I understand that analysis can only tell us so much, but it is important for the solution to be based on a number of crucial considerations. I do not find that economic considerations are the most important factor.

Have you considered things from this angle, as well?

[*English*]

Mr. Eric Hobson: Can I let Andy Wright address that question? Thank you.

Dr. Andrew Wright: The answer is yes. In our study, which runs to 50 pages, the biology of the fish was very carefully considered in terms of growth rates, temperature, and the feed-conversion ratios. Our study took the exact growth rates that were provided by Stead in the *Handbook of Salmon Farming*. Our growth rate and work was based around 18 months grow-out at eight degrees centigrade. In-ocean, you typically see temperature variations, water variations, that impede growth. So although it's not embedded in our analysis for the economic support, our expectation is that growth rate of 18 months would be reduced to 15—maybe fewer—months, and because temperature stability is higher and oxygen is higher and optimal, fish condition would actually be superior to ocean-based fish.

[*Translation*]

Mr. Raynald Blais: There are other elements you talk about in your document. You talk about regulations and monitoring. I understand that those two elements require resources for ensuring proper monitoring and compliance with the regulations. Even if we had the best regulations in the world, we could still find ourselves in situations where we are unable to gauge what is going on and intervene when necessary. That explains the disasters we are seeing all over the place.

When considering regulations and monitoring, are you also giving some thought to the resources required for implementing these elements properly?

● (1715)

[*English*]

Mr. Eric Hobson: The answer to that I think lies in the licensing fees that can be charged, and perhaps should be charged, to any aquaculture operation. My understanding is that licensing fees are fairly minimal right now for the open-net cage industry. Some things have changed in the last couple of years. One is that the price has increased dramatically for farm fish. A lot of the reason for that is because of the problems that have been occurring in Chile and Norway and other places in the world that have actually caused a decline in the production of salmon around the world for the first time in a long time.

My suggestion on that would be that it does need more resources. You have to regulate it better and you have to monitor it properly. That costs money. I think the money should come from the licence fees.

[*Translation*]

Mr. Raynald Blais: Mr. Orr, do you have anything to add to the questions I have asked our witnesses?

[*English*]

Mr. Craig Orr: Not particularly on that. I've read Dr. Wright's study. I was at the workshop on recirculating aquaculture. I believe the economics are there. We also have to keep in mind that it's been popular around the world in resource management to offload fees, if you will, onto ecosystem services, which is exactly why open-net cage salmon farming is cheaper. We let the environment deal with this and we don't do full-cost accounting in terms of the damage to wild fish, the damage to the people whose livelihoods and cultures depend on those fish. All of that should be factored into the economics if we're really concerned about the transition to closed-containment aquaculture. But if you put those factors in, we would have transitioned a long time ago.

The Chair: Thank you.

Mr. Donnelly.

Mr. Fin Donnelly: Thank you, Mr. Chair, and thank you to both panellists for your presentations.

I'll just start off in Ottawa with Dr. Orr's last comments and relate them to the earlier question about motivation and why a company would move to land-based closed containment, or any closed containment, when it's essentially cheaper to do otherwise or to look at open-net systems. Would it be fair to say that you're considering the ecological impacts and people's reaction to ecologically friendly products, and the value-added of pricing things like that?

Second, there was a comment made at an earlier committee meeting about life cycle analysis, that is, the carbon footprint, energy inputs, waste management systems, etc.

I'm wondering if you can comment on both of those things.

Dr. Andrew Wright: The economic analysis that we did at the back end of the technical analysis was based on both commodity pricing and premium pricing for people who were prepared to pay for fish that was chemical- and therapeutant-free and raised in a more sustainable manner. The answer for that is yes, because Overwaitea is getting a premium for the first land-based closed containment salmon that they're selling. So a market exists for that, and you have seen it in breadth in both the beef industry and chicken industry.

Moving to the footprint issue, I would argue that in British Columbia—particularly where we have hydro, which is the biggest footprint concern around close containment—we have an advantage, because our power is hydro-based. It's clean.

Power keeps coming up, and I would like to put some stats on the table so that people are very acutely aware of how much power you really need. I'd ask you to think about the industry at full scale, ten years out, with 100,000 tonnes of landed farms, closed containment salmon, and the power that would be associated with supporting that. In your minds, think of one, two, or four nuclear power stations—and you're probably doing a quick calculation about that. But you will be shocked to learn that you can build a 100,000-tonne industry on the back of 0.01 of a nuclear power station, a 10-megawatt plant. In British Columbia, we have Bute Inlet, one of the biggest run-of-river hydro facilities. It's a one gigawatt facility. It's equivalent to a nuclear power station. The average run-of-river project is about 50 megawatts. So we're talking about a very small amount of power to transition this industry. Please do not be mistaken about that fact at all.

My numbers are based on a very conservative design that comes in at seven kilowatt hours per kilogram of landed fish. The best designs from AKVA and AquaMaof require three kilowatt hours per kilogram of landed fish, which would mean that we're at even lower power. That puts you in the realm of one pulp mill of the total power needed for a whole 100,000-tonne industry. So from a footprint point of view, that's very important to consider.

I would also reflect on the fact that the current industry utilizes diesel fuel to transport feed in and fish out, and the total amount of energy required for that transportation is about a tenth of the numbers I've just provided—except that's diesel fossil fuel, not hydro or clean hydro.

So I would recommend that Peter Tyedmers' work be followed up, because his working methodology was excellent, but the data that he has put on the table has errors in it and is old. It was based on a ten-year-old design that pumped water through 60 vertical feet. The modern recirculating designs are incredibly efficient, because two or three feet of head at maximum is all that it is employed in the new designs. They are incredibly efficient, and that must be factored into your thinking.

Thank you.

● (1720)

Mr. Fin Donnelly: If I may ask one other question, if I have time, Dr. Orr, you mentioned you were at a sea lice conference. I'm wondering if you could just add any comment on why the conference is taking place now, who is there, and any further comments you wish to make to this committee.

Mr. Craig Orr: It's an international workshop that happens every year. It just happened to be in British Columbia this year, but, again, we're hearing all the learning from Europe in particular, which has a really hard time seemingly to penetrate on this coast. We seem to be pioneers here. We have to reinvent the wheel all the time too. Again, we've heard a lot from people who deal with chemical treatments of sea lice, which is the major pest. There are something like 300 million euros spent every year around the world combatting sea lice. That's a factor that's not taken into account in terms of open-net-cage aquaculture either in the analyses.

I do want to finish with one thing on change, because you brought that up, Fin. I'd like to say that humans are notorious for resisting change. They cling to outdated ideas and practices even though they know these are damaging. You can look at all kinds of human behaviours that are self-destructive, and I won't go into those, but there have been many studies looking at this from an ecological standpoint. One of the biggest drivers to get somebody to change is they finally get into a crisis so deep that they have to look themselves in the mirror and say they have to change.

We've had a crisis with our Fraser sockeye. We've had the worst returns on record in the last year on the Fraser River, and to Minister Shea's credit, she called an inquiry into the problems here. We've had a crisis with salmon farming on this coast, which is the main reason why we're seeing some change on this coast, and it's not happening fast enough to save certain stocks of fish. So we should be looking at why people resist change. There's lots of literature out there on that. But we do have a crisis, we have to change, and it has to happen fairly soon.

The Chair: Thank you.

Mr. Calkins.

Mr. Blaine Calkins (Wetaskiwin, CPC): Thank you, Mr. Chair.

I appreciate the testimony from our witnesses. I'm going to first of all start by saying how pleased I am to see, Eric, that you are using your own wherewithal and your own means to do this. I think it's commendable. As an Albertan, I do believe that good things always come out of Alberta. Good ideas come out of Alberta. It's nice to see you.

I have a similar situation to you. I'm a sport fisherman; I love sport fishing. My interest in being on this committee is primarily from that perspective, but my background as well.... So I wanted to say thank you for the work that you're doing and for the seemingly middle-of-the-road approach where you're actually trying to find a solution where we have what appears to me, and before this committee, very divided parties coming together. It makes it easier for policy analysts and policy setters like us to hear from all those sides. It's nice to hear it from somebody who comes from a more tactful approach in trying to find a legitimate solution to the issue.

I do have some questions for you. On the closed containment issue, I believe there are some significant barriers in the knowledge there. Andrew, I know that you're working hard on this. Perhaps you could elaborate on some of this for me. My understanding is that the business model includes, obviously, using the waste product for lettuce. I'm not sure that there's a gap in the marketplace for lettuce. I think flooding the marketplace with lettuce would probably drive the price down, which might affect your model.

I also think that your proposal suggests that there are various different stages of cohorts involved in the same pens, at the same time, in the same tanks. Salmonids are piscivorous, which means they eat each other. Also, I'm a farm boy from Alberta and I know from intensive livestock operations that you don't grow different sizes of animals in the same pen at the same time. That kind of thinking doesn't work. So if that's the case in your model, could you elaborate on that?

I'd be very curious to find out how Overwaitea has dealt with this. Obviously they're finding a market for this; they're selling this fish. From my experience with fish farming, if you take a freshwater-raised salmonid and compare that to a farm-raised saltwater salmonid, and you compare that to a wild saltwater salmonid, the taste and palatability of those fish across that spectrum varies significantly due to the various issues pertaining to their growth. I'm hoping that you can address some of those.

This is something that's never been brought up in any of these discussions—and I think Ron MacDonald was highlighting that. His fear, as part of the sablefish organization, was that farmed sablefish will be called the same thing as wild sablefish. We haven't had a discussion. At any rate, farmed salmon are called Atlantic salmon. If you read the literature out there, when you take a look at what happened to the Patagonian toothfish, it was sold as Chilean sea bass to distort feelings in the marketplace or to confuse the consumer. So we haven't had very much discussion about whether we're accurately labelling what consumers are buying.

I would appreciate anybody's input on that.

Also, Dr. Orr, I would like to know this. Pharmaceutical companies, from my understanding, are often looking for new ways to access the marketplace. Is there anything that you know of or that you could enlighten this committee with? I would imagine if a problem is presenting itself through sea lice resistance, a pharmaceutical company would be looking to fill that gap. Could you let us know if there's anything new that's being tested or that's being proposed in a push towards the market to head off what everybody seems to see as an inevitable situation?

Thank you.

● (1725)

Dr. Andrew Wright: Shall I go first, Craig?

The first question was the notion of multiple fish in one tank. That's not quite correct. If you get the time to look at the report, it's multiple cohorts in the same water volume or same treated water volume, but they're actually separated into growth classes in different tanks. Small fish never meet big fish. That is called sequential harvest, and it's a technique that's used in all the other closed-containment fish farm species, to keep the loading on the biofilter the same.

What is required is good biosecurity protocols when you bring your new smolts in, that they don't bring disease in that then wipes out the whole of your farm. So you have to have a holding tank to do that biosecurity. That's quite standard practice in the existing closed containment industry.

I wager I'm probably the only person in the room who's eaten land-based—

Mr. Blaine Calkins: I hate to interrupt you. I just want some clarification on that point. Are you suggesting that the smolts are not coming from another biosecure facility? My understanding is that these things are reared and come from hatcheries.

Dr. Andrew Wright: Yes, for sure, but if you take the position that you're an isolated farmer and you're buying the stock in, you can believe that it might come from a biosecure facility, but—

Mr. Blaine Calkins: You have no control over that.

● (1730)

Dr. Andrew Wright: —it's not yours.

We saw that in Chile with the ag-lime disease, coming through the ag-lime into Chile. Enough said, perhaps, on that.

The second question was with regard to the quality of the fish. I'm probably the only person in the room who has had the luxury of eating land-base-raised coho and ocean-based coho. I can tell you that I couldn't tell the difference.

In other species, such as barramundi, which are delivered fresher to the market because they've been raised in good-quality water close to market, the quality of the raised fish is actually superior to wild fish, because you can go from tank to table in under two days, whereas if it's harvested in another part of the world and flown across the world, the fish quality goes off. That is true of the barramundi market.

Third, you put a question mark around the production of lettuce. Lettuce is only used here as a placeholder to illuminate the value of the waste in terms of two things: how much you can grow, and put a value on it. So there's a whole range of crops that you could grow on the back end of these farms. It doesn't have to be lettuce, but in this work, the bioproductivity from a pound of waste into what it means in terms of growth has been documented, articulated, for lettuce.

The economics, by the way, stand on their own without hydroponics, but why would you throw $4 million away every year when it's there to be had?

Was that the full set of questions?

Mr. Blaine Calkins: I think you pretty much answered that.

My other questions were more along the lines for Dr. Orr, or perhaps yourselves as well, talking about the consumer labelling of salmon. But also, I would appreciate having an opportunity to have Dr. Orr respond to my questions before the time expires.

Mr. Craig Orr: Sure, I can do that.

Andy, do you want me to do the chemical resistance?

Dr. Andrew Wright: Go for that.

Mr. Craig Orr: I was at a session yesterday at Sea Lice 2010, called “Resistance”. It had titles such as “Reduced sensitivity to emamectin benzoate in a farm population of sea lice”, “Increased tolerance towards emamectin benzoate versus fitness in lab-reared sea louse”, etc.

The plenary talk was given by Professor Tor Horsberg, from the Norwegian School of Veterinary Science in Norway. He's a pharmacologist who has studied this for a number of years. He's a world authority. He showed us the problems that were happening in Norway. One of the things he said was that SLICE wasn't working in this last year. It's the last chemical that has been developed, and it was developed in 1999. So we're talking about something that's 11 years out of date now in terms of recent developments. He did say that they were working on vaccines for fish to deal with sea lice, but as far as he knew—and he should know—there was nothing in the pipeline for vaccines right now.

He was quite worried about the efficacy of SLICE, obviously, as were many of the other people. He talked about how they had to resort to other ways that were used in the past to deal with lice, including organophosphates like DDT and those kinds of things, and chitin disruptors.

One of the things that Norway does, too, is take boats around to these farms, closed boats, and they have a hydrogen peroxide bath that they put these fish in to kill the lice. But all these things have limitations on what they do in terms of killing lice, and Norway has a problem.

I also sat down to lunch yesterday with Dr. Karin Boxaspen, who's a major sea louse researcher in Norway. She said the only reason they actually saved some fish last year, in terms of the wild fish, is because they had an exceptional cold snap that killed off some of the lice. She said it would have been far worse without the weather assisting in terms of killing lice.

So we have problems, even though we spend 300 million euros a year—that's from the paper I told you about before, by Costello. We have considerable problems in killing lice off in a way that's sufficient to save wild fish.

Peter Heuch, who is a leading expert on the sea lice action plan that they have in Norway, was at the conference as well. He has shown that as farms get larger and larger, they have more and more problems with these chemical treatments. They just do not do the job, and they have been unable to recover their wild fish in Norway because of salmon farming.

The Chair: Thank you very much.

Ladies and gentlemen, on behalf of the committee, I want to thank you once again for taking the time out of your busy schedules to come and answer our questions and make your presentations.

Committee members, perhaps we could remain for a couple more minutes. We have an item of committee business to clear up with respect to the committee's request to travel.

Thank you.

[*Proceedings continue in camera*]

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