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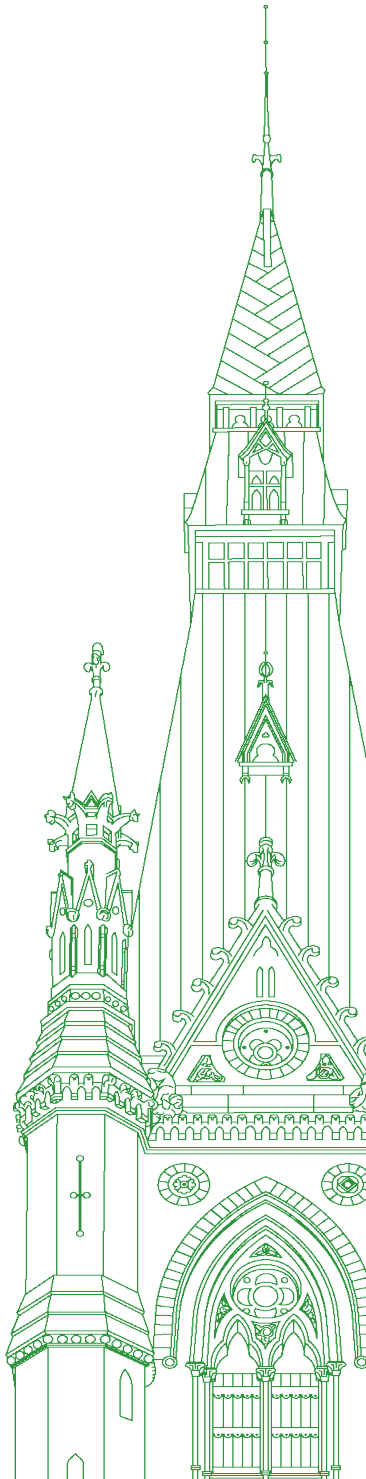

Chair: Mr. Ken McDonald

Standing Committee on Fisheries and Oceans

Wednesday, March 24, 2021

● (1655)

[*English*]

The Chair (Mr. Ken McDonald (Avalon, Lib.)): I call the meeting to order.

Welcome to meeting number 22 of the House of Commons Standing Committee on Fisheries and Oceans. Pursuant to Standing Order 108(2) and the motion adopted on October 19, 2020, the committee is meeting for its study of the state of the Pacific salmon.

Of course, there are lots of guidelines for us to follow. We all know from the public health authorities what we're supposed to do if we're here in person or in contact with anyone else, so I'll skip along, but as chair, I will be enforcing these measures for the duration of the meeting. I thank members in advance for their co-operation.

For those participating virtually, I'd like to outline a few rules to follow.

Members and witnesses may speak in the official language of their choice. Interpretation services are available for this meeting.

You have the choice, at the bottom of your screen, of floor, English or French audio. With the latest Zoom version, you may now speak in the language of your choice without the need to select the corresponding language channel. You will notice that the platform's “raise hand” feature is now in a more easily accessed location on the main toolbar should you wish to speak or alert the chair. For members speaking in person, proceed as you usually would when the whole committee is meeting in person in the committee room.

Before speaking, please wait until I recognize you by name. If you are on the video conference, please click on the microphone icon to unmute yourself. For those in the room, your microphone will be controlled as normal by the proceedings and verification officer. I remind you that all comments by members and witnesses should be addressed through the chair, and when you are not speaking, it is very important for you to have your mike on mute.

I would now like to welcome our witnesses. From the British Columbia Institute of Technology we have Dr. Rosenau, doctor of philosophy in biological sciences. From the Living Oceans Society we have Karen Wristen, executive director. Finally, from the Pacific Salmon Foundation we have Emiliano Di Cicco, fish health researcher.

I'll remind the witnesses that they have up to five minutes for their presentations. I will be fairly strict on time, as we want to get to questions as well, of course.

We'll go to Mr. Rosenau first. Go ahead, when you're ready.

Dr. Marvin Rosenau (Instructor, Fish, Wildlife and Recreation Program, British Columbia Institute of Technology, As an Individual): Thank you, Mr. Chair.

My name is Marvin Rosenau, and I'm honoured to talk to you today. My background in fisheries work goes back 40 years locally, nationally and overseas within and outside of governments, including in academic and scientific venues as well as in management and policy and the courts. I am now an educator with the fish, wildlife and recreation program at the British Columbia Institute of Technology, and I specifically concentrate on fish and aquatic sciences.

My personal view is that the current salmon collapses that have occurred in southwestern B.C. and the Fraser River have largely been driven by impacts associated with fish farms. However, with the recent announcement of 19 farms being removed from the Discovery Islands smolt out-migration routes, along with the decommissioning of the Broughton Archipelago fish farms several years ago, the DFO is moving in the right direction. I praise Minister Jordan, this standing committee and others for making these bold moves.

Today I will focus on habitat destruction and the failure of DFO to address this issue, and that's my theme. Species and ecosystems cannot survive and thrive without properly functioning habitats, and thus I pose the following questions. Are there sufficient and appropriate rules in place in Canada to protect these salmon stocks and species in B.C. from habitat damage, for example, through Canada's Fisheries Act? Are the existing rules being implemented properly, either at the referral and approval stages for new projects where potentially deleterious impacts might occur, or where random violations might take place and fisheries officers need to initiate an investigation and the triage decision folks need to go forward with charges or directed remediation?

It's my position that, notwithstanding the recent upgrades in the Fisheries Act via Bill C-68, which was very good, in my experience over the last 30 years using the act, there is no reason to believe there hasn't been sufficiently good legislation, regulations and policy to protect fish and fish habitat. However, the implementation of these rules has sometimes been woefully inadequate. This can be due to a lack of will in the internal DFO decision-making process, sometimes due to a failure in understanding what constitutes destruction of fish habitat, and there's often a failure in regard to how to restore or mitigate damage.

Staffing capacity at DFO habitat protection in British Columbia continues to be a major issue. The loss of the Prince George DFO habitat office and some of the closures in the Quesnel, Clearwater and eastern B.C. offices exemplify this problem.

My opinion, having worked on this issue for many years, is that habitat protection is the most difficult part of fisheries management, and to do it properly always requires a lot of work and tough decisions. If they're doing their jobs properly, agency habitat decision-makers have to constantly tell developers, farmers, loggers, miners or the hydroelectric industry that no, they can't do that, and that rarely occurs.

The capitulation to proponents becomes the norm, due to pressure both within and outside of government. Roberts Bank Terminal 2 in the Fraser estuary and the Trans Mountain Pipeline expansion project are current examples of this scenario.

Habitat protection and enforcement staff and the fish and fish habitat protection program, FFHPP, decision-makers in DFO often feel personally and professionally vulnerable to criticism. They try to do the right thing: protect habitat. My observations and my own personal history is that superiors often come down hard on employees who try to take legally and scientifically defendable positions.

As an example, there has been a spectacular failure to protect large amounts of salmon habitat in recent years regarding the removal of flood-land forests in order to develop farmland in the areas between Mission and Hope on the lower Fraser River in B.C., and I think you might have some figures to see. In my opinion, many of these activities in what we refer to as the heart of the Fraser have been clear violations of the habitat provisions of the Fisheries Act. However, DFO has not charged any landowners under the act that I'm aware of, and up to a thousand hectares of prime Fraser River juvenile salmon-rearing habitat have been or will be lost because of inadequate enforcement or bad triage decision-making in the FFHPP.

DFO has failed to properly interpret the science and/or the law, and/or has simply refused to enforce its own rules in this instance, and this is just one example.

● (1700)

In conclusion, Canada has lots of good rules for salmon that are adequate to protect fish and habitat, but the government needs to concentrate on applying its existing powers, and not politically interfering with but supporting line staff in terms of increased capacity and the various ways I've just discussed.

Thank you very much.

The Chair: Thank you, sir. That was pretty well dead on the time allotted.

We will now go to Ms. Wristen, for five minutes or less, please.

Ms. Karen Wristen (Executive Director, Living Oceans Society): Thank you, Mr. Chair.

I wonder if we might consider reversing the order here. I have had the opportunity to discuss Dr. Di Cicco's evidence with him briefly, and mine will make more sense after his.

The Chair: Okay, I'll do that.

Mr. Di Cicco, you can go for your five minutes or less, please.

Dr. Emiliano Di Cicco (Fish Health Researcher, Pacific Salmon Foundation): Thank you, Chair, and thank you to all the members of the committee for inviting me here. It's a big honour for me to be here today to attend this session.

I've been told to say my statement is going to take five minutes and 50 seconds, so hopefully I'll be able to say it all.

I would like to introduce myself. I'm Emiliano Di Cicco. I'm a doctor of veterinary medicine and I have a Ph.D. in fish pathology. I have worked in this field for over 15 years, and for the past six years in British Columbia.

In 2015, I was hired as a fish pathologist and project manager for the strategic salmon health initiative, also known as SSHI. The primary objective was to assess the contribution of pathogens and diseases to the decline of Pacific salmon.

We have evaluated more than 50 infective agents across 30,000 salmon sampled over the last decade as the basis of the most comprehensive investigation of infection and diseases ever undertaken in wild salmon. We have identified several infectious agents that appear to impact the health of salmon in the wild, with effects that can be as great as the well-known effects of sea surface temperature.

Just to give you a few examples, we found that piscine orthoreovirus, also known as PRV, is associated with condition and survival in chinook and coho salmon. This virus, introduced to B.C. from the Atlantic Ocean about 30 years ago, is also prevalent in salmon farms. This is an important aspect to keep in mind, because viruses carry the potential to rapidly evolve, and just like the current situation with the coronavirus, the availability of a high number of hosts favours viral replication and facilitates the development of more dangerous variants.

As a pathologist working in the SSHI, I led the two main studies on the effect of PRV infection in British Columbia. The first study identified the disease called heart and skeletal muscle inflammation, also called HSMI, associated with the PRV in farmed Atlantic salmon in B.C.

Considering that the weight of evidence worldwide indicates that PRV causes HSMI in Atlantic salmon, we therefore recommend that PRV be treated as a pathogenic agent regulated under the Fisheries Act.

In the second study, we found that PRV can also induce a related disease in chinook salmon, called jaundice anemia. This disease has also been described in Chilean coho, and our wild salmon carrying a high abundance of PRV develop similar pathology to what we described on farms. Finally, B.C. salmon sampled within 30 kilometres of a salmon farm showed the highest rate of infection by PRV.

A similar situation has been revealed for another bacterium, called *Tenacibaculum maritimum*. It appears to be responsible for significant mortality on salmon farms and likely plays a role in the health and survivorship of sockeye salmon, chinook and coho.

Importantly, this bacterium has been found to be abundant in the water around active salmon farms during outbreaks, and the risk of infection in Fraser River sockeye salmon is highest as they pass by farms in the Discovery Islands.

One of the 15 salmon viruses newly discovered by our team is the nidovirus, which is related to coronaviruses. It infects gills—the respiratory tissue of salmon. We see this virus most commonly in fish released by our federal hatcheries. Preliminary results indicate that this virus may play an important role in the survival of juvenile salmon upon entry into the marine environment.

However, there are some agents that impact the survival of wild salmon that are naturally present in their ecosystems. An example is a small skin parasite that causes white spot disease in juvenile Pacific salmon in fresh water and appears to have a significant carryover effect upon ocean survival.

The agents I just mentioned are not the only ones posing a risk to our wild salmon, but they are among the most significant and consistent across species.

In recommending management actions, we can only mitigate factors that we can control, most of which will be anthropogenic. When it comes to diseases in salmon, the main lever we can control is cultured fish, including salmon farms and hatcheries. We have the power to control when and how cultured salmon are grown and their abundance relative to wild salmon. We can regulate the type and level of infection that would be tolerated. In this context, a closed containment system for salmon farms is strongly recommended.

Furthermore, there is a risk associated with hatcheries releasing a large number of Pacific salmon, which may not only compete for a dwindling food supply with wild salmon, but could represent an additional source of transmission and evolution of diseases. Therefore, proactive monitoring and regulation of the health and condition of hatchery fish before release into the ocean is essential. All testing should be available publicly to provide confidence in our management system.

● (1705)

As my last remark, I would like to say that the expression of disease associated with a pathogen is often triggered by environmental conditions that a fish experiences. We should expect that diseases will increase in frequency and impact as the climate situation worsens. The cumulative impacts of stress and diseases are likely not simply additive, and there is no doubt that the direct and indirect effects of climate change are impacting the survival of salmon in freshwater estuaries and the ocean. This is why rapid action to deal with fish pathogens and diseases is not only recommended but necessary. We have no time to waste. We need mitigation and restoration now.

Thank you very much.

The Chair: Thank you, Mr. Di Cicco.

We'll now go back to Ms. Wristen for five minutes or less, please.

Ms. Karen Wristen: Thank you, Mr. Chair.

When I was first invited to speak to the committee, I was going to speak to you about sea lice, because it's a subject on which I've published rather extensively. I expect, however, that you've heard quite a bit about them by now, and there's something entirely new that I want to talk to you about instead today.

Dr. Di Cicco touched on it. It's a new study that has come out of the SSHI dealing with a bacterium called *Tenacibaculum*. Because that is a mouthful for late in the afternoon, I am going to henceforth refer to it by the disease it causes, which is “mouth rot”, if you'll forgive me for being a little unscientific about it.

What I want to talk to you about concerning mouth rot is the significance of the finding. You will all be familiar with the Cohen commission's failure to find what Justice Cohen referred to as “the smoking gun”. I think we may have found it.

This bacterium has been determined first of all to infect wild juvenile salmon and to have, in the words of the SSHI, “population level impacts”. This is what we were looking for all along in terms of being able to quantify the risk to sockeye salmon, and to the Fraser River sockeye salmon in particular.

What's even more important about the findings is that the SSHI was able to spatially determine where this was taking place. By testing actual samples of wild fish along their migration route, they were able to determine that the infections were occurring within the Discovery Islands region, that the bacterium was present on the salmon farms there, and that survival was being impaired to the extent of 87.9% of migrating sockeye.

That's a very important bit of information, and it directly contradicts the conclusions of one of the nine risk assessments the Department of Fisheries and Oceans conducted to inform the minister about her decision on the Discovery Islands.

I want to spend a second to take you back through that risk assessment for mouth rot, because it's important to see what happened there. The department concluded that there was a high risk of an outbreak, that it was very likely that this disease would break out on a salmon farm, but also that it was very likely that juvenile salmon would be exposed to the organism. What they didn't know—they concluded it was highly uncertain—was whether or not sockeye could become infected as a result of exposure. Not knowing this, they went on to decide that neither the abundance nor the diversity of Fraser River sockeye would be impacted beyond a negligible extent.

All of those conclusions are now proven wrong. First of all, concerning the likelihood of infection, it's a certainty of an infection. Secondly, concerning the severity of the impacts, no one one would call 87.9% a “negligible impact”.

This is one example of how tenuous the DFO risk assessments are. The science to underpin them simply has not been done. Here we have it done, and the risk assessment goes out the window.

The next important point is what happened when this information was sent up the chain of command in DFO, or more precisely what didn't happen. Dr. Miller-Saunders advised senior management on December 15, 2020, just before the minister's decision was to be made, that she had new modelling results and new evidence that was highly germane to the decision to be made.

When committee members ultimately get my written documents, you'll see that I've copied into them verbatim from an ATIP result that we got searching for the correspondence around the communication of these findings. It's really interesting to note that Dr. Miller-Saunders gave to her immediate superiors a complete lay description of the findings, so there could be no uncertainty as to how important the findings were.

She said, in her initial email on December 15 at one in the afternoon, that “our models have revealed population-level associations with survival and condition with this agent”—being mouth rot—“for Chinook, coho and sockeye salmon”.

● (1710)

She also pointed out that she'd been discussing these findings and the work that was being done to arrive at these findings with staff for more than a year, so this is nothing coming out of the blue at them.

An excerpt from the lay description that Dr. Miller-Saunders provided made it clear. Contributions from Discovery Islands salmon farms dwarf those from other salmon farming locations. Farm-source infection pressure peaked at 12.7 times the background infection levels for this agent. The model resulted in an 87.9% reduction in smolt survival. It was very clear.

The summary paragraph at the end of that lay description laid it out even more clearly: “Our models raise realistic and serious concerns about farm-origin transmission of”—mouth rot—“to Fraser River sockeye salmon and population-level impacts to Chinook, coho and sockeye.” Although “there remains uncertainty”, she says, “it is the bulk of evidence, rather than any one particular model, that should give pause.”

The summary goes on to say, “Taken together”, the results identify mouth rot as “one of the most likely candidates for population-level impacts on wild populations, and present evidence that infections in the Fraser River sockeye may originate from salmon-farm sources, especially in the Discovery Islands region. Given knowledge about the depressed state of Fraser River sockeye stocks, the evidence we have presented suggests extreme caution and further research are required.”

The Chair: Thank you, Ms. Wristen. We've gone well over the five-minute allotment, but hopefully anything you didn't get out will come out in the rounds of questioning to start very shortly.

I would remind committee members, if you can, to identify who your questions are for, as it will make it go much more smoothly and you'll get more value out of your time.

Mr. Arnold, for six minutes or less, please.

Mr. Mel Arnold (North Okanagan—Shuswap, CPC): Thank you, Mr. Chair, and thank you to all the witnesses for being here today. It's important to all of us on the committee to get as much information as we can.

I'll start with Dr. Di Cicco.

Where the Cohen commission focused on Fraser River sockeye salmon, the committee's current study is examining the state of all Pacific salmon stocks. Justice Cohen used the term, and I quote, “more than minimal risk of serious harm” when he defined the threshold of risk or harm the government should apply when managing impacts of open net-pen salmon farms on wild Pacific salmon. In your opinion, is there scientific evidence that open net-pen salmon aquaculture in British Columbia poses more than a minimal risk of harm to wild Pacific salmon?

● (1715)

Dr. Emiliano Di Cicco: We have to approach this in two ways. There is definitely worldwide evidence that aquaculture operations have impacts on wild populations when they coexist in the same region. We're talking about here in the west coast, and the same thing applies in Europe. As Karen Wristen just mentioned in her previous statement, it's a cumulative sum of the different parts that actually raises the question of whether there is actually such a minimal impact or much more than that.

We have to consider a few factors in this aspect. First, we have evidence that fish farms carry a plethora of agents, agents that can be a threat to Pacific salmon, and in this case it can even be wild Pacific salmon, and they can be carried in concentrations, so the *Tenacibaculum* case is one of them, but this can be applied to several different agents. In this case, the farms can work as an incubator for this agent, but at the same time they can work also as a reservoir.

There was a case we did on VHS, which is a virus that can be retained by the farm as a reservoir and infect herring, which is a food source for salmon as well.

The other thing to consider is that wild salmon swimming by, like sockeye salmon at Discovery Island, and wild salmon living nearby, for example chinook on the west coast of Vancouver Island, have a higher probability of picking up these agents that are released in high concentrations from the farms. That's another risk factor to watch in the puzzle.

Then we have evidence that some of these agents can actually induce lesions and disease, just as we see in farmed fish. An example would be PRV—

Mr. Mel Arnold: I hate to cut you off because I'm sure there's much more you can add. In your opinion, is there evidence that open-net pen salmon aquaculture poses more than minimal harm to wild Pacific salmon?

Dr. Emiliano Di Cicco: If you put all the evidence together, yes, there is more.

Mr. Mel Arnold: Thank you.

I'm going to move on to Dr. Rosenau now.

Dr. Rosenau, 2005 and 2006 were brood years for the record-low run in 2009 and the record-high run in 2010, respectively. What significant factors would account for such a wide range in returns from those consecutive brood years?

Dr. Marvin Rosenau: Hi Mel. How are you doing?

I'm assuming you're referring to sockeye.

Mr. Mel Arnold: Yes, I'm referring to sockeye.

Dr. Marvin Rosenau: Fraser River sockeye have four-year cycles. There's typically a very large brood year every four years, which is dominated usually by Adams River fish. It seems like there was a perfect positive storm for the group of animals that went out for the 2010...so that would have been the 2008 smolt outmigration. Perhaps the fish farming industry—and I am a proponent of the theory that fish farms have an impact—may have dealt with some of these diseases, specifically sea lice. In any event, 2009 would have been a small run. With the perfect storm of good oceanographic conditions, perhaps the fish farms and whatever diseases were at a minimum, so that's why we can have this flip flop.

Mr. Mel Arnold: Thank you.

I will move on to Ms. Wristen now.

I'll start with the preamble. I know you have a background in law, so I'd like to ask a legal question. In its 1997 decision in Comeau's Sea Foods Ltd. v. Canada, the Supreme Court stated that the minister of fisheries and oceans holds the responsibility to "manage, conserve and develop the fishery on behalf of Canadians in the public interest".

Ms. Wristen, do you agree with that statement from the Supreme Court?

● (1720)

Ms. Karen Wristen: Yes, of course.

Mr. Mel Arnold: Thank you.

I'll go back to Dr. Di Cicco now. Do the findings from the nine strategic health risk assessments apply to all wild salmon populations and the risk from aquaculture operations?

Dr. Emiliano Di Cicco: No, they don't. The title of the assessments says that the assessments were based on the sockeye salmon and aquaculture in the Discovery Islands, so they don't apply to all the species and they don't apply to all the regions.

The Chair: Thank you, Mr. Arnold, your time is up.

We'll now go to Mr. Hardie, for six minutes or less, please.

Mr. Ken Hardie (Fleetwood—Port Kells, Lib.): Thank you, Mr. Chair. Thank you all for attending.

This is very revealing information today.

Dr. Di Cicco and Ms. Wristen, we've taken the move and we've shut down—or we are in the process of shutting down—the operations in the Discovery Islands. A key question for me is whether there is remediation work that needs to take place at those locations, or if can we just let them pull up their gear and go away.

Dr. Emiliano Di Cicco: It's a question for whom?

Mr. Ken Hardie: I'm sorry, we'll start with Dr. Di Cicco.

Dr. Emiliano Di Cicco: When you empty a farm because of the removal of the fish, you cannot clean the water around the farm. It takes some time to actually go to the base level of agents, remaining food, drugs and whatever is used during the production cycle. Usually, it takes some months. It depends on the tidal flow and how secluded or not the location is. It usually takes some time to go back to the regional situation before the fish were put in. Again, it's from weeks to—

Mr. Ken Hardie: I'm sorry, Doctor. What about the ocean floor? There would be a lot of debris and detritus from the operation down there.

Dr. Emiliano Di Cicco: It takes weeks, if not months.

Mr. Ken Hardie: Ms. Wristen, what are your thoughts?

Ms. Karen Wristen: I can't really add to what Dr. Di Cicco said. It recovers naturally, as far as the ocean floor is concerned. My concern is that the infrastructure is removed.

Mr. Ken Hardie: The community impacts of closing down the operations in the Discovery Islands have been noted, and we've certainly heard from them. I heard Dr. Di Cicco reference the operations on the west coast of Vancouver Island, where tidal activity, etc., must be quite a bit different from what it would be in the Discovery Islands, one would think.

Does that make a difference in terms of the acceptability of aquaculture operations?

Dr. Emiliano Di Cicco: The water flow is definitely different, so the last stage in the life of the fish living in those areas is different. When we talk about the Discovery Islands, we're talking about those islands between Vancouver Island and the mainland. Usually the fish use that area to migrate up north when they are juvenile and come down when they are adult.

What happens on the west coast is slightly different. We have a population of chinook and coho that spend the first year of their life in those sounds, where there are also farms. In that case, they are not exposed during the migration, but they are exposed during the whole first year of life. I don't think either is good.

Mr. Ken Hardie: Dr. Rosenau, when we talk about habitat, is joint care and attention necessary between the province and the federal government when it comes to dealing with habitat in the inland waters?

Dr. Marvin Rosenau: I've been advised that the province has pulled out of habitat in the eastern part of the province. As an example, DFO has had to move back as per requirements under the Canadian Constitution. Its fractured forest rules are different. There is a combination of provincial and federal collaboration within the urban environments, the riparian area regulation types of legislation. DFO seemed to pull out, and I don't know if they're coming back. There is a mixture of collaboration and, in some cases, very close connections; in other cases, they're split right apart. It's a bit of a grab bag from my experience.

● (1725)

Mr. Ken Hardie: We've heard that water temperature can quite often be an issue, certainly out in the deep ocean, but also in the freshwater cycles. We have water temperature; we have the availability of food; we have the stream beds and the lake beds, as well.

Where in your view is most of the damage taking place, or is it evenly distributed across all those aspects of the habitat?

Dr. Marvin Rosenau: I would suggest it's not evenly distributed. Concentrations occur in populated areas. There is always a sort of death by a thousand cuts in the Lower Mainland, where every little development, every little shopping centre, every little parking lot that goes up affects habitat. Of course we have large mine proposals in the interior of the province. I would suggest that within areas of community development, lots of non-diffuse impacts are just as serious as a large mine going up. The Mount Polley mine is a good example; it collapsed and things spiralled out of control.

Mr. Ken Hardie: While I still have time, we've asked this question a number of times—

The Chair: Sorry, Mr. Hardie, your time just ran out.

We'll now go on to Madame Gill, for six minutes or less, please.

[*Translation*]

Mrs. Marilène Gill (Manicouagan, BQ): Thank you, Mr. Chair.

That was passionate testimony. Personally, I lost track of the time. My thanks to all the witnesses for their testimony, Mr. Di Cicco, Mr. Rosenau and Ms. Wristen.

Ms. Wristen, I listened to you with attention and interest. You talked about the many causes of what is happening now to Pacific salmon populations.

Could you give us some more details about what you were saying earlier with respect to the department itself? For example, you mentioned the marked differences between the scientific information that the department could have had at its disposal in order to make recommendations to the Minister. You also talked about Ms. Miller-Saunders, who noticed much the same thing in terms of the differences in the scientific data.

How can we improve this state of affairs within the department itself?

[*English*]

Ms. Karen Wristen: That's a large question. Let me confine my remarks to what happened with these scientific recommendations.

They were written down, so to speak. The significance of the remarks was obscured by titling them, by prefacing them, with the suggestion they were unpublished and somehow less than the dire warning that Kristi Miller was trying to convey up the chain of command. It's not even clear that this information was placed before the minister before she made her decision, based on the paper record that we see.

Certainly, there's nothing in the record of decision that appeared in the proceedings of the court—to which I'm a party, which is why I know about it—that would suggest that she had the information before making the decision. This has really important ramifications in practice. The companies are in court right now, trying to get an injunction to reverse this decision and allow them to stock the farms in the Discovery Islands, and the judge hearing that case will have no evidence before him of the dire impacts to Fraser River sockeye that could ensue should he decide to restock those farms. It's simply missing from the record, and that is indefensible.

What needs to happen in order to prevent this from happening again is that DFO's mandate to promote the industry must be removed from that department. They cannot both promote aquaculture and adequately protect wild salmon. They can certainly regulate aquaculture. They have the knowledge to do that, but they cannot promote it and reconcile that promotion with the protection of wild salmon. It's been clear that that has not happened in the past, and there's no indication it can happen going forward.

● (1730)

[*Translation*]

Mrs. Marilène Gill: Thank you, Ms. Wristen.

You anticipated the subject of my next question a little. I will put it to all the witnesses.

It is about farming salmon without adversely affecting wild salmon populations or the environment, and, at the same time, employment and the economy.

Is any reconciliation possible between the economic activity with salmon, and protecting the environment and salmon populations?

[*English*]

Dr. Emiliano Di Cicco: When you have a sustainable activity, it means you have a balance between economic factors, social factors and financial factors. Trying to find the balance among these three big areas is not very easy.

Personally I've been struggling to understand what would be a way to address all three factors at the same time. The idea of having a closed containment industry, I think, not necessarily on land but definitely a closed containment industry, might help to maintain a certain economic impact in the region while not having the impact on the environment. That would be my idea.

Ms. Karen Wristen: I would say there are a number of economic activities that could replace the economic activity of open net-pen salmon farming. Land-based salmon farming is only one of those. There are also opportunities for the farming of things like seaweed and bivalves that do not interfere with the environmental integrity but, in fact, enhance it and provide habitat for other species. There are opportunities for very small-scale, land-based salmon farming development that could be within the confines of a small community or first nations community on the island.

We have lots of alternatives if we think broadly enough about what we're trying to replace here. In terms of reconciling having both farmed salmon and wild salmon in the water, we see no evidence anywhere in the world that this is possible.

Dr. Marvin Rosenau: In response to your question, madam, my view—and I discussed this with some of the members of Parliament some years ago—is that in effect the most pragmatic thing is to choose parts of the coast where salmon runs are very minimal, where the large Fraser River stocks aren't migrating through, and just basically say we're going to sacrifice those areas.

The fish farming industry is so large and so economically powerful that you have to come up with a Solomon's way of cutting the baby down the middle to deal with it and move these guys to areas. It may cause some problems with respect to companies being in conflict with each other, but in terms of providing safe passageways.... Take Nootka Sound versus Barkley Sound: Nootka has lots of farms but no fish. Barkley has no farms but lots of fish.

The Chair: Thank you, Madame Gill.

We'll now go on to Mr. Johns for six minutes or less, please.

Mr. Gord Johns (Courtenay—Alberni, NDP): Thank you, Mr. Chair.

Thank you to the witnesses.

Mr. Hardie asked a question, Dr. Di Cicco, about the west coast of Vancouver Island. We've seen plummeting returns, whether it be in Tofino Creek, Atleo River or Tranquille River, all in Tla-o-qui-aht and Ahousaht Nation territory, or in the Kennedy. Do you believe that salmon farms have had an impact on those wild stock returns?

Dr. Emiliano Di Cicco: I believe so. We've been trying to do a study directly in that area to assess what the impact was of the agents in that type of population because, as I said, chinook and coho in particular spend a lot of time inside the sound in the first phase of their lives. They are in close contact for a long period of time with the farms that are present in that area, so the impact is definitely prolonged, and that can be detrimental to their survival.

● (1735)

Mr. Gord Johns: We've heard about mouth rot, PRV and sea lice. We've had escapes. We've had die-offs.

This is a question for Ms. Wristen.

The Cohen commission's third recommendation was that the Government of Canada “remove from the Department of Fisheries and Oceans' mandate the promotion of salmon farming as an industry and farmed salmon as a product.” Do you believe it can be both the regulator—to protect wild salmon—and the agent?

Ms. Karen Wristen: No, it simply has not worked out at all for the wild salmon in that regard. The mandate to expand the industry to help it grow has overtaken, at every turn, considerations of the impacts on wild salmon. I mean, I could provide you with a host of examples—very specific examples—of how that's happened.

Mouth rot would be a good one. The government, together with industry, has been studying mouth rot since at least 2009, but in 2019 it couldn't answer the question, “Do wild fish get it?” In 2019 it couldn't answer the question, “How many sea lice are there on migrating Fraser River sockeye?”

It just doesn't look at any of the questions that need to be looked at to protect the wild fish, because if it did, it couldn't promote the salmon farming.

Mr. Gord Johns: Given that, do you believe British Columbians can trust the science that the government has? We've had several reports and a recent Canadian science advisory secretariat that said that PRV is endemic in British Columbia and not a concern. This is right there.

Would you agree that PRV is not of concern, like DFO is saying, or is PRV concerning you? What is the failure of DFO to not take PRV seriously?

Ms. Karen Wristen: PRV is a very good example, and I think Dr. Di Cicco is probably better qualified than I am to answer this question.

Dr. Emiliano Di Cicco: There has been an interpretation of the word “endemic” by DFO and the application in this case, because endemic can usually be seen as consistently present in a population, as opposed to epidemic.

Mr. Gord Johns: What about “minimal concern”? They keep saying “minimal concern”.

Dr. Emiliano Di Cicco: Yes. The problem is that even if it was endemic—and it's not—there are endemic agents that are a concern. There is IHN, which is another virus that is endemic of the sea and endemic of sockeye, but if they get IHN, they die. It's a measure of concern, even if that agent is endemic. Saying that because it's endemic it is not a problem is wrong.

Mr. Gord Johns: If this is being left out of scientific assessments, what does it tell us about the processes within the department?

Dr. Emiliano Di Cicco: The process as it was set up for those nine reviews was wrong from the start, in the sense that it was already narrowing the scope to only sockeye salmon and only in that region.... They were already positioning themselves for the failure of a meaningful review from the start.

Mr. Gord Johns: Ms. Wristen, I'm hoping you can tell the committee more about sea lice on wild salmon. Maybe you can tell us what impact sea lice have on an individual fish and how the infection rate of Fraser River sockeye has changed between 2015 and 2020.

Ms. Karen Wristen: Fraser River sockeye are very much at risk from sea lice, particularly as they were passing through the Discovery Islands in 2020. The monitoring results from 2020 indicated that 99% of the fish sampled were infected with an average of nine lice per fish. At that rate, the fish are suffering extreme stress. It's interfering with their ability to regulate their blood chemistry. They're not likely to feed well, and their chances of survival are severely depressed.

These are the—

Mr. Gord Johns: Yes. When we have high infection rates like you're seeing, what do they mean for salmon returns? There are a lot of things impacting wild salmon returns. Is there a way we can quantify or look at how sea lice infections are impacting these numbers? Is this an isolated problem, just for the Fraser salmon?

Also, what about the pesticides that companies are using? Maybe you could speak about that as well.

Ms. Karen Wristen: It's not isolated to the Fraser River salmon, by any means. Fraser sockeye took quite a beating this year. There are other places where the lice have been out of control, because they are now resistant to drugs. It's been the same case. Clayoquot Sound is another good case in point. The Broughton was too, until we started removing salmon farms and reduced the lice pressure there.

Sea lice are everywhere. It's not going to change, because they are not something that can be controlled. It has not happened anywhere in the world and it's not going to happen here.

I'm sorry, Mr. Johns, but the second part of your question just escaped me. You asked me two very distinct things.

● (1740)

Mr. Gord Johns: Since the infection rate is this high, can you talk about how we can quantify or look at sea lice infections impacting stocks in these large numbers?

Ms. Karen Wristen: In terms of quantifying it, we know where they're being impacted. However, quantifying the impact on individual runs is extremely difficult because we don't have a great deal of data on runs in many parts of the province. They've dwindled to almost nothing and they can't stand any more impact. That's all we really need to know at this point.

Mr. Blaine Calkins (Red Deer—Lacombe, CPC): It looks like you're trying to give me some time, Mr. Chair, so I'll go ahead and take it.

The Chair: Yes, I'm going to give you five minutes, sir.

Mr. Blaine Calkins: Thank you.

My questions will be primarily for Ms. Wristen and Dr. Di Cicco.

Would it be fair to say that *Tenacibaculum* is ubiquitous in the Pacific Ocean? Is it more ubiquitous wherever there is fish farming?

Dr. Emiliano Di Cicco: It's ubiquitous in the Pacific Ocean, but it's definitely more prevalent around salmon farms.

Mr. Blaine Calkins: Okay. The prevalence is increased around farming.

It doesn't appear to be only a salmonid issue. Is that correct? You can find it in flatfish and various stocks throughout the water column, from the ground fish right to the surface.

Dr. Emiliano Di Cicco: Yes, it can impact several different species. The mouth rot that Ms. Wristen was referring to is a particular manifestation for Atlantic salmon. Tenacibaculosis—that's the name of the disease—occurs in different species.

Mr. Blaine Calkins: Is it transferable between species?

Dr. Emiliano Di Cicco: I don't think there's been a challenge where it has tried to go from one species to another, but I wouldn't exclude that.

Mr. Blaine Calkins: I want to talk about the infection fatality rate for *Tenacibaculum*. Is it the same for juvenile salmonids as it is for adults?

Dr. Emiliano Di Cicco: It's probably one of the main causes of high mortality—at least in the farms, where it's easier to study—compared with all the other agents that usually occur. In the first three months, it's probably the main cause of mortality. There's a pretty acute [*Technical difficulty—Editor*] mortality.

Mr. Blaine Calkins: I'm sorry, but would that be primarily in juveniles? Does it matter?

Dr. Emiliano Di Cicco: It can happen in every phase, but it's more common in juveniles, yes.

Mr. Blaine Calkins: We're looking at an 87% infection rate, and we're talking about the spatially determined rates along the migration routes. I think Ms. Wristen brought that up.

Have you cross-referenced this with the research that's done by Kintama and others to verify that this mouth rot, or *Tenacibaculum*, actually corresponds with the findings of the spatial studies that Kintama has done?

Dr. Emiliano Di Cicco: This study was actually performed for two years. In the first year, which is the one I have references for, tests were done in a region where there were basically very few, if any, active farms. The permanence of the fish in that area was very short. I don't have the final data for the second year, but the permanence was definitely longer once the farms were actually present.

Mr. Blaine Calkins: How does *Tenacibaculum* get into a fish farm? Is it attracted there? Does it just develop there naturally, or is it brought in and introduced? Do we know?

Dr. Emiliano Di Cicco: As I said, it's a ubiquitous bacteria, which means it can stay in the water column. Some studies say that it's also in jellyfish. It stays in the water column, and then when fish are stressed and you have intensive farming in a farm.... This is an opportunistic bacteria. When there is something not going properly, it can infect the fish, and then it explodes.

Mr. Blaine Calkins: Are you aware of any studies that tried to use any type of antibacterial, like drugs or chemicals?

Dr. Emiliano Di Cicco: No. It's a treatable disease without any antibiotics, but sometimes the treatment has to be prolonged for a long time to resolve the disease.

Mr. Blaine Calkins: Do we know how long it takes between when the bacteria sets in and death?

Dr. Emiliano Di Cicco: It's usually a pretty acute disease, so we're talking about days.

Mr. Blaine Calkins: Wow. Days. Okay.

I want to talk to you a bit about the record returns of salmon—I believe it was in 2010 and 2014. Everybody tells me the salmon migrated along the west side and didn't go up through the archipelago, and that's why we had those record salmon returns for the Fraser. However, Dr. Di Cicco, you have indicated that there are salmon farms now in Barkley Sound and so on, and Mr. Johns has brought it up as well.

Can you clarify for me, does it really matter which way the salmon go around the island? I can't understand why we had record returns in those two years, and then, with not much else changing in the interim, all of a sudden we have all these reductions and these critical levels of certain stocks in the Fraser.

● (1745)

Dr. Emiliano Di Cicco: Unfortunately the answer to the question depends on the species. The sockeye don't go inside the bays like chinook and coho. They stay in open water, so in that case, they—

Mr. Blaine Calkins: They pass by the salmon. Okay.

Ms. Wristen, do you have any evidence to support your claim that DFO is being purposefully negligent? You made a pretty bold statement before the committee, indicating that the Department of Fisheries and Oceans is being wilfully negligent in studying things like sea lice and so on to fulfill their mandate of being pro fish farm.

Do you have any ATIPs, any information or any records that would support your claim?

Ms. Karen Wristen: Yes, and you will see them when you get my speaking notes.

I did not call them wilfully negligent. I do not think this is negligent conduct. I think this is deliberate conduct.

Mr. Blaine Calkins: Maybe it's my poor choice of words. You have supporting evidence to say that this is deliberate. Okay. I will look through it.

Ms. Karen Wristen: Yes. In this case we do.

The Chair: Thank you, Mr. Calkins.

We will now go to Mr. Hardie for five minutes or less, please.

Mr. Ken Hardie: Thank you, Mr. Chair.

I will put Ms. May on notice that I'm going to give her a few moments to ask a couple of questions, as well.

We have received information that the deep ocean conditions have changed. Climate change, which is a real thing, has impacted the sources of food, the plankton, etc., out there, and the chinook coming back are smaller. They are coming back sooner, and they are simply not in as good a condition to lay eggs and procreate.

What can we do to offset the deep ocean conditions over which we have very little control?

I will go to Dr. Rosenau on that one, and maybe then Dr. Di Cicco.

Dr. Marvin Rosenau: If you look south of the Canada-U.S. border, yes, there have been declines in species like chinook and coho. However, those declines are not nearly as precipitous as in the Fraser River and the Gulf of Georgia, so there's a lack of synchrony. In fact, some years our Okanagan River sockeye are now as high or higher than in the whole Fraser River watershed.

Yes, there are some issues, such as the earliest semi-decadal oscillations, whereby there have always been very large ups and downs over time that are independent of anything that's happening inside the Gulf of Georgia or the larger Pacific Ocean.

The big picture is climate change, but notwithstanding that, there's something very specific inside southwestern B.C. and the Fraser River that is different from south of the border and up in Alaska in some years of record runs.

Mr. Ken Hardie: Dr. Di Cicco, briefly, do you have anything to add to that?

Dr. Emiliano Di Cicco: As I said in my opening statement, we can control anthropogenic impact on the survival of fish. Honestly we have very little control over climate change other than maybe in the great scheme. Definitely, available food is controlled by climate change.

I don't think we have much here that we can do to fix that directly. We can control other aspects better, but that one is pretty hard to control.

Mr. Ken Hardie: Thank you for that.

Ms. May, do you have questions that you would like to ask?

Ms. Elizabeth May (Saanich—Gulf Islands, GP): Yes. Thank you, Ken.

Given that I probably have very little time, I want to run some things by you, Karen Wristen, and confirm if I have it right. I don't think Blaine Calkins intended to say something that was inaccurate; I just want to double-check that I have it right.

I think Blaine said that we were seeing an 87% infection rate, and I believe it was an 87% reduction of survival. Can you confirm if I have that right?

Ms. Karen Wristen: Yes, that's correct.

Ms. Elizabeth May: Okay.

I think what you're saying is that there was a deliberate attempt by people within the department to keep science away from the minister before she made her critical decision. Is that your understanding, based on what you have from your ATIP report?

● (1750)

Ms. Karen Wristen: Yes. It's quite clear from the exchange of emails that an attempt was made to downplay the findings. Whether or not those were actually given to the minister, as I said, is completely unclear.

Ms. Elizabeth May: I'm not a full member of this committee, obviously. Unless you've already done so, could you make sure that the committee has all of the ATIP material you have that led you to that conclusion of deliberate interference, to block science from the minister's desk for purposes of a correct decision?

Ms. Karen Wristen: Yes, I can certainly share the ATIP.

Ms. Elizabeth May: Lastly, as a current Vancouver Islander.... I was a Cape Breton Islander. Ransom Myers was a dear friend of mine, and we tried for years to protect the North Atlantic cod stocks while DFO practised a religion of believing there was a thing called the "spawning biomass". We had paper fish but not real fish. I would have hoped that by now DFO's culture had changed.

Do you think that at this point we should move the promotion of aquaculture maybe to the Department of Agriculture and Agri-Food, and take it right away from DFO?

Ms. Karen Wristen: That would certainly be my preference. Agriculture is well placed to do that marketing and promotion. DFO needs to be instructed that its primary mandate is the restoration of wild salmon.

Ms. Elizabeth May: Thank you.

The Chair: Thank you, Ms. May. That was almost right on time.

I think we'll all agree that you're an islander, regardless of which one it is.

We'll now go to Madam Gill, for two and a half minutes or less, please.

[*Translation*]

Mrs. Marilène Gill: Mr. Di Cicco, you ended your presentation by saying that urgent action is needed. You also just mentioned that, of the many things that are to be done, we can only control a few of them anthropogenically.

What are you proposing? What should be done urgently in order to come up with solutions?

[*English*]

Dr. Emiliano Di Cicco: Are you referring to the situation about controlling diseases or promoting a rebound of Pacific salmon? Those are two different things. Which one are you referring to?

[*Translation*]

Mrs. Marilène Gill: Actually, my question was a general one so that you can talk more about what is most important, in your opinion.

You can send us documents later if you want to provide us with additional information.

[*English*]

Dr. Emiliano Di Cicco: As I said, as a fish shelter operator, I would say there definitely needs to be more monitoring and control of those operations, and, as Ms. Wristen also said, a definite transparency in the results, so we can take an informed decision on how to deal with diseases happening in the farms and how we can help in not having these agents infect wild fish either.

[*Translation*]

Mrs. Marilène Gill: Ms. Wristen, Mr. Rosenau and Mr. Di Cicco, do you have any final comments to add about what we could do quickly about the salmon issue?

[*English*]

Dr. Marvin Rosenau: In my view, we're in an unprecedented crisis. We've had the Big Bar incident, where the Fraser River collapsed and the upper river stocks aren't able to get up there. This seems to be remediated, but boy, things have to change, otherwise our kids will have absolutely zero.

The problem that I tell my students is that this already happened in 1994-95, so it's like the passenger pigeon for coho. We had a million fish being caught in the Gulf of Georgia and now we have basically zero wild fish. This is a catastrophe that's unprecedented in modern Canadian history.

● (1755)

Ms. Karen Wristen: One solution might be to implement another of Justice Cohen's recommendations, which was to ensure that there is a position within DFO that is responsible for wild salmon, one position that is dedicated to the rebuilding of salmon stocks. I believe the House is currently working on the rebuilding provisions of the Fisheries Act. It's important that it be given life through an individual who will be responsible for ensuring that those provisions are implemented.

The Chair: Thank you, Madame Gill.

We'll now go to Mr. Johns for two and a half minutes, please.

Mr. Gord Johns: Dr. Di Cicco, in 2018, the Commissioner of the Environment and Sustainable Development published a report indicating that DFO "had not made sufficient progress in completing risk assessments for key diseases, which were required to assess the effects of salmon farming on wild fish."

Would you agree with that assessment?

Dr. Emiliano Di Cicco: Yes, and they didn't do their job later either, when they did the nine CSAS reviews.

Again, by narrowing the scope and ignoring a lot of other issues, they didn't succeed in doing that even later.

Mr. Gord Johns: Ms. Wristen, in the event that the federal government isn't successful in closing down open net-pen fish farms—for example, if the companies involved in the injunction right now win their case or different governments were to, say, reverse course on the transition away from open net-pen salmon farms—can you elaborate on what's at stake and what would happen if companies are able to restock farms that impact Fraser River sockeye?

Ms. Karen Wristen: We can only imagine that given the twin threats they'll face—the sea lice at 99% and the impaired survival at 89% from mouth rot—we could wipe out fully half of the recovery potential of Fraser River sockeye.

This year and next year, every single smolt that makes it down the river is of critical importance, so everything we can do to make sure they survive is essential. If those farms are restocked during the next two years, they will not be able to control their sea lice and they will have outbreaks of mouth rot, and it will be transmitted to those smolts. It's unthinkable that this would happen.

Mr. Gord Johns: Dr. Rosenau, can you speak about the B.C. salmon restoration fund? You talked a lot about mitigation and the impacts. Thank you for talking about that and citing the important work that needs to be done.

The B.C. salmon restoration fund is $148 million over five years. The NDP has been saying that we need that actually every year for the next five years to remediate a lot of the damage to habitat. Do you agree with that?

Dr. Marvin Rosenau: I do agree with that. It hearkens back to the old salmonid enhancement days in the 1970s and 1980s. In my view, it's basically pocket change. British Columbia is salmon, and salmon is British Columbia.

I would add, though, and it goes back to my "heart of the Fraser" issue with the large islands, that if we can't stem the tide of some of these really serious habitat losses and that particular stretch between Hope and Mission, which is absolutely critical to Fraser River stocks.... We have Big Bar, we have the heart of the Fraser, we have sea lice and mouth rot. These are catastrophic things.

Although I know stuff about fish farms and I'm familiar with it, my focus again would be on the heart of the Fraser. Take some of that money, which DFO has been hesitant to do, and put it into that.

The Chair: Thank you, Mr. Johns.

We'll now go to Mr. Zimmer, who is in the committee room, for five minutes or less, please.

Mr. Bob Zimmer (Prince George—Peace River—Northern Rockies, CPC): Thank you again. It's great to be back at the fisheries and oceans committee.

Dr. Rosenau, I was just actually at the heart of the Fraser a couple of weeks ago and saw some of the loss of habitat that you were referring to in some of your images. With the person who was there, we talked about the lack of understanding of what salmon habitat actually is. When you see even sturgeon in the waters at high levels, even in some of the forested areas, people just don't understand that's where fish are. That's critical to their survival.

I want to speak to you about the frustration with the lack of enforcement of some of the regulations along the Fraser. I've spoken to many members of the public fishery. One of their frustrations is watching the lack of implementation of regulations in some respects. You referred to this in your opening statement.

How would you fix this? You talk about enforcement, and again, implementation. How would you make it better?

● (1800)

Dr. Marvin Rosenau: Thank you very much. You must have been out with my friend, Dean Werk, who's a great guy.

I would say it comes from the top. There has to be a psychological change in regard to direction right from the executive down. We know back in the 1990s to about 2013, gravel removal was a big deal, ostensibly for flood protection. We knew it was just for the construction industry. The stewardship groups would meet with the local and middle managers, and we'd say, “There's no benefit for flood protection. You're destroying a bunch of habitat.” They would say, “Yes, but we got this direction from Ottawa. Ottawa says to take the gravel out. It's a political thing.” There are no secrets really. It has to come from the top, and the senior folks have to support the line staff, the people out in the field.

We have something known as subsection 35.2(2), which is “ecologically significant areas”. This is a great thing. It was put into play about two years ago. Again, it relates to the stuff you're talking about, and when we talk to the senior middle guys in DFO, they're saying, “That's not going to happen for two or three years because the senior folks at the executive are not going to support something like that.”

It's a psychological thing that has to change in Ottawa, I think.

Mr. Bob Zimmer: I think, from the many members I've spoken with.... I spoke with Brian Riddell, too, the former PSF chair, about what we do now. There's a need for that grander plan. We all have these different pieces that need to be put into one overall puzzle to fix this issue.

I was just going to ask you generally about the Big Bar slide. One thing we saw as members from B.C. was the inaction around the Big Bar slide. We were wanting to get in there and do some work on this removal of debris in the winter, when the water was low and the impacts would have been relatively small.

What would have been a different reaction? You said you thought it was mainly remediated at this point, but quick action was required and it just didn't happen. Maybe you can make some comments there.

Dr. Marvin Rosenau: I was interviewed by CBC, and I said, “You guys have to get out there.” It's not like I really knew what was going on more than a lot of people, but I have a lot of contacts inside DFO, and some of their line guys were saying, “We need to get going, guys.”

I guess what I've been seeing is a really fast reaction once they got going. We had folks give a presentation to my class, and it's quite amazing what they have done. I think there needs to be more, but that's my sense. It's a big deal.

Mr. Bob Zimmer: I would hope that we would have.... DFO needs to look at the way it has managed B.C. salmon. Some of these responses are needed not within months or years, but hours or days. We need a much more responsive DFO to these pressing issues.

I'll go back to Dr. Rosenau, just because you know the area so well, about this desire for a plan for B.C. salmon that is a holistic plan that goes beyond political cycles. I call it election-cycle economics. At times your election cycle in terms of projects like this.... The need is there, and it's a big ask. It's like engineering a huge building with all the details.

What would you say to that, Dr. Rosenau?

Dr. Marvin Rosenau: Notwithstanding some issues that people were maybe not satisfied with after the Cohen commission, you almost have to strike a commission to figure that out, because no individual can come up with it all. You're right; it's a big engineering project.

Mr. Bob Zimmer: Thank you, Doctor.

The Chair: Thank you, Mr. Zimmer.

Now we'll go to Mr. Morrissey for five minutes or less, please.

Mr. Robert Morrissey (Egmont, Lib.): Thank you, Chair.

My question is for Dr. Di Cicco.

Doctor, as a scientist, is climate change real? What are the negative impacts you are witnessing from a changing climate on fish stocks in general?

Dr. Emiliano Di Cicco: I will start with yes, it's real. I'm not the only one saying that. I will start with that.

The impact of climate change on salmon can happen in different aspects. Fish are ectothermic, which means they use the temperature of the surrounding environment to.... They have the same temperature as their environment. When you have all those fish coming up through a river, and the temperature of the river is 20°C to 25°C, which is not the optimal temperature for those fish to live at, they are overstressed. That will be the first impact.

On the other hand, if you have higher temperatures in the ocean, the whole trophic chain is out there, so algae and phytoplankton bloom and therefore the shrimp that feed on them proliferate. Therefore, what amount of food is available for salmon? It's all a chain.

Unfortunately, these changes happen even with a minimal change in temperature. We're talking about even a couple of degrees Celsius being able to trigger this big change in productivity.

● (1805)

Mr. Robert Morrissey: Is your advice to this committee that a warming ocean is going to reduce the number of fish or the size of fish stocks in the ocean, simply?

Dr. Emiliano Di Cicco: To put it very simply, that will be one of the effects you can have. You have less food, so the fish have a harder time to find food and they don't grow as much. Some of them might die because they don't have enough food.

Mr. Robert Morrissey: The alarms have been sounding on the east coast, too, about the impact of a warming ocean on lobster stocks, which is one of the most valuable—well, lobster and crab stocks—on the east coast.

If any government doesn't get its mind around this and begin dealing with it, then we're going to see less economic activity in any community attached to and dependent on the fishery. Would that be a correct assumption, Doctor?

Dr. Emiliano Di Cicco: I would say so.

Mr. Robert Morrissey: Thank you.

Mr. Rosenau, you made a statement in the testimony that one of the issues affecting salmon on the west coast, besides the issue of the impact of the changing ocean temperature and climate change, is the failure to properly monitor and restore habitat.

You made a comment about the closure of DFO offices. Mr. Rosenau, could you give me a timeline and expand a bit on when...and what impact that has had on providing adequate protection?

Dr. Marvin Rosenau: This came from a conversation with one of the enforcement staff out of the Kamloops office. It was a recent conversation.

Back in the day when I was a habitat person with the province, DFO had a presence. His point was that all habitat, basically, in the interior, up to Prince George and all the way out to Cranbrook, is now managed through the Kamloops office, which is a massive geographic area. It's like a small European country.

I'm guessing that would have happened somewhere in the previous government, prior to the Trudeau government. I can't give you an exact date, but it certainly is a concern. The fact that the province has pulled out of a lot of habitat stuff that they normally did makes DFO now responsible under the Constitution.

Mr. Robert Morrissey: Past cutbacks and reductions in DFO personnel are partially why we are here today.

Mr. Rosenau—and anybody else who would want to comment—the impact of sea-based fish farming is becoming clear, but why is land-based fish farming prohibitive?

Dr. Marvin Rosenau: I used to be married to a fish-culturist with the province's Freshwater Fisheries Society. It's just expensive—the pumps, the electricity, the tanks and moving water around. That's my view.

We did have some little net-pen operations when I was working for the province. They worked great, because all the poop just dropped to the bottom of the lake.

For me, outside the box here, really it's just pure economics.

The Chair: Thank you, Mr. Morrissey.

We'll now go back to Mr. Arnold for five minutes or less, please.

Mr. Mel Arnold: Thank you, Mr. Chair.

I want to go back to Mr. Di Cicco. Many of these scientific assessments were a derivative of the strategic salmon health initiative that the Conservative government initiated in response to the Cohen commission, which was, again, started by the Conservative government.

Are there any issues, concerns or limitations in the nine assessments that were done, in your opinion?

● (1810)

Dr. Emiliano Di Cicco: Yes, there are several limitations. I mentioned at the beginning that there was a very narrow scope, addressing only sockeye salmon and only in a very specific area, which was the Discovery Islands.

They also didn't take into account new information that came out in the last couple of years. I'm referring in particular to assessing the one on PRV and the one on *Tenacibaculum*. There were a few errors that would have changed the actual results of those impacts. They definitely glazed over the uncertainties. As Ms. Wristen said, if you say a statement, but you have high uncertainty, that statement has a completely different value than if you have one with a very high certainty.

Then sea lice were completely excluded from the assessment and the—

Mr. Mel Arnold: Do you know why sea lice were excluded from that?

Dr. Emiliano Di Cicco: I don't know.

Mr. Mel Arnold: Okay, thank you.

Is there any evidence demonstrating the risk to wild salmon from PRV? I believe you spoke about that earlier. I just couldn't quite catch exactly what you were saying. Can you expand on that a bit, please?

Dr. Emiliano Di Cicco: Yes. PRV is a virus that is highly prevalent in salmon farms, but it's a virus that has been demonstrated to impact all Pacific salmon. We have an overwhelming amount of evidence from around the world that different types of PRV can actually induce disease in Pacific salmon, so that is already one piece of evidence. Plus, we have more recent evidence that there's an association between the presence of PRV and the potential impact in this fishery regarding this viral...or the body condition of these wild fish that are infected with the virus.

Mr. Mel Arnold: Okay, thank you.

Can you give an indication as to—whether it's the farm sites or wherever there is a concentration of these pathogens—how much of an effect separation distance or close proximity have on the apparent or potential infection rates?

We talk about migration paths. Is there an opportunity for other sites that are away from migration paths to be used, possibly? Is there a potential for deeper, offshore ocean sites to be used without the same risk of infection or transfer?

Dr. Emiliano Di Cicco: Well, again, we have to calculate the costs and benefits, and the impact on the spreading of agents from the farms has a lot of variables depending on where the farm is located.

If you are in a very slick channel, of course, it's easier to contain the agents in that channel going back and forth with the tides. There are different variables.

I would say, overall, that we have seen an effect within 30 kilometres of a farm, and again, it's a gradual distribution. Very close to a farm this is very concentrated, and the further we go from the farm, we have a more diluted concentration of agents.

I know offshore farming is a solution that has been taken into account in some other countries. It has costs and benefits. The fact that it would dilute the concentration of agents and pollutants, and also, let's say, the production from the fish, is definitely a pro. However, dealing with the open-ocean condition is sometimes challenging for the farm structure. As I say, it's a pro and con on that type of operation.

Mr. Mel Arnold: Thank you.

Very quickly, Mr. Rosenau, what produced the high runs that we had in 2010 and 2014?

Dr. Marvin Rosenau: That's part of the cycle: 2010 was 30 million, roughly; 2014 was 20 million; but 2018 was down, down, down, for the same cycle run. Again, I think it's just a perfect storm of good conditions.

The Chair: Thank you, Mr. Arnold.

We'll now go to Mr. Hardie for five minutes or less, please.

● (1815)

Mr. Ken Hardie: Thank you, Mr. Chair.

This wouldn't be a study on any fishery in the west coast if we didn't bring up the issue of predation, and particularly the impact of seals and sea lions on the smolts.

You were mentioning that we have to do everything we can to protect the next batch of smolts coming down the Fraser River.

I'll ask Dr. Di Cicco. Is it your observation that the seal and sea lion issue is one of the things that is causing the lack of survivability?

Dr. Emiliano Di Cicco: Well, predators definitely play a role. We have to consider two factors when we consider predators. Predators also remove sick fish from the population, so that's one benefit, actually, of having predators, but we have to take into consideration the balance between predator and prey.

I would say it might be a contributing factor, but the actual amount of the factor still has to be evaluated. There are contrasting studies on that.

Mr. Ken Hardie: Mr. Rosenau, we've heard comments in the past that some of the flood control systems in use along the Fraser River are old and were designed without fish survivability in mind.

Is this your observation, and would you have a recommendation about how much emphasis we should put on updating and modernizing those systems?

Dr. Marvin Rosenau: The flood system is actually pretty good in terms of the diking. It's the pump stations that are old and decrepit—or at least some of them. The local governments have been slowly upgrading them. The Somass River pump station is pretty fish-friendly. The Salmon River in Langley is pretty fish-friendly. There's a lot of habitat behind those dikes that would have been there prior to diking, so the more pump stations that we can fix and make fish-friendly, the better we are.

Recall that 50% of the Fraser River stocks were actually below Hope, downstream of Hope, so your point is really well taken. All of these dikes, all of these pump stations, have an impact, and fixing those has potentially large benefits.

Mr. Ken Hardie: When we look at our recommendations for this, I would be tempted—just to be very provocative about it—to call for a complete ban on new development along the Fraser River, which, of course, would put some pressure on the municipalities to preserve whatever industrial access remains. Or, would you—just purely from the viewpoint of the salmon—suggest that it's better to have a bunch of townhouses next to the river than a sawmill?

Dr. Marvin Rosenau: If you're exchanging a brown field for an even browner field, I guess it's site specific. If you're taking a sawmill and turning it into a subdivision, you should be able to negotiate a riparian area—at least get something out of it. That should be one of the positive things. Some of the stuff I've seen, say, in Fort Langley—and you're aware of this.... The development there by the old sawmill didn't go wide enough, in my view. The big thing, though, is the change from flood-land forest to farmland. These guys keep pushing and pushing and pushing, so that's the really big thing in terms of development, in my opinion.

Mr. Ken Hardie: Can you talk about the cumulative impact? It seems that each development proposal is assessed, but it seems to be assessed on its own merit, without much of a shadow cast back to what happened before and what was approved before.

Dr. Marvin Rosenau: There's a little story behind that that's right in your backyard. We found out.... Some of the folks who have met with you—I don't know if you remember, but I actually met with you over the Kinder Morgan thing—some of these guys, under the cover of darkness, got their restrictive covenants removed in the Langley-Surrey area. Not only were we not holding the line, but we were making some great, big steps backwards.

Notwithstanding the fact that some of the local governments are pretty good about this, yes, the steamroller effect of all the population moving into the Lower Mainland almost seems unresolvable.

Mr. Ken Hardie: Dr. Di Cicco, we were told by the DFO that the DNA of the PRV that was in the fish farms was different from that which was found in the salmon. Is that the case? Are we dealing with different viruses?

Dr. Emiliano Di Cicco: No, we are not. We have just been working on a study that is under review right now, and we were able to see that the virus that we find in wild salmon jumps a bit back and forth between farmed salmon and wild salmon.

● (1820)

The Chair: Thank you, Mr. Hardie.

Ms. May, I notice that you have your hand up. Is there any particular reason?

Ms. Elizabeth May: I was hoping there might be a tiny chance for one more quick question.

The Chair: There's still time yet. I'll see what we can do as we move along.

Ms. Elizabeth May: Thank you.

The Chair: We'll now go to Madame Gill for two and a half minutes, please.

[*Translation*]

Mrs. Marilène Gill: Thank you, Mr. Chair.

My question once more goes to all the witnesses.

Given that we are living in an unprecedented crisis, as Mr. Rosenau said, do you believe that, given its mission, the department feels that it is able to solve the current issue completely? Do we need to make changes to the department's mission? Is it possible to consider collaboration with other departments?

[*English*]

Dr. Marvin Rosenau: I guess you used my name, so I'll jump in first.

If a violation occurs, a fisheries officer goes out and does an investigation. He then takes it to the FFHPP—the fish and fish habitat protection program—and those guys have to make a decision with regard to whether a charge takes place or not. On top of that, those guys do what's known as a triage, and they say, "That's unlikely to win in court. That's unlikely to be able to be addressed. Okay, we'll pick this one."

The very notion of a triage says to me that the department is so understaffed with regard to habitat protection and habitat mitigation and resolution that.... It's easy for me to say that more money and more resources have to go into the agency, but I can't see any other way around it unless more support capacity is thrown at these really egregious issues.

The Chair: Ms. Wristen.

Ms. Karen Wristen: Perhaps I could just say, in agreeing with Marvin, that this is an opportunity for reconciliation. It's an opportunity to invest in first nations guardians programs to get them involved in not just the monitoring and enforcement end of things, but also in research to really build capacity in the communities to take care of the resource.

This is an important area for government to consider investing in as it considers how to protect wild salmon.

The Chair: Mr. Di Cicco, do you have any comment there?

Dr. Emiliano Di Cicco: Yes, I can speak for the official section.

Every time I meet with the aquaculture men in the division I hear the great job they do, but also how much they are limited in their work because of the limited staff. Definitely that would be another aspect that could be taken into consideration if you want to improve that aspect of the issue.

The Chair: Thank you, Madame Gill.

We'll now go to Mr. Johns for two and half minutes or less, please.

Mr. Gord Johns: Thank you, Mr. Chair.

Dr. Rosenau, we talked about the critical importance of restoration enhancement and habitat protection. Of course monitoring and science go into the fold as well.

Do you believe that this budget is so critical? Is it critical that we have a wild salmon recovery budget?

I know that the Nuu-chah-nulth where I live have been looking for funds to help rebuild the habitat and protect habitat. Often they don't get the applications supported because there are so few funds.

Do you believe that this budget is absolutely critical?

Dr. Marvin Rosenau: I don't know the details of the budget, but in a general sense, yes, more needs to be done. We're just sitting here in a crisis situation.

I mentioned the passenger pigeon and coho. That happened 30 years ago. Sockeye have basically disappeared off the map, so yes, I would agree with you.

Mr. Gord Johns: Ms. Wristen, do you want to comment on that, as well as on the fact that there are pesticides going into the water to deal with sea lice?

You talk about the impact not just on the salmon, but obviously on the other stocks in the ecosystem.

Ms. Karen Wristen: Yes, there is considerable concern about the pesticides and the abundance of shellfish like krill in particular—which is food for so many parts of the food web—being impacted, with no study whatsoever being done on it.

Our concern is also the likelihood that additional chemicals will be brought into the mix, as they have been unable, here in B.C., to control sea lice with the mechanical equipment they have brought in. Since the drugs have failed, the next thing is to move on to the next level of toxic drugs. There are severe consequences, particularly for shellfish, if such drugs are used here on this coast. Again, those haven't been studied either. It's critical that we get a grip on this right away.

● (1825)

Mr. Gord Johns: Can you speak a little, too, about the fact that the minister hasn't even declared a state of emergency for wild salmon and then we have this budget coming up? Can you talk about the importance of this budget and how little money is going into this crisis that we're seeing right now?

In the Nuu-chah-nulth territories, we're seeing runs of salmon dry right up. It's a crisis.

Ms. Karen Wristen: I see a number of areas where I've advocated for investment. I'll wait to see the budget to see how well I do in that advocacy.

The areas I've specifically mentioned are research, monitoring, enforcement, building the capacity in the communities to help participate in these things, and getting serious about habitat protection and restoration.

The Chair: Thank you, Mr. Johns.

We'll now go to Mr. Calkins, for five minutes or less, please.

Mr. Blaine Calkins: Thank you, Chair.

It is a very interesting conversation going on right now. I'm going to move over. I didn't get a chance to talk to Mr. Rosenau.

Mr. Rosenau, you mentioned earlier in the conversation we had that there are places where you feel fish farms would be successful, without having any, or negligible, impact on wild salmon stocks.

I'm assuming you have some places and destinations where.... If you were in charge of placing fish farms in and around Vancouver Island and so on, where would those be? Would you be willing to share your thoughts with the committee?

Dr. Marvin Rosenau: I'm not saying this from an oceanographic perspective, because tidal currents are so important for the maintenance of water quality, but in my view, behind Sechelt Peninsula, for example, we have these long inlets up the coast that have salmon runs. This is under the assumption that fish farms affect migrating salmon. If you move those farms, on an experimental basis and on an adaptive management basis because I'm sure the industry is not going to allow you to just go holus-bolus....

The sound is a really good example. The steelhead have collapsed in Nootka Sound. There are huge numbers of farmed fish there.

In Barkley Sound there are very small numbers. Barkley Sound populations are pretty stable, so you'd have to try it on an experimental basis, but I am sure there are inlets—Burke inlet or some of the inlets—that have modest runs of salmon that you would just basically sacrifice.

Mr. Blaine Calkins: That's an interesting perspective.

I want to move back over to the freshwater side of things, especially when it comes to parasites and disease, so I guess we're going to go back to Dr. Di Cicco.

Do we actually face any freshwater, brackish water or estuary water types, or is it mostly in the salt water that we experience the parasitic disease issues where migrating salmon are concerned, both for juveniles and adults?

Dr. Emiliano Di Cicco: In our program, we focus primarily on salt water, but we are able to have other projects where we assess also what happens in fresh water.

Yes, we definitely have parasites that can be taken into account on this. I mentioned at the beginning the protozoan that causes white-spot disease, *Ichthyophthirius multifiliis*. That is very interesting, because it infects the fish in fresh water, but we see the parasites also in salt water. We are starting to think that the effect this agent can have is not only limited to fresh water but has a carry-over effect that will show up in salt water.

Mr. Blaine Calkins: It's not always the case, right? Sea lice only stay on in salt water. Of course, as soon as you hit fresh water, they immediately drop off.

We're talking about some of these other things, though, that actually do transcend both through fresh water, all the way through the estuary water, into the ocean. Is that correct?

Dr. Emiliano Di Cicco: Yes. Again, this is a freshwater parasite, but we found it also in salt water. We have also found other agents and other parasites. *Ceratomyxa shasta* is supposed to be a parasite that infects fish in fresh water. We found evidence of lesions even in salt water, which was surprising for us, too.

Even though every agent has its own preferred environment in which to thrive, we also have agents that are very flexible, and they can have an impact on fish in different types of environments.

Mr. Blaine Calkins: I have a question for all three of you. This is a hypothetical question. I don't want to put anybody in a terribly difficult or awkward position, but if you had a list of three things you could do....

I'm just going to ask you straight up. I'm asking each of you your opinion. If the farms were completely removed, would you say we would see an immediate recovery in the health of salmon stocks in the Fraser and throughout the west coast?

If we just did that one thing.... I understand that there's a multitude of things, but in your opinion, because I'm sure you guys think about this full time, if we were to remove the farms, would you guarantee that it would improve the likelihood that these stocks, whether they be chinook, coho or whatever, would recover, assuming that all the fisheries management and everything else stays the same?

● (1830)

Dr. Emiliano Di Cicco: I would say, for a starter it wouldn't hurt. As we have been saying during the whole meeting today, I don't feel there is one single smoking gun, but there are a series of effects that are adding to each other, definitely making the life of wild fish much more difficult, if not almost impossible.

From that point of view, every little step we make helps.

Mr. Blaine Calkins: Would you categorize removing fish farms as a little step?

Dr. Emiliano Di Cicco: Well, it's a lot of little steps. That's what I'm trying to say.

Mr. Blaine Calkins: Ms. Wristen.

Oh, is my time up?

The Chair: You're way over.

Mr. Blaine Calkins: Mr. Chair, it was a really good question—

Dr. Marvin Rosenau: I can't say “instantaneous”, can I?

Dr. Emiliano Di Cicco: I wouldn't say instantaneous either. That's for sure.

The Chair: Thank you, Mr. Calkins.

We'll now go to Mr. Hardie for five minutes or less, please.

Mr. Ken Hardie: Thank you.

I'll put Elizabeth May on notice that she'll get her other question in here in just a second.

Dr. Rosenau, you were mentioning enforcement and so on, and the DFO officers not bothering to press charges because there was no likelihood of conviction. Do those charges have to be approved by Crown counsel in B.C.?

Dr. Marvin Rosenau: I think they do, but under the legislation of the previous government and the changes in the rules, they can actually now give out tickets or force people to remediate without having to go to the courts. That was laid out to me by one of the fisheries officers just recently.

There's a mixture there. Normally, for the really big ones, I think they would have to go through Crown counsel, but I'm not close enough to the situation to say exactly where any of the cut-offs are.

Mr. Ken Hardie: It's an unrelated issue, but it is a problem—for instance, with the gangs and guns issues that we have at home in Surrey—that the police can't lay charges. B.C. is one of the few jurisdictions where the Crown has to approve charges and that, of course, stops a lot of action from taking place.

This goes back to Dr. Di Cicco. What do we know about the Nass and the Skeena? They're not affected by the kind of development that we've seen on the Fraser. However, there are some runs, particularly chum, up there that are also in distress. Do we know anything about that?

Dr. Emiliano Di Cicco: They weren't directly on the program I've been working on personally. I know there has been a decrease in population over there too, but maybe not as dramatic as other populations more in southern B.C.

Mr. Ken Hardie: Ms. May, do you want to ask your question now?

Ms. Elizabeth May: Thanks, Ken. You're a hero.

Dr. Rosenau, it's kind of a shot in the dark question, but since you raised TMX, how familiar are you at this point with how the construction of TMX may be impacting salmon habitat? I've been particularly concerned, just to frame this, by the fact that DFO has a memorandum of understanding with the Canadian Energy Regulator, so DFO is not monitoring for impacts on fish habitat.

● (1835)

Dr. Marvin Rosenau: I knew that intimately. That was sort of my life and breath for about five years. I was one of the scientists who worked for the Salmon River Enhancement Society. We met with Ken Hardie and Terry Beech and did all sorts of stuff, at the end of the day. My understanding is that we were pushing for trenchless crossings of streams, so riparian vegetation on either bank of the stream and hardening of the banks is a really serious issue.

I had those calculations. It was in the hundreds of thousands of square meters; I don't have it off the top of my head. We were basically overruled. I presented as an evidentiary witness at the National Energy Board in Burnaby four or five years ago. It seems to have just been steamrolled over. Part of the issue, of course, is that the consultants were able to get away with what they said through the professional reliance model, which is another issue, but still part and parcel of this.

It's a big deal, in my view, but I think we just lost on that one.

Ms. Elizabeth May: I hate to give up.

Thank you.

The Chair: There's still a minute left, Ms. May.

Ms. Elizabeth May: If I'm not giving up, is anyone monitoring what kind of capacity the Canadian Energy Regulator—which used to be the National Energy Board—has? Are they monitoring to protect fish habitat in the construction of TMX?

Dr. Marvin Rosenau: I've been away from it for about two years, but there was monitoring up to five years or maybe 10 years, I think. We said that the impacts related to the crossings needed to be measured 20 years or longer—or continuously. We used the Jasper, Alberta leg as an example. That had been done—I don't know—10 years earlier. The mitigation trees and shrubs were, like, that big. Most of them died. It still was problematic. The companies would say that they basically got this all signed off because they did what the government told them to do, but I don't think it was sufficient.

It goes back to my earlier talk. Capacity and understanding what constitutes habitat and how to repair it is still a really big issue. It loops back to the Trans Mountain pipeline project.

The Chair: You're out of time, Ms. May. I'm sorry about that.

Before I move on, Mr. Calkins, do you have your hand raised?

Mr. Blaine Calkins: I just wanted to extend an invitation to Mr. Rosenau. If he looks at my profile picture on here, there's probably a couple of dozen pipelines that go right underneath that river I'm holding that beautiful cutthroat trout in. I'll be happy to show him where pipelines and rivers can meet up and do no harm.

The Chair: Okay, no problem.

Mr. Zimmer, over to you for five minutes or less, please.

Mr. Bob Zimmer: Thank you, Mr. Chair.

Thank you, again, to our witnesses. Everybody's been very informative, I think, to most of us.

One thing I will just make a comment about—it's been talked about in this conversation a bit—is climate change. It was a conversation I had with Brian Riddell—again, a former expert...well, not a former expert because he's still an expert on our salmon in B.C.—about the effects of climate change on the fish populations, specifically B.C. salmon, and the reality of that. I asked him this question: What do we do to fix this—not the climate change issue but the salmon problem in B.C.? I was asking about fish specifically. It's not something where we can wave a magic wand and two sentences later it's fixed. Again, I think it goes back to what Dr. Rosenau talked about, more of a commission-type of larger plan that looks over the long term.

While I still have some time, I want to talk to Dr. Di Cicco—and I hope I'm pronouncing your name right. We talked about fish farms and the like, and you talked about the negative effects in your opening statement. I've spoken with the Norwegian ambassador, as one country that does aquaculture, because I was looking into it. You know, there has to be a country that's doing this in a way that's potentially having less of an impact on our wild stocks.

I don't want to presume that you have this knowledge of aquaculture around the world, but are there countries around the world that do aquaculture well? If they do, what are some of the key things they do differently to do it successfully?

Dr. Emiliano Di Cicco: Well, one way to approach this is, for example, like Chile. I'm not sure that it's doing well, but it definitely has a different impact than what we have in B.C. because it doesn't have wild fish. In Chile's case, it's easier. I know, even from a public opinion perspective, that aquaculture is received in a better way there than in Norway—well, than in Europe, in general, and in B.C.

I would say that aquaculture operations have improved over the last few years—the last 10 or 20 years. They are definitely better than they were 20 years ago. However, there is a difference between being better and being sustainable, and I don't think we are there yet.

● (1840)

Mr. Bob Zimmer: Thank you.

Dr. Rosenau, based on the same question that I asked Dr. Di Cicco—and you had this question just before you ran out of time—what's a more ideal situation for aquaculture in B.C.? Are there nations around the world that do aquaculture better? If so, what do they do? What do they do differently from Canada that we can maybe learn from?

Dr. Marvin Rosenau: I'm not aware of any. Certainly, I'm not exhaustive, but I keep in touch with the literature. It seems that wherever you have anadromous salmon or trout runs, there's always an impact. That's the sense I get. Chile doesn't have anadromous salmon runs that are natural. In fact, these are escapees that now run into the rivers from the fish farms, and eventually they naturalize.

I cannot come up with any positive answer for you.

Mr. Bob Zimmer: Okay. Thank you for that.

With regard to the conversation I had with the Norwegian ambassador to Canada about this, what he told me was that the aquaculture industry started, similarly, 40 years ago—this is what I heard anyway—but that they have always had this constant of advancing their technology. They're looking at putting these pens further out into deeper waters so that the effects of the food falling through the nets are less impactful. To me, something that we should probably look at as a nation is whether there are countries doing this better and what they are doing. Then, obviously, we should implement that in our country.

I have just one last comment, maybe for Dr. Rosenau because we talked about a mutual friend of ours, Dean Werk.

One thing I am concerned about in some of these actions of the minister is the effects on those people who are actually the environmental stewards on the water. Dean is one of them. He's the one who is actually out there. I was with him; we were doing some sturgeon research on the water as part of that program. It's been a very successful program. That's why we still have sturgeon today. There are sturgeon there that are older than Confederation, some of them. That's how old they are, as you know.

What can we do to better support those environmental stewards—the ones who are going out there and who might fish with fishing rods during the week but are out on the weekend? They're picking up garbage along the stream, or they're helping remediate streams and restore the habitat that we just talked about that's been lost in some cases. How do we better help those volunteers do more of that? To me, it seems like it would be a great investment. Have you any thoughts on that?

Dr. Marvin Rosenau: I work quite closely with one of my former students who is a community adviser. He's a DFO employee now and he connects with these local stewardship groups. A lot of them are running shoestring operations.

We closed down the Vedder River gravel removal, which was a nonsensical thing for flood protection by the City of Chilliwack this last summer. I probably spent two weeks analyzing the data. When we presented the data to the agencies, including DFO, they said we knew that stuff way better than they did. Eventually, it was so embarrassing they pulled it.

One of the things that stewardship groups can benefit from probably is some funding, but the other thing is going back and giving capacity to your own line staff, opening back up those offices. Those feet on the ground are really super important. They are the people I teach in my classes.

Support feet on the ground and they can interact with the local stewardship groups.

The Chair: Thank you for that.

Mr. Bob Zimmer: Thank you, Chair.

The Chair: You've gone way over.

Mr. Hardie, we'll go to you for five minutes or less, please.

Mr. Ken Hardie: Thank you again, Mr. Chair.

Dr. Di Cicco, you mentioned earlier that the situation with plankton out in the deep ocean was also affecting shrimp. The other thing, of course, that salmon eat is herring, and we've seen some stress on herring stocks as well. What's going on there?

● (1845)

Dr. Emiliano Di Cicco: Herring feed on shrimp, so the chain is there.

We just finished the herring spawning season right now, and definitely, fishing for that herring is not helpful in trying to rebuild the stock. That's definitely one thing to take into consideration, and the environmental conditions don't help these fish to feed and thrive either.

There are quite a few factors that should be taken into account as to why the herring is not doing great in the Pacific Ocean for now.

Mr. Ken Hardie: Is there anything that we can do anything about?

Dr. Emiliano Di Cicco: As I said, avoid fishing for them, or regulate that in a way that will preserve the stock that we have. That will help. That's something on an anthropogenic level.

It's tough to regulate the temperature of the ocean. It's definitely easier to regulate how many of them we catch for our purposes.

Mr. Ken Hardie: Dr. Rosenau, I'm sorry. I was calling you Mr. Rosenau, but I will give you your proper title.

When we were discussing, basically, the fix for the Big Bar slide, we got into quite a discussion about hatcheries and their impact on the wild salmon stocks, and there was a good discussion about a proper strategy toward hatcheries, particularly up-country, up both the Thompson and the Fraser river systems.

What do you have to say about how hatcheries actually should be employed to rebuild salmon stocks?

Dr. Marvin Rosenau: Well, I'm not a fan of hatcheries. A lot of my mortgage was paid for by my former partner, who was a hatchery manager, and a lot of my students get jobs in both federal and provincial hatcheries. However, I think you have to be very careful about hatcheries.

Going back to what I would like to have said on one of your earlier questions, if you take the fish farms out, I think you would have an instantaneous response, and the need for hatcheries would almost be non-existent. I think the response would be that crucial.

In the case of Big Bar, when you have the potential to lose the last genetic material, hatcheries sometimes are very important from a conservation perspective. Up in the Nechako, I've worked—in a federal court case with Rio Tinto—on flows and stuff like that. Without the sturgeon hatchery, that population would probably collapse to extinction.

There are these weird balances. It's not a “yes, hatcheries are great” or “no, hatcheries should never be used”, but in my opinion, you have to be really careful about it. Particularly in the interior stocks, yes, you might have to do it if Big Bar isn't completely rectified.

Mr. Ken Hardie: Is there deep ocean conflict between hatchery fish and wild fish?

Dr. Marvin Rosenau: In regard to the science, some of the stuff out of SFU, by Randall Peterman, suggests that yes, there is competition. The Alaskans putting out jillions of pink salmon affects chum salmon, which also overlap in terms of feeding.

Out in open ocean, there can be potential impacts, but that's something that I think scientists haven't really figured out to that detail yet.

Mr. Ken Hardie: I'm not sure who to ask this question, so if anybody has the answer, just put your hand up or launch in.

There has been some discussion about a mark selective fishery, because we are told that there are times when the ocean is teeming with hatchery fish, especially from Washington state, and some people see this as an opportunity for the recreational industry to get those lodges up again and get people catching and keeping some fish, etc.

What do you think of a mark selective fishery?

Dr. Marvin Rosenau: I guess I'm the hard-core angler here. I spend more time chasing chinooks than probably anybody in this whole meeting.

Yes, again, there are potential negative impacts from a genetic perspective. What I would say, though, is that if you're going to have a fishery, every single chinook and every single coho should be marked, and there should be very clear discrimination.

The problem with hatcheries, again, is that they're sort of the crack cocaine of the fisheries world. You get addicted to them really easily, and you can end up with problems associated with weak stock harvests, which Carl Walters and all the UBC guys went through 30 or 40 years ago. It's just kind of a known thing.

● (1850)

The Chair: Thank you, Mr. Hardie.

We'll now go to Madame Gill for two and a half minutes or less, please.

[*Translation*]

Mrs. Marilène Gill: Thank you, Mr. Chair.

I have one final question for all the witnesses.

In your respective fields, have you seen any best practices abroad that could influence us as to measures to be taken here in Canada?

[*English*]

Ms. Karen Wristen: If I may begin, at least, I looked at practices in several jurisdictions just this past year when we were sitting as the enhanced sustainability in aquaculture initiative. I can't say that there is a jurisdiction I would point to and say, “This is a model. This is being done well.” I think that is because this industry got out far ahead of any government's regulation of it. It was big and impactful before anyone understood what the impacts would be, so every jurisdiction has had to play catch-up with it in terms of trying to regulate it.

Some of the catch-up measures are working better than others. Norway stands out as a great example there, in that it has substantially curbed the growth of the industry in the water except if the industry can adhere to environmental standards, which means controlling the lice and controlling the spread of disease. These tenures in Norway are handled completely differently from the way we handle them here.

I'm not sure we can take a direct lesson from them, but certainly one of the things that stand out is that they charge an awful lot more for the right to use the ocean. This is something that we could employ as a technique to incentivize salmon farmers to stop using the ocean as a sewer and move into closed containment. This is something else that Norway is incentivizing: the development of new technologies, including land-based, closed containment.

Someone asked a question earlier, indicating that these developments were prohibitive, and I must say that they are not prohibitive. There are over 70 projects that have been announced worldwide in land-based, closed containment. It's expected that they will produce over one million tonnes of salmon within the coming decade.

There are several of them that are under way, under construction right now, and there are at least three that I am aware of that are in production right now, that are selling their fish already. These are not prohibitive. They are attracting billions of dollars of investment worldwide, and they could be attracted here as well because we have all the advantages that we require to develop a land-based salmon-farming industry.

The Chair: Thank you, Madame Gill.

We will now finish off with Mr. Johns for two and a half minutes or less, please.

Mr. Gord Johns: Thank you, Mr. Chair.

Dr. Di Cicco, Pacific herring was just raised. Do you believe that the current DFO management regime is applying the precautionary principle in terms of managing the herring fishery, especially in the Salish Sea? We all know the importance of that fishery and the interconnectedness it has, whether it be for cod, salmon, whales or other mammals and marine life.

Can you speak about how confident you are that they are applying the precautionary principle?

Dr. Emiliano Di Cicco: Allowing the fishery as it is right now, or as it just happened, I don't think was a very precautionary move. As I said, we have a very limited stock, and every fish counts. That applies to the place, and it applies to the predators. I wouldn't say that I agree that they are applying the precautionary approach right now.

Mr. Gord Johns: Do you think the 20% measurement they use for the biomass harvest rate is sustainable? What rate would you recommend?

Dr. Emiliano Di Cicco: That's a much more complex question. It also varies year by year. You cannot use a measure that is fought over every year. Every year we have different productivity, so we cannot use that same variable every year.

Mr. Gord Johns: Can you speak about the impact an overharvest could have on future generations of the species?

Dr. Emiliano Di Cicco: If you have an overharvest—and this applies to every species—you definitely impact the survival of the species. Some years might be better and some years might be worse, but every time you go worse, you really have a huge impact on those populations.

Mr. Gord Johns: Ms. Wristen, Mr. Calkins asked a question about the impact of salmon farms, especially thinking about Clayoquot Sound, where we have a high concentration of farms and low returns of wild salmon in the Nuu-chah-nulth territory—really overall, but specifically near those river mouths of the existing farms.

How important is it to remove salmon farms, especially in areas where you have low returns and they're having an impact?

● (1855)

Ms. Karen Wristen: It's critical. If you look at Clayoquot Sound, there is no habitat reason why those returns shouldn't be brilliant. The habitat is in terrific shape for almost all of the rivers in Clayoquot Sound.

Why the impacts? Monitoring for sea lice in Clayoquot Sound, for example, has shown that the impacts to the wild salmon have been huge in the last three years. Removing the farms would remove a threat that is responsible for perhaps as much of 94% of mortality in some of those tiny out-migrating runs. They're down to tens of fish in some of the rivers. There's nothing left to play with or to gamble with in terms of leaving those farms in place.

The Chair: Thank you, Mr. Johns.

That clews up our session for today.

I want to say a big thank you, of course, to our witnesses for their insightful testimony here today. We'll say thank you to our committee members.

It's nice to see Mr. Arnold has his hand up. I don't know if that's intentional or not.

Mr. Mel Arnold: Thank you, Mr. Chair.

I just wondered if I could do a 10-second question here. I would like to ask Ms. Wristen if she could repeat—

The Chair: Actually Mr. Arnold if I do that for you.... The time has expired and I have gone over time. With the permission of the committee, I will allow it if it's just for the purpose of clarification of an answer.

Mr. Mel Arnold: It is for clarification. I would just ask if she could repeat, for the record, the date that Dr. Miller-Saunders provided Minister Jordan with the data related to the mouth-rot bacteria.

Ms. Karen Wristen: On December 15, Dr. Miller-Saunders sent it to her immediate supervisor. As I said, I don't know that it ever got to the minister.

Mr. Mel Arnold: Thank you very much.

The Chair: Mr. Johns, you had your hand up.

Mr. Gord Johns: I just wanted to ask, Mr. Chair, if we can ensure that we have some time allotted in the next meeting for committee business. I have a motion I'd like to table at that meeting.

The Chair: So far, we will be doing committee business to some extent at the next meeting. I guess it will be version two of the moderate livelihood study. If it's relevant here, or if we get time for it, we'll certainly try.

Madame Gill.

[*Translation*]

Mrs. Marilène Gill: Like Mr. Johns, I would like to introduce some motions to the committee, Mr. Chair.

Thank you.

[*English*]

The Chair: I understand. I will do my best to carve off a little time for committee business.

Again, thank you to everyone and committee members. It's nice to see some familiar faces back. Mr. Zimmer and Ms. May, it's always a pleasure.

Thank you to our clerks and to our analysts and, of course, to the very important translators who make it possible for us to hear this in both official languages. We will see you at the next committee meeting.

The meeting is adjourned.