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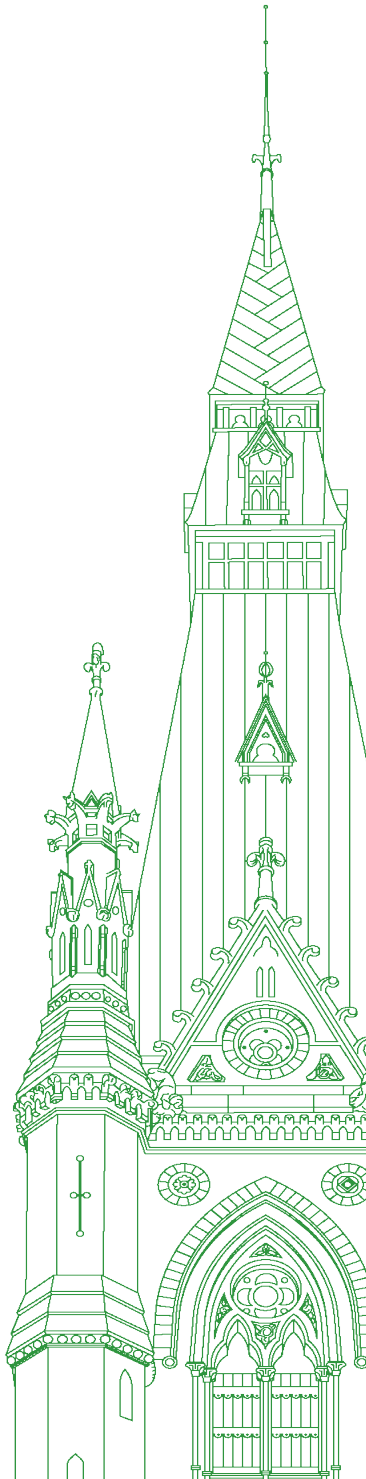

Chair: Mr. Ken McDonald

Standing Committee on Fisheries and Oceans

Monday, April 26, 2021

● (1540)

[*English*]

The Chair (Mr. Ken McDonald (Avalon, Lib.)): I now call this meeting to order. Welcome to meeting number 26 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 on the state of the Pacific salmon.

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 either the floor, English or French. 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 also 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.

I would now like to welcome our witnesses. Today we have, from the Department of Fisheries and Oceans, Kyle Garver, research scientist, Pacific region; John Holmes, division manager, stock assessment and research division; Simon Jones, research scientist, Pacific region; Kristi Miller-Saunders, research scientist, Pacific region; Jay Parsons, director, aquaculture, biotechnology and aquatic animal health science branch; Rebecca Reid, regional director general, Pacific region; and Andrew Thomson, regional director, science, Pacific region.

We will now proceed with opening remarks.

Ms. Reid, you may begin with introductions and then, of course, I believe we're going to hear from at least one other person from the department.

We'll go over to you when you're ready.

Ms. Rebecca Reid (Regional Director General, Pacific Region, Department of Fisheries and Oceans): Thank you very much, Mr. Chair.

Good afternoon, committee members.

Yes, I'm Rebecca Reid. I'm the regional director general for DFO Pacific region. My colleagues and I greatly appreciate the opportunity to appear before the committee on behalf of Fisheries and Oceans Canada.

[*Translation*]

First of all, we'd like to thank you for your interest in this extremely important issue.

[*English*]

Our aim today is to provide you with as much information as possible to support your deliberations.

[*Translation*]

We are particularly pleased to have the opportunity to discuss the department's actions to conserve and rebuild Pacific salmon populations.

[*English*]

Over the next 10 minutes, I will introduce you to the witnesses and describe their areas of expertise. I will invite Dr. Kristi Miller-Saunders to provide a more in-depth description of her field of research, and then I will close with some final remarks.

Andrew Thomson, whom many of you have met before, has been recently appointed as the regional director of science. Prior to that, he was regional director of fisheries management for over six years and has held other management positions, including director of aquaculture management.

Dr. Jay Parsons is the director of the aquaculture, biotechnology and aquatic animal health science branch. Dr. Parsons has worked for over 30 years in the field of aquaculture, including both research and aquaculture management.

Dr. John Holmes, division manager, stock assessment and research division, is currently responsible for stock assessment surveys, activities and advice on all marine finfish, invertebrates and Pacific salmon.

Dr. Kyle Garver is a research scientist in the aquatic diagnostics, genomics and technology division. Dr. Garver's research focuses on identifying and characterizing finfish viruses to understand transmission and pathogenic potential.

Dr. Simon Jones is a research scientist with the aquatic diagnostics, genomics and technology division. Dr. Jones' research focuses on diseases in wild and farmed salmonids.

Dr. Kristi Miller-Saunders is section head in salmon genetics. Dr. Millers-Saunders' research focuses on molecular biology, genetics and genomics, ecology and fish health.

At this point, I will turn to Dr. Miller-Saunders to provide some remarks before I offer concluding comments.

Thank you.

Dr. Kristi Miller-Saunders (Research Scientist, Pacific Region, Department of Fisheries and Oceans): Thank you very much for the opportunity to come before you.

My name is Dr. Kristi Miller-Saunders. I hold a Ph.D. from Stanford University and have been a research scientist with DFO since 1994. My areas of speciality include molecular biology, genetics and genomics, ecology and fish health. I have worked my entire career on salmon at DFO, and issues surrounding salmon health and salmon declines for the past 20 years, with at least 75 of the 140 publications from my program focused on fish stress and disease.

I co-developed the strategic salmon health initiative with Dr. Brian Riddell in 2012 in response to the clear data gaps on infectious disease discussed in the Cohen inquiry. The SSHI is a large multimillion dollar project that sought to bring clarity to the role of infectious disease as a factor in salmon declines, and to reveal pathogens undermining the survival of salmon in British Columbia.

With a focus on all salmon in B.C.—wild, enhanced and aquaculture—the SSHI assessed over 30,000 salmon for over 50 viruses, bacteria and parasites associated with diseases in salmon worldwide. Technological advances in disease monitoring and diagnostics within the SSHI provided a new foundation for studying complex disease processes in live-sampled fish, including a high throughput molecular infectious agent monitoring system; an innovative approach to the resolution of novel viruses and viral disease, and to visualize viruses in tissue; and a holistic tool called salmon FIT-CHIPS that can resolve specific stressor and disease states in salmon using only a small gill clip.

The funded SSHI program was completed at the end of March 2021. The SSHI has resolved a clearer picture on the role of pathogens on declining survival of our wild B.C. salmon. Key highlights included the discovery of over a dozen previously uncharacterized viruses infecting salmon in aquaculture, hatchery and wild settings. There were no detections of several viruses of regulatory concern, corroborating evidence by the CFIA that these agents were not found in British Columbia

The identification of several agents with higher probabilities of transmission and disease under high water temperatures suggested that disease risks may continue to worsen as the climate warms. Included was the discovery of piscine orthoreovirus in B.C. cultured and wild salmon, the first documented farm-level observation of heart and skeletal muscle inflammation in farmed Atlantic salmon, and a different but related PRV-associated disease in farmed B.C. Chinook salmon.

In juvenile salmon, using infection data spanning a decade and traditional stock assessment modelling approaches, several infectious agents have been resolved that show associations with annual variance in marine survival of Chinook, coho and sockeye salmon.

This represents the most comprehensive analysis of population level impacts of infection on naturally migrating wild salmon. Two of the six agents with consistent associations between species also show connections with farm-mediated transmission, informing the risks to wild salmon posed by open-net farming.

The most notable agents include PRV, or piscine orthoreovirus, associated with annual variances in survival and low weight of Chinook and coho salmon, with highest incidence if infection within 30 kilometres of salmon farms. Phylogenetic studies show that PRV has been repeatedly exchanged between farmed and wild salmon in British Columbia.

The bacterium *Tenacibaculum maritimum*, responsible for significant mortality on salmon farms, is strongly associated with annual variance in survival and low weight of sockeye, Chinook and coho. For sockeye, the highest incidence of infection is in fish sampled near farms in the Discovery Islands.

The small skin parasite *Ichthyophthirius multifiliis* that infects salmon in fresh water shows a strong carryover effect on survival and low weight of sockeye, Chinook and coho salmon in the ocean that may indicate years in which poor condition fish are entering the ocean.

A newly discovered Pacific salmon nidovirus, related to mammalian respiratory coronaviruses, infects the respiratory gill tissue of salmon released from some federal hatcheries. We see preliminary associations with survival in Chinook and coho.

A virtual international workshop was held at the end of March to provide expert advice on next steps for the program which will include disease challenge studies and understudied agents if facilities and funding can be sourced.

Our program is now moving to apply salmon FIT-CHIPS to reveal the role of cumulative stressors on salmon survival. This tool can reveal if salmon is undergoing salinity stress, low oxygen stress or thermal stress, and if they are experiencing a viral disease. It can also predict whether salmon is likely to die within 72 hours, and the cumulative level of stress that they carry, which is predictive of lower survival over longer timeframes.

By applying this tool, we can assess the role of climate driven changes on salmon health, and identify environments and years in which salmon are most compromised. Importantly, it is our goal to use this tool to identify the stressors that, if mediated, could increase survival and productivity of our wild salmon. The success of this program has led to a demand for the technology and approach to understand similar issues in salmon worldwide, including Norway, the Netherlands and the U.S.

● (1545)

We're also working closely with many first nations in B.C. and transferring some of the tools to the first indigenous-led genomics laboratory in Canada.

Thank you.

Ms. Rebecca Reid: Thank you, Kristi.

● (1550)

[*Translation*]

As you know, DFO's primary mandate is to manage Canada's fisheries and to protect our waters.

[*English*]

Consistent with that mandate, the protection, conservation and restoration of wild Pacific salmon is a key priority.

Pacific salmon are under threat, and the challenges facing them are numerous and multi-faceted. Unforeseen events such as the Big Bar landslide have further heightened the risk facing these populations.

The department has taken significant action, guided by Canada's wild salmon policy and its corresponding implementation plan, as well as the 75 recommendations from the Cohen commission. With respect to marine finfish aquaculture, the department continues to rely on the best available science and a robust regulatory system to manage potential risks to wild fish stocks and ecosystems.

We have made a number of strategic investments, including $142 million, with the province of B.C., for the B.C. salmon restoration innovation fund; $5 million to support the work of the Pacific Salmon Foundation; and, $15 million to implement the Pacific Salmon Treaty's new commitments for stock assessment, coded wire tagging and catch monitoring.

The minister's supplementary letter sets out a commitment “to bring forward a” long-term “Pacific Salmon Strategy and deliver on our commitment to conserve and protect wild Pacific salmon and their habitats and ecosystems”. Budget 2021 identified $647 million over five years to support this work.

Over the coming months, we will be actively supporting the minister in shaping and delivering on this initiative, including close collaboration with our many partners working on the front lines of salmon conservation.

[*Translation*]

Thank you for your attention. Your questions will be welcome.

[*English*]

Thank you.

The Chair: Thank you for that.

I'm sure everybody is anxious to get to the questions.

We'll start off with Mr. Arnold, please, for six minutes or less.

Mr. Mel Arnold (North Okanagan—Shuswap, CPC): Thank you, Mr. Chair. I'll start off with Ms. Miller if I could, please.

Ms. Miller, you last appeared before this committee in November of 2016. In that appearance you stated:

> In my view, it's difficult to convince a skeptical public that we are doing everything we can to conduct robust, transparent evidence-based risk assessments on aquaculture-wild interactions if we do not maintain independence from industry....

Since 2016, in your view, has DFO's independence from industry changed?

Dr. Kristi Miller-Saunders: Well, I am supposed to be sticking to the science, but in short, no.

Mr. Mel Arnold: Okay. Thank you.

In March 2020, the Canadian Science Advisory Secretariat released its report on nine populations that COSEWIC has designated as threatened or endangered. The CSAS report stated that “all sources of harm should be reduced to the maximum extent possible” in order to provide the best chance of survival of threatened or endangered wild salmon stocks.

In your view, are viruses from fish farms, such as PRV, a source of harm that should be reduced to the maximum extent possible?

Dr. Kristi Miller-Saunders: Viruses are particular concerns because of their capacity for rapid evolution. In farmed salmon, viruses have a constant supply of a new host to infect, so there's no negative fitness consequence and the virus evolves to become more virulent. It is a different situation for wild salmon, where densities are not as high. We do have to worry about having large captured populations of fish and the potential for rapid evolution, which has been demonstrated in many parts of the world, including with PRV in Norway.

In the SSHI, we've amassed strong evidence that PRV is a risk to wild salmon, particularly in Chinook and coho salmon. That risk does need to be managed. I can go into details on what our evidence is, if you are interested.

Mr. Mel Arnold: Okay. I'll try to get through some more questions, but if you have further detail to provide to the committee, I would ask you to do that in writing afterwards.

In your view, are sea lice a source of harm that should be reduced to the maximum extent possible?

Dr. Kristi Miller-Saunders: Sea lice are not my area. The SSHI didn't look at sea lice, so I can't respond from a place of being an expert in sea lice.

I can say that it does concern me with increasing resistance in the drug SLICE that impacts of treatments like the Hydrolicer, which employs a strong stream of water so that fish are dislodged of sea lice, create a lot of stress on fish. I do know something about stress, and I am concerned that if that kind of tactic to control sea lice were to take place that the stressed fish, the fish that would come out of those kinds of treatments, may be more vulnerable to infection and disease. It's plausible that treatment could actually elevate risk to wild salmon.

● (1555)

Mr. Mel Arnold: Thank you.

In your view, are bacteria from fish farms such as Tenacibaculum or mouth rot a source of harm that should be reduced to the maximum extent possible?

Dr. Kristi Miller-Saunders: There were two agents in the SSHI that really stood out in terms of risks of transmission from salmon farmers and Tenacibaculum was one of them. Tenacibaculum is also the most consistently impactful agent in our population level models, showing impacts across all three species. It is certainly of concern. There is more work to do on this bacterium in understanding its disease-causing potentially in all of the Pacific salmon species.

We know that in farmed Atlantic salmon, it causes the disease mouth rot and can be quite problematic on farms. In Pacific salmon and other species of fish, it causes a different disease called tenacibaculosis. There have not been a lot of studies done on wild Pacific salmon with that bacterium, but certainly our data do suggest that we need to be very precautionary in our approach with this bacterium.

Mr. Mel Arnold: Thank you.

The strategic salmon health initiative was started in 2012, I believe, by the Conservative government following the Cohen commission. I believe that that initiative has stopped due to lack of resources. Could you comment on that, please?

Dr. Kristi Miller-Saunders: The program was developed to be run in phases, so it wasn't stopped because of a lack of resources. It simply has run through the course of phase 2b, which was one of the planned phases. The next phase was supposed to be phase 3, where we were basically going to do disease challenge studies on the understudied agents that came out to be the most impactful from phase 2b.

We have to source new funding and facilities to do those research challenges. It's not certain that the Pacific Salmon Foundation or Genome BC will necessarily be involved. So we need to find new partners. It's not necessarily dead; it just means that we have to start over again and make a new program.

Mr. Mel Arnold: Thank you.

Really quickly again, were the nine risk assessments used to inform Discovery Island's decision correct in their conclusions that those nine pathogens posed less than minimal risk to wild Pacific salmon?

The Chair: Sorry, Mr. Arnold, you've gone over your time. Hopefully, we'll get that answer along the way.

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

Mr. Ken Hardie (Fleetwood—Port Kells, Lib.): Thank you, Mr. Chair. I do appreciate the opportunity to speak with the department.

I have so many questions. I too will [*Technical difficulty—Editor*]

The Chair: You're muted, Ken.

Mr. Ken Hardie: Okay. Not now. It must have flipped back, I think I hit the space bar by accident.

Dr. Miller-Saunders, the pathogens that you've identified—and it seems that there are more ones that haven't commonly been discussed, at least here at this committee.... Now that they're in the population of wild salmon, if we were to lift all of the open-net aquaculture out of the ocean now, would those pathogens still represent a huge ongoing risk to our wild populations?

Dr. Kristi Miller-Saunders: First of all, I have to be clear that not all pathogens that are coming out of our program are a risk of transmission from farmed salmon. If we look at the six most impactful agents from our models, two of them show a risk of transmission from salmon farms. So you're not going to remove the risk of all infection, most of which is natural and endemic, by removing salmon farms. However, you may considerably reduce the risks of two of the agents that we find to be most impactful across species.

Mr. Ken Hardie: Okay. With the identification of these new pathogens—and here I wouldn't want you to speculate—it would seem, obviously, that something has changed if they didn't exist before, if they're new, if they were introduced or again naturally occurring. I guess the key question here, with the background of all of these pathogens being present in our wild salmon population, is whether we can do anything about that, or are we simply going to have to watch the inevitable decline of our population because these pathogens are present and will keep circulating among our stocks?

● (1600)

Dr. Kristi Miller-Saunders: Well, one of the reasons that we expect pathogens may be more impactful today than they were in the past is not only the potential for interactions with cultured fish—and that could be our hatchery fish and aquaculture—but also the shift in the climate. The relationship between pathogens and disease depends upon the susceptibility of the host as well as the environmental conditions that are experienced. When you have salmon that are swimming through areas of very high temperature, that are experiencing low oxygen and experiencing lower food availability, they will be more vulnerable to infections and to becoming diseased. It's not simply cultured fish. It's the combination of environmental change and cultured fish that we should consider when we're looking at disease-causing potential and the potential of disease to undermine the survival of our wild salmon.

Mr. Ken Hardie: Are there mediation strategies that can help offset what you've noticed so far, such that we can constructively look at rebuilding salmon stocks?

Dr. Kristi Miller-Saunders: In my first outline, I named three agents that are associated with cultured fish. As managers, we're able to deal with the anthropogenic activities that we can control. Obviously one of those is control of cultured fish. We can control how many hatchery fish we release. We can control the health and condition of those releases. We can control where and when farms are occurring and under what regulations.

There's also good evidence that both the freshwater environment and the pathogens that are coming out in salmon from fresh water can be important pathogens in the marine environment. There is mounting evidence in our program that areas of the coast that have more industrial activities may be where salmon are undergoing the highest levels of infection.

I think we need to be focusing not only on what we can control anthropogenically but also on identifying the critical areas along the coast where salmon are most infected and most stressed, and then on remediating the stresses in those habitats.

Mr. Ken Hardie: Will focusing on that make enough of a difference to save wild salmon stocks? That's the key question.

Dr. Kristi Miller-Saunders: Well, I do believe it will. Our early application of FIT-CHIPS in sockeye salmon is showing a very high level of thermal stress occurring in the northern Strait of Georgia, right before salmon have to migrate through the Discovery Islands and Johnstone Strait passage. Those salmon are starting out compromised before they move into an area that is quite challenging, not only because of the currents but also because of the farms. The siting of farms in that area may be detrimental, more because they're hitting those farms right after they have left a very stressful area due to climate change. We need to be really careful about how we think about the kinds of industrial activities that we do and where we do them—and try to remove them from salmon's critical early rearing environments.

Mr. Ken Hardie: Do we have—

The Chair: Thank you, Mr. Hardie. There is about 10 seconds left—not much time for a question or an answer.

We'll go now to Mr. Blanchette-Joncas. Welcome back to the committee. You have the floor for six minutes or less, please.

[*Translation*]

Mr. Maxime Blanchette-Joncas (Rimouski-Neigette—Témiscouata—Les Basques, BQ): Thank you very much, Mr. Chair.

My question is for Dr. Miller-Saunders.

Dr. Miller-Saunders, what do you think the impact of these viruses is on biodiversity?

[*English*]

Dr. Kristi Miller-Saunders: Are you referring to biodiversity in salmon?

[*Translation*]

Mr. Maxime Blanchette-Joncas: Yes, exactly.

[*English*]

Dr. Kristi Miller-Saunders: We have discovered at least 12 new viruses infecting salmon. I can't tell you a lot about the impacts of those viruses yet, because they have only just come under study. Viruses do carry the potential to have population-level effects. The fortunate thing here in B.C. is that the only reportable virus we have is IHN, which has been shown to have devastating effects at a population level. That is an endemic virus here on our coast. PRV is also occurring in our farmed and wild salmon. No one has ever actually studied whether they have caused changes in diversity or genetic diversity, so I can't really answer that question.

● (1605)

[*Translation*]

Mr. Maxime Blanchette-Joncas: I want to make sure I understand. Do you see any impact on the environment around salmon and other species? In fact, could this cause a chain reaction?

[*English*]

Dr. Kristi Miller-Saunders: Is that that viruses have an impact on salmon and other species as well?

[*Translation*]

Mr. Maxime Blanchette-Joncas: Exactly.

Could biodiversity viruses cause a chain reaction?

[*English*]

Dr. Kristi Miller-Saunders: Well, there are quite a few viruses that can infect multiple different species. Some viruses are very specific to a given species. We have a Pacific salmon parvovirus that we only find in sockeye salmon, for example. Then there are other viruses like the erythorocytic necrosis virus that can be found across salmon, herring and other species and that we know can cause high levels of mortality in herring.

Yes, there is evidence that you can have epidemics occur because of viral infection. The best evidence is in herring, because we can see mass die-offs in herring. But whether viruses themselves alone have caused enough mortality to diminish the biodiversity of salmon, again, I can't answer that question.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you for these clarifications.

Dr. Miller-Saunders, earlier you mentioned studies done in Norway. Do you think there are any studies that have been done outside of the country that the department could learn from?

[*English*]

Dr. Kristi Miller-Saunders: Well, in fact, we're a little bit ahead of Norway when it comes to our studies of wild salmon in British Columbia, which is why we're starting to use some of the technologies that we've developed here on Norwegian wild salmon. What we do know from studies in Norway is that there really is little doubt that salmon farming has negatively impacted the wild salmon in the country. The numbers of wild salmon in most parts of the world where farming is coexisting with natural wild populations have generally been negative for the abundance and biodiversity of those species.

We are in a much different situation in Canada, where we still do have abundant wild stocks and have a diversity of species. This is exactly why we need to carefully manage to ensure that some of the same impacts that have been seen in other parts of the world don't happen here.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you.

Have you seen any studies outside the country, such as conservation of resources or dealing with the negative impact of viruses, particularly pathologies on Pacific salmon?

[*English*]

Dr. Kristi Miller-Saunders: Yes, of course I have. Pacific salmon, other than rainbow trout, is not common in other parts of the world where farming takes place. However, Pacific salmon is farmed in Chile. They're not endemic to Chile, but they are farmed there.

Interestingly enough, if you look at the salmon farming industry in Chile, where Atlantic salmon were moved over to Chile from Norway and other parts of Europe, and Pacific salmon were moved over to Chile, mostly from Washington state, we see, along with those movements, that the vast majority of infective agents occur in the countries of origin where those fish came from. We've shown in our latest PRV study, in fact, that PRV has been introduced to Chile both from North America and from the northern Atlantic. Those movements to start those industries have resulted in the movements of infective agents along with the fish.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much.

How much time do I have left, Mr. Chair?

● (1610)

[*English*]

The Chair: You have 10 seconds— not much time to ask a question or get an answer. We'll get back to you again, I'm sure.

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

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

I first want to begin by highlighting the Globe and Mail article from October 2020. In it, Dr. Miller-Saunders, you say that you were told by your managers that your statements were your opinion and not those of the Department of Fisheries and Oceans.

My first question is for Ms. Reid and Mr. Parsons. Can you assure us that Dr. Miller-Saunders is free to speak today without any repercussions from the department?

Ms. Rebecca Reid: Thank you, Mr. Johns.

We've said to each of the witnesses that we're asking them to speak to their area of expertise, and they are absolutely free to do so within that area of expertise.

Thank you.

Mr. Gord Johns: Dr. Miller-Saunders, I'd like to get a better understanding of the process or what happens when scientific research reveals the impact of salmon farms on wild salmon. For example, when you were asked in 2012 by Creative Salmon to look into why their salmon were dying, what was the department's response to your findings, and were you free to publish them?

Dr. Kristi Miller-Saunders: Back in 2012, I undertook a study with a chinook farming aquaculture company that was looking at whether jaundice anemia, as a disease that was causing overwinter mortality on farms for over a decade, was caused by environmental factors or by a virus. All of the work—the genomics, pathology and epidemiological work—pointed to the activity of a virus. When we employed molecular tools to look at all the known viruses, and identified that PRV was heavily loaded in the farm that was undergoing the disease and not found in any kind of abundance in the other farm, the co-authors of the study, who were both industry vets, were not happy with the finding and did not want the finding to be included in the paper.

No, I have not been able to publish that paper to date.

Mr. Gord Johns: Is there a reason?

Dr. Kristi Miller-Saunders: It's because I have to have agreement from the industry vets that the interpretation is what we can all agree on.

Mr. Gord Johns: Ms. Reid, when Dr. Miller-Saunders reported to senior management last October that the widespread bacteria in salmon farms that was causing mouth rot was accumulating outside the salmon farms in the Discovery Islands, infecting sockeye and causing a negative population impact, I see from an ATIP that was sent to me that salmon farmers were briefed.

Was the minister also briefed on this, as she was in consultation with the seven first nations of the Discovery Islands? Would this have been important to share with the local first nations?

Ms. Rebecca Reid: With regard to information-sharing within the department, we certainly would share information of that nature for context and general awareness. With regard to the consultation process that went on with first nations, I wasn't in the room with them, so I can't speak specifically to that. If you wish, I think Dr. Parsons could speak more specifically to some of those conversations.

Dr. Jay Parsons (Director, Aquaculture, Biotechnology and Aquatic Animal Health Science Branch, Department of Fisheries and Oceans): The specific point about Tenacibaculum was not brought up as part of the technical briefings we had with the first nations. Their primary interest in the briefings that we provided really revolved around the nine risk assessments, and that had been—

Mr. Gord Johns: Was the minister briefed?

Dr. Jay Parsons: I wasn't involved in any of the briefings with the minister or with the minister's consultations with the first nations.

Mr. Gord Johns: Can anyone confirm if the minister was briefed on this?

Ms. Rebecca Reid: I can confirm, Mr. Johns, that the issue was definitely raised to the office. That's as far as I could say.

Mr. Gord Johns: Dr. Miller-Saunders, in your view, are bacteria from fish farms such as mouth rot, a source of harm that should be reduced to the maximum extent possible? Maybe you can speak about the emerging research on the potential of mouth rot from fish farms to have population level effects on wild Pacific salmon.

Dr. Kristi Miller-Saunders: Tenacibaculum is the agent. Mouth rot is the disease that the agent causes in Atlantic salmon, so it's not mouth rot that has the impact. However, as I said before, Tenacibaculum was coming out of our models as being one of the most consistently associated with population level impacts. Moreover, in sockeye salmon we found that the highest incidence of infection was in fish migrating past farms in the Discovery Islands.

We then employed spatial and epidemiological models and fit the data from migrating sockeye salmon to identify whether farms in the Discovery Islands were a source or the dominant source of Tenacibaculum infection along the Fraser River sockeye salmon migration route. Not only did the models confirm that the best-fitted models confirmed that the highest source of Tenacibaculum was around the Discovery Island farms, we were also able to show that in the water column Tenacibaculum was one of the agents most strongly concentrated around active farms, compared with fallow farms. There was a lot of Tenacibaculum in the water column.

Further, we looked at whether or not treatment of mouth rot was a correlated factor with the potential transmission into wild fish. We did not find any effective treatment; a farm simply being stocked with fish was enough to create a risk to wild migrating salmon.

● (1615)

The Chair: Thank you, Mr. Johns.

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

Mr. Blaine Calkins (Red Deer—Lacombe, CPC): Thank you, Chair.

I'll be asking my questions of Ms. Miller-Saunders.

Do you believe the information that you are providing through the SSHI is informing policy today for the Department of Fisheries and Oceans?

Dr. Kristi Miller-Saunders: I do believe that the information is provided to managers—certainly to managers in direct line of authority from me. Whether the information I provide is actually going to the resource managers is not something I'm aware of. I don't handle those briefings.

Mr. Blaine Calkins: That's understood. I'll let the folks at the table who might be able to answer that, answer that in a bit.

I want to talk to you a little bit more about your research. Has the work you've done with Dr. Riddell been published anywhere? Has it been peer reviewed or anything like that?

Dr. Kristi Miller-Saunders: I don't know which research you're talking about, but we have published 50 papers from the SSHI in the last six years.

Mr. Blaine Calkins: It's consistent with international findings, wherever else there are fish farms or wherever else there are similar types of species. Is that correct?

Dr. Kristi Miller-Saunders: Absolutely. Our PRV papers have been published with the same vets that have originally described HSMI in Norway. One of our lead vets is a very predominant pathologist out of Europe.

Mr. Blaine Calkins: I want to talk to you a little bit about the comment you made about the nidovirus insofar as hatcheries. You said that it's found in “respiratory gill tissue of salmon released from some federal hatcheries”.

These would not be hatcheries, of course, that would be providing Atlantic salmon to the farms. They would be hatcheries that are producing Pacific salmon. Is that correct?

Dr. Kristi Miller-Saunders: That's correct. These are enhancement hatcheries.

Mr. Blaine Calkins: Are they all enhancement hatcheries? Is none of it in the community-based hatcheries, to your knowledge yet? Have you even been able to look?

Dr. Kristi Miller-Saunders: We have not looked a lot at community-based hatcheries. We've looked at some, but we have seen that particular virus coming out of hatcheries on the east coast and west coast of Vancouver Island and in the Fraser River.

Mr. Blaine Calkins: Is there any reason for you to believe that it hasn't always been there? Is it coming in through the brood stock or is it being picked up in the hatchery scenario?

Dr. Kristi Miller-Saunders: Those are really good questions. We have picked up Pacific salmon nidovirus in farmed chinook salmon. We know it's on Pacific salmon farms. We also have picked it up in the odd returning adult wild fish, so it is out there.

The thing that's really different about this particular one is that we rarely detect it in wild salmon coming out of fresh water. Where we're seeing it has been in hatcheries.

Mr. Blaine Calkins: How would you know that, if the hatchery fish aren't completely marked? How do you differentiate an unmarked hatchery chinook from an unmarked wild chinook in the same system?

Dr. Kristi Miller-Saunders: For one thing we actually get fish from the hatcheries. We take samples of fish before they've released them. After that, you're absolutely right; we are only able to use the adipose fin clip to identify if it as a hatchery fish or not.

Mr. Blaine Calkins: Would it be helpful to your research if we actually marked all chinook and coho?

Dr. Kristi Miller-Saunders: Absolutely.

Mr. Blaine Calkins: That's good for me to know.

I'm going to go back over to the department officials.

Could anybody speak to what level this research has been informing policy on the west coast?

● (1620)

Ms. Rebecca Reid: I'll ask Dr. Parsons to start and then we can go from there. Thanks.

Dr. Jay Parsons: Thank you.

I'll start off with a response and speak to you from the perspective of the science branch.

As you know, DFO is a science-based department. The science sector within DFO is responsible for producing science advice that contributes to the department's mandate. When research findings are published, those are certainly considered as part of our adaptive management approach.

More fulsomely, we have a very strong, formal, robust peer-review process that we call the Canadian Science Advisory Secretariat, or CSAS, that we use to provide formal science advice to DFO resource managers. That process involves looking at the breadth of the scientific literature that's available. That is not only the science we do in the department, but all available science. We conduct a synthesis of that information. That information is then peer reviewed through a process where we bring both internal and external experts together to review that information and provide advice. That advice is then communicated to the DFO managers and is also published on our website.

It's a robust, transparent process to formalize the advice and provide it to aquaculture management as part of their decision-making process.

The Chair: Thank you, Mr. Calkins.

Mr. Blaine Calkins: Thank you, Chair.

The Chair: We'll now go to Mr. Morrissey for five minutes or less, please.

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

My question is for Ms. Reid.

Can DFO assure the future of salmon, primarily the commercial salmon, based on what DFO has done in the past?

Ms. Rebecca Reid: In my opening remarks I talked about the significant concerns we have around salmon and their future state. Part of the minister's commitment to deliver a Pacific salmon strategy really speaks to the need for a change in how we approach salmon management and a number of different—

Mr. Robert Morrissey: Okay, Ms. Reid. Based on that, I take it, then, in your answer, that if we continue to do as we've done in the past, there's no assurance that there will be any type of salmon fishery in the future, either recreational or commercial.

Am I correct?

Ms. Rebecca Reid: We are seeing very significant declines in salmon and have significant concerns about that.

Mr. Robert Morrissey: What has to change?

Ms. Rebecca Reid: Well, the salmon—

Mr. Robert Morrissey: Let's start with one. Recently, in the budget, our government allocated over $600 million to begin addressing this issue.

What advice would you give this committee as to what should be the priority to focus on that would lead to a better future for the salmon fishery on the west coast?

I'm talking about the natural fishery first.

Ms. Rebecca Reid: I would recommend four key strategies. The first would be to focus investments in habitat, conservation and restoration-type activities.

I would recommend strategic enhancement to support stocks of concern, and where possible, to support harvest where appropriate.

There's a need for some significant harvest sector transformations to focus on selective fishing to avoid stocks of concern.

Finally, we need to focus on integration and collaboration to ensure that our governance structures, both within and outside the department, are functioning at their optimal capacity.

Mr. Robert Morrissey: Okay. Thank you.

Habitat, we know; it has been consistent. If there's one common area, it's habitat.

I made notes, but could you expand on your second one, strategic investments? Could you explain?

Ms. Rebecca Reid: My second recommendation was around salmon enhancement. There are a couple of areas. For example, we don't have any major hatchery facilities above the Big Bar slide along the Fraser River. That's a gap that has been in place forever, made worse by the slide and the pressure on those stocks.

That would be an example of an important investment to be made to protect the returning stock.

● (1625)

Mr. Robert Morrissey: Earlier in a meeting we had a fisher by the name of Captain Hauknes. This goes to the comment you made, that you have to re-evaluate the impact of harvesting. Correct me if I'm paraphrasing incorrectly how you referenced it, but I picked out that there has to be a serious discussion on the commercial fishing effort on the west coast as it relates to salmon.

Am I correct? Is that where you were going?

Ms. Rebecca Reid: Yes. My comment was really intended to say that because salmon swim together, the weak ones and the strong ones, we need to find ways to selectively harvest to avoid harm to those particular stocks of concern.

Unfortunately, they all look alike when they're swimming together. Some are of concern and some are stronger. How do we make sure we selectively harvest the stocks that can withstand that fishing pressure?

Mr. Robert Morrissey: Is that technology or know-how available? Is that knowledge available to a commercial fisher to selectively fish?

Ms. Rebecca Reid: There are a number of techniques you can use to encourage selective harvesting. It's not just equipment. Area and time can allow for selective harvest as well, but also gear types, locations, those types of things.

There are a number of different techniques to encourage the selective harvest of the stocks that can withstand the pressure of harvest.

The Chair: Thank you, Mr. Morrissey. You have six seconds left, so it's hardly time to ask a question or get an answer.

We'll go now to Mr. Blanchette-Joncas again, for two and a half minutes, please.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Chair.

Dr. Miller-Saunders, you told us about the impact of climate change on Pacific salmon. Obviously, we know that problems associated with climate change are going to get worse over time.

If an urgent action was required, what would it be?

[*English*]

Dr. Kristi Miller-Saunders: One of the things we need to better understand is where the bottlenecks are and in which areas along the coast and in the rivers climate change is having its greatest effect. We know that, in freshwater systems, when we have premature mortality of returning adult salmon, they are most likely to die in the areas where they're experiencing prolonged periods of high thermal stress.

Sometimes conditions in a system will allow for cooler water to be introduced. That is obviously more common where there are dams, and unfortunately we don't have as many of those here as there are on the Columbia. But we need to do what we can control, which, for one thing, is that if we're going to rely on hatcheries, we need to produce the most robust fish we can. We know that the condition of fish coming out of fresh water is in one part a predictor of how well they are going to perform in the marine environment when they are exposed to different stressors. If we can produce optimally healthy fish that are ready for that transition to salt water and have as few infections as possible, we will increase the probability that those fish will actually survive long enough to either be prey for killer whales, in the case of chinook salmon, or be available for fisheries.

Certainly climate change affects more than just temperature. It affects the prey availability; it affects the predators, etc., so it is a larger issue than that. But in my view, identifying the areas of the coast—and this is something that I do believe our FIT-CHIPs are going to be really strong for—where there are stressor bottlenecks associated with climate change will allow us to determine what mitigative actions we can possibly take along different parts of the coast.

● (1630)

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much.

Mr. Chair, do I have enough time left for another witness to suggest an urgent action to curb the impact of climate change on Pacific salmon?

[*English*]

The Chair: I'm sure we'll get back to more questions. The time is up for now.

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

Go ahead, please.

Mr. Gord Johns: Thank you.

Last week, the B.C. Court of Appeal once again affirmed that the five Nuu-chah-nulth nations' aboriginal right is a high priority in their court case.

This is for Ms. Reid. Will the department recognize the priority of the nations' right and its importance to the economic and social well-being of their fishing communities and our west coast economy, instead of continuing to fight the five Nuu-chah-nulth nations in court?

Ms. Rebecca Reid: Thank you, Mr. Johns. We do recognize the court-defined right of those five nations. We do.

Mr. Gord Johns: So recognizing the importance of last week's B.C. Court of Appeal decision, what actions will the department be taking for the 2021 fishing season to increase the allocations of chinook, coho, and other species in keeping with the priority of the five nations' aboriginal right and a generous approach to chinook and coho specifically, and what recommendations will you be bringing to the minister?

Ms. Rebecca Reid: We are still reviewing the court decision, of course, as you know, and we are also undergoing negotiations with the five nations from a reconciliation perspective. They do have a fishery management plan in place now for their rights-based fishery.

Mr. Gord Johns: So even in times of lower returns, do you agree that if any fishing takes place, the first nations' aboriginal rights fisheries have priority after conservation, and also, do you agree that this priority includes the rights-based economic fisheries of the five Nuu-chah-nulth nations as the courts have stated?

Ms. Rebecca Reid: The rights priority would follow conservation. There's FSC that needs to be taken into account along with treaty rights, but, yes, those are the priorities we are managing.

Mr. Gord Johns: Thank you.

Dr. Jones, in 2018 you published an important paper that described the profound physiological impact of sea lice on young sockeye salmon. Do you think this information should have been included in DFO's assessment of whether salmon farms are a risk to Fraser sockeye salmon, given that the sea lice outbreaks we hear about, it seems, every year now suggest that the farmers are having trouble controlling sea lice?

Dr. Simon Jones (Research Scientist, Pacific Region, Department of Fisheries and Oceans): The paper we published in 2019 was a continuation of work that we had begun in 2013, when we had first published on the impacts of sea lice on sockeye salmon. Your question, I believe, referred to risk assessments. We have not conducted a risk assessment, per se, on sea lice. However, published works such as the paper you described and others that we publish do serve as alternative sources of scientific advice that are provided into the department.

The Chair: Thank you, Mr. Johns.

Mr. Mazier, you have five minutes or less, please.

Mr. Dan Mazier (Dauphin—Swan River—Neepawa, CPC): Thank you, Mr. Chair.

Thank you to all of the witnesses for coming out this afternoon.

The committee has heard repeatedly that out-of-control pinniped populations are decimating juvenile Pacific salmon populations and that this is contributing to ongoing stock declines.

Dr. Carl Walters stated that he had worked with the Pacific Balance Pinniped Society "to develop proposals for commercial and first nations' harvesting of seals and sea lions, aimed at reducing pinniped populations" to salmon stock recoveries. The witness went on to say, and I quote, "Those proposals went into DFO two years ago, and the department has been sitting on them for over two years with one excuse after another for not taking any action."

What is the status of the proposals submitted to DFO by the Pacific Balance Pinniped Society?

Mr. Andrew Thomson (Regional Director, Science, Pacific Region, Department of Fisheries and Oceans): I'd like to take that question, Mr. Mazier. In my previous capacity, I was the regional director of fisheries management. I was responsible for all fisheries management, including marine mammal management.

The proposals that came in from the Pacific Balance Pinniped Society were assessed under a new and emerging fisheries policy. That policy, the same as is done for every new and emerging fishery, requires quite a significant amount of information to be provided by proponents in order that we can properly assess any potential impacts of the new fishery not just on the target stock but of course the ecosystem impacts and the impacts that the fishery may have elsewhere.

We have been in conversations with the Pacific Balance Pinniped Society and others that have proposed these things to try to get a full picture so that we can assess what the impacts might be of any potential pinniped harvest on not just the pinnipeds, obviously, but also other stocks. As we all know, pinnipeds are a consumer of salmon. They're also a consumer of prey species of salmon and a consumer of fish that prey on salmon. There's a significant amount of ecosystem impacts that you'd have to fully understand and study to make a broad determination as to whether or not a fishery should proceed.

● (1635)

Mr. Dan Mazier: So basically, over the last two years there's been no action taken out in the field or anything. It's still under study, as far as you're concerned,

Mr. Andrew Thomson: No. We've been in conversation with the society as well as other proponents to try to fill in those information gaps. We've had our science branch colleagues out studying some of these potential impacts. We've convened two symposiums of international researchers to try to fill in some of those information gaps to give the department and those who may be applying it a full picture as to what the impacts of pinnipeds may be and what potential actions should be taken.

Mr. Dan Mazier: Okay.

Ms. Reid, I'll turn to you for my next question. In April 2021 a report prepared by BC Salmon Farmers provided an analysis of the economic impact in Surrey, B.C., of the decision by the federal government to close open net-pen salmon farms in the Discovery Islands region. The report indicated that “potentially more than 1,500 people province-wide could lose their jobs in the near term”, and “salmon farming companies will lose almost $200 million in ongoing annual revenue from salmon farming and processing.”

Did the DFO conduct its own socio-economic analysis prior to taking that decision? If so, can you explain what the analysis consisted of and who was consulted?

Ms. Rebecca Reid: I would say that the decision taken was around the risk evaluation and other considerations related to the transfer of fish into Discovery Islands. While there was some socio-economic information collected through our policy and economic analysis branch, there wasn't a study. It wasn't an extensive amount of work. We had some conversations in general with the industry about the size and value of the industry but not related to this specific decision.

Mr. Dan Mazier: This is impacting 1,500 people province-wide and $200 million.

Why was there no detailed transition plan to support the affected workers in the local communities?

Ms. Rebecca Reid: The decision was taken with respect to this particular location. It doesn't affect the rest of aquaculture across British Columbia, so it's for this particular location.

The question put before the minister was whether these fish could be transferred to this location or not. That was based on the factors we consider around risk, health and elements of reconciliation.

The Chair: We'll now go to Mr. Hardie, for five minutes or less.

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

Ms. Reid, I'll ask you to act as traffic cop here, and direct the questions to whomever is in the best position to answer them.

On an ongoing basis, from time to time, we see announcements of various programs that have to do with habitat restoration, or anything that preserves or basically restores salmon stocks on the west coast.

Does anybody have any idea about how many of these programs exist right now, or have existed within the last couple of years?

Ms. Rebecca Reid: To clarify the question, how many restoration-type projects—

Mr. Ken Hardie: Or with any kind of program that has to do with restoring or preserving salmon stocks, does anybody have a fix on the number of these programs?

Ms. Rebecca Reid: For sure. Would you like me to describe some of them?

Mr. Ken Hardie: No. I just need to know that somebody has the list, because the next questions that fall out of that are the following. Are you comfortable, overall, when you look at the accumulative aspects of all of these programs, that are they getting us anywhere? Is there coordination? Is there somebody looking at the ground that we're covering, and identifying gaps where new programs could happen, or where there's duplication of effort and we're spinning our wheels?

● (1640)

Ms. Rebecca Reid: That is one of the key pillars of the Pacific salmon strategy and the funding that was provided, the idea being that we need to have a better coordinated and integrated approach to support the many different restoration programs that are going on right now. The BCSRIF, the salmon restoration and innovation fund, has actually funded programs to create that priority list and priority setting exercise.

We do see the Pacific salmon strategy as creating the governance around restoration and stewardship from outside of the department, which will significantly improve the way we manage and plan.

Mr. Ken Hardie: The Pacific salmon strategy creates the framework, but has the framework been filled in? If it were your money the department was putting out there to these various projects, would you be satisfied that we were getting back some of the value for that money?

Ms. Rebecca Reid: The thing with restoration is that it's hugely expensive, so are we putting the money in the best places? We work very hard to prioritize and work with stakeholders, with indigenous groups, to really ensure value for money. There's a need for greater coordination between the stakeholders, so that we can take the various sources of money and collectively put it to good use. There are opportunities for improvement, yes.

Mr. Ken Hardie: When we were looking at the Big Bar slide last year, hatcheries came up in the discussion, particularly hatcheries further upstream from the slide. There was really quite a bit of disagreement about the role that hatcheries should play and whether or not they're helpful in the grand scheme of things.

Does the DFO have an overall strategy for hatcheries, and if so, can you describe it?

Ms. Rebecca Reid: The salmonid enhancement program, which has been around for 40 years, has spent a significant amount of time looking at that question, namely, when is enhancement good and when is it not good?

It has created guidelines to ensure that any enhancement activity falls within the acceptable practices, so that you can produce more fish, but you're not endangering the genetic diversity or impacting the stocks of concern.

It is a really important question to ask. The salmonid enhancement program has done a lot of work on it. There is still more work we can do to improve it.

Mr. Ken Hardie: Are there any conclusions being drawn about the size of hatcheries, for instance? Certainly, what we heard in the testimony about the Big Bar landslide was that the great big operation might be the source of more harm than good, and that smaller community-based operations might be the way to go because they can be a little bit more specific to the location you're trying to enhance.

Ms. Rebecca Reid: Right now, we have a mix of large and small community-based hatcheries, and we have always supported that kind of dual model. Just because you have a big hatchery doesn't mean you're only producing one type of fish. There is a lot of flexibility within those facilities to create different populations of fish that can be enhanced, and in some cases moved to different locations as required.

That is certainly what we're doing right now with Big Bar, because we don't have them in the places we need them. We're transporting brood stock or eggs to other hatcheries and then relocating them where they go back to, what we'd hope would be, their natal stream.

In that way, you can be strategic about those large hatcheries and not just rely on the smaller ones.

The Chair: Thank you, Mr. Hardie.

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

Mr. Richard Bragdon (Tobique—Mactaquac, CPC): Thank you, Mr. Chair. Thank you to each of the witnesses for your time this evening and your testimony.

I'd like to start by asking Ms. Reid a couple of questions. What is the status of the Pacific salmon secretariat? Have plans been finalized for the creation of the secretariat?

Ms. Rebecca Reid: You're referring to the one as part of the Pacific salmon strategy?

Mr. Richard Bragdon: Yes.

Ms. Rebecca Reid: We have created an internal team, which we have staffed. It's quite a small team at this point, but the idea would be—subject to going through the financial processes, Treasury Board submissions and those types of things—to start to build out the secretariat. We would also build on the external piece as well, but it's very early days at this point.

● (1645)

Mr. Richard Bragdon: Do you have an estimated time as to how long the process will take to get it up and going?

Ms. Rebecca Reid: From an internal perspective, it will be a matter of whether we can get the staff in place. We do have a structure in place right now. I can imagine it will be quite a few months to get it fully staffed. From an external perspective it will take longer, because we do need to consult with our partners—with indigenous groups—in a meaningful way, to really talk to them about what the structure would look like and how they would like to be involved. I could see that taking considerably longer to stand up.

Mr. Richard Bragdon: Can you tell us the status of the restoration centre of expertise? Have the plans been finalized for its creation?

Ms. Rebecca Reid: No. I would put that in the same category. We have a number of ideas and strategies that have very recently been accepted and announced. Now we have to do the work to really start to build them out.

Mr. Richard Bragdon: Okay.

Do you know what external organizations the department consulted with in the Pacific as it relates specifically to the salmon secretariat or the restoration centre of expertise?

Ms. Rebecca Reid: Whom did we consult with to build it?

Mr. Richard Bragdon: Yes, to come up with the concept.

Ms. Rebecca Reid: The department has worked with its stakeholders and indigenous groups for...well, forever. We have regular, ongoing conversations about what is needed, what is required. The B.C. salmon restoration and innovation fund has been very helpful to help us set some priorities. That said, it really is at this point that we've started to reach out and build the right centre, based on what stakeholders and indigenous groups say to us.

We need to do it collectively, together.

Mr. Richard Bragdon: Thank you, Ms. Reid.

Can you tell me clearly who proposed the ideas for the secretariat and the centre of excellence? Where did it come from?

Ms. Rebecca Reid: We developed the proposal within the department and sought approval for it.

Mr. Richard Bragdon: Okay, so it came from in the department.

Ms. Rebecca Reid: But it was informed externally as well.

Mr. Richard Bragdon: For over a year, the committee has been studying the state of Pacific salmon. We've heard from numerous indigenous and non-indigenous organizations involved in trying to restore wild Pacific salmon. We've been told that the proven methods for restoring stocks are known and available. They just need to be resourced. They haven't been resourced properly to this point.

It seems that the current government's funds, in the federal budget, will basically be reinventing the wheel that we know already exists. Wouldn't these new federal resources be better placed in support of actions restoring salmon stocks than creating more and new innovative structures?

Ms. Rebecca Reid: That's exactly what we're trying to do. You need to be able to set priorities; you need to do it in a way that considers the views of your stakeholders, your partners, the indigenous groups; and then you need to take action. We have a number of restoration projects and programs on the grounds doing work right now. This work is under way already. There are several examples.

What we need to do is make sure we're using the money in the wisest way to get to those priorities. In that way, we need to reach out and work with others to make sure that the priorities are set and understood and accepted.

Mr. Richard Bragdon: Do you feel overall that with the known solutions and recommendations already out there, there's enough of what we already know works being done? Do you feel that enough steps are being taken and enough resources being committed to the recommendations that are well known to everyone in field?

It's a matter of implementation. Do you feel that the practical steps towards implementation to get results have been made, so far?

Ms. Rebecca Reid: Well, I think we need to be strategic in where we put our money, because there is not enough money in the world to do every single restoration project people may wish to see. The challenges are overwhelming and intense.

You've heard talk about the impacts of climate change on fresh water, on temperatures, on flows. Those are all very significant problems. Can we make improvements? Absolutely. But can we fix everything? It's here that you need to be strategic about what provides the best bang for the buck.

The Chair: Thank you, Mr. Bragdon.

Mr. Richard Bragdon: Thank you, Mr. Chair.

The Chair: You've gone a little bit over.

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

Mr. Robert Morrissey: Thank you, Chair.

I want to follow up on the question from MP Hardie and to a lesser extent from MP Bragdon.

Ms. Reid, why have past practices of DFO failed to restore commercial salmon?

● (1650)

Ms. Rebecca Reid: Well, there are many challenges facing salmon. There are any number of impacts on their survivability. It's not just harvest; there's climate change, there are impacts upon habitat. They encounter any number of ways that cause their decline.

Mr. Robert Morrissey: Okay, but we've known that for a while. We've known the impact of civilization upon the habitat. We have known—at least those who accept the fact—that the climate is changing, that the ocean is warming. We also understand, from the testimony given by Dr. Miller-Saunders, that a lot of the viruses—in fact, I was surprised when she said the majority—are naturally occurring. The impact of fish farming would appear minor and on that side.

Then I'll go to my next question, because it doesn't appear there's one specific area of past practices that has failed. What's your advice, to use your words “strategic investment”, for ensuring that the substantive amount of money that has now been targeted towards this industry.... Where strategically should it be placed?

Ms. Rebecca Reid: That's really what we want to do when we create the governance structures and put the advisory processes in place: to be strategic about where to spend the money.

It's not that all populations are in decline. We have examples of salmon populations improving, and those—

Mr. Robert Morrissey: Which ones are those?

Ms. Rebecca Reid: Well, some of the chinook populations are in good health, for example. There are a number of examples. We have, though, some very significant challenges that impact upon some of those stocks. You have climate change, you have warming water conditions, urbanization, habitat, development. You need to basically bring people together to set the priorities and start to work away at these problems.

Mr. Robert Morrissey: You're the senior person in DFO on the west coast. What is your recommendation, to those people you're going to bring together, going to be?

Ms. Rebecca Reid: My recommendation is that we will achieve a lot more by working together in partnership, by setting priorities together and by agreeing on the broad outcomes we want to accomplish.

Mr. Robert Morrissey: Do you have a mindset on what the priorities should be?

Ms. Rebecca Reid: Well, I've given you four categories in which we should make efforts, including habitat restoration for sure. We also need to do some harvest transformations, and we need to make sure our governance pieces are—

Mr. Robert Morrissey: To follow up on Mr. Hardie's point, which he was correct in, we do not want to be reinventing the wheel. That's why my question was: do we know what has not worked in the past? If we're not really clear on that as a governance body, it will impact where we're going to make these strategic investments. You're right that it's a large budget, but every budget is finite.

We do not want to reinvent the wheel in areas where there have been no successful results in the fisheries. With that particular view, can you assure this committee that we won't be reinventing the wheel and will target and use the money wisely, as in your statement? Where would the key targeted areas be?

Ms. Rebecca Reid: We fully intend to use the money wisely. We are extremely pleased to have this level of support to protect wild Pacific salmon. It's an extremely exciting opportunity, and we take very seriously our responsibilities to deliver value for money and ensure that as we set priorities, we're not reinventing the wheel.

We are moving forward with what we know, and we're leveraging what's already in place and available. We're also taking advantage of what we know, looking for opportunities to make a big difference. There are lots of different places to work, and I think there are tons of conversations we need to have to really create the best plan.

● (1655)

The Chair: Thank you, Mr. Morrissey.

We'll now go to Mr. Blanchette-Joncas, for two and a half minutes or less, please.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Chair.

My question is for Ms. Reid.

Ms. Reid, if you don't feel comfortable enough to respond, your colleagues can also respond if they wish. I'd love to hear from them, as well.

My question is about first nations. We haven't heard much about the role that first nations should play in salmon conservation.

What role do you think first nations should play in salmon conservation?

[*English*]

Ms. Rebecca Reid: We view the role of indigenous people as absolutely critical to any plan and strategy that we develop. We have a number of governance processes already in place that will help levers that work. For example, there is the Fraser Salmon Management Board, which was recently created for the Fraser River. A large number of indigenous groups are working together on it for the good of Pacific salmon.

We do intend to work with indigenous groups to talk to them about what sort of advisory process they would see as effective and helpful in supporting the conversations we need to have about where to put the money and how to set priorities. We view those conversations at a government-to-government level as critical to the success of this strategy.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Ms. Reid.

Dr. Miller-Saunders, what is your opinion about the role of first nations in salmon conservation?

[*English*]

Dr. Kristi Miller-Saunders: First nations are critical because they are on the ground and have years and years of history witnessing the changes we are studying today. My program is working extensively with first nations on the west coast of Vancouver Island and in the Broughton Archipelago. We hope hoping to utilize their history of knowledge to better understand where we need to focus our efforts in understanding stressor and historic patterns in population.

From what I can see from a scientist's perspective, there has been a lot of activity in the department to more fully integrate first nations in the interpretation of the work we do, both in the field and in the consultations. I see it as a very positive move forward for the department and its relationship with first nations.

The Chair: Thank you, Mr. Blanchette-Joncas.

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

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

Dr. Miller-Saunders, we've heard a lot today about the cumulative effects of climate change, disease and pollutants on wild salmon. With so many things going on, can your program offer any insight into which factors are playing the biggest role and which could be mediated through some kind of intervention?

You talked about your FIT-CHIP program. Can you elaborate a bit more on this work and what is needed to move forward with it?

Dr. Kristi Miller-Saunders: Sure. I really do believe that the FIT-CHIPs will give us the new resolution that we've never had before. Previously, we could go out and measure temperatures, and we could go out and measure environmental conditions, and we could surmise that they might be impactful on salmon. The FIT-CHIPs actually offer an opportunity to look at the salmon themselves and allow the genomic signatures of the salmon to speak for themselves. We can actually tell when the salmon is experiencing thermal stress: not just that they're in a high-temperature area, but whether they're actually feeling the stress of the environment.

The point of the FIT-CHIPs is to better understand the interconnection between different kinds of stressors and diseases. If you can understand whether they're cumulative, which means that they're additive, or they're synergistic, which means that they could be multiplicative so that you have one stressor and you have another stressor and they're 10 times more powerful when they're together, when you have that kind of information, you're able to ask what would happen if you just removed one of those.

We can't remove all of the stressors, but if we can target the stressors that we can mitigate and we can understand how they interplay with each other, we can be better informed as to what strategies we can take to reverse the declines, to actually develop a measure to increase survival substantially.

The other thing they allow us to do is identify the habitats that are most impactful in terms of stress: Where is the stress hot spot occurring? Then we can target our mitigative actions to those areas. I know that we've done a lot of work in freshwater systems, and I cannot emphasize enough that the early marine rearing environment, where many of our stocks spend up to a year, is also critical and that we need to be looking at what we can do there.

● (1700)

Mr. Gord Johns: Can you talk a bit more about the science of the increased survival of hatchery fish in relation to that?

Dr. Kristi Miller-Saunders: The increased survival of hatchery fish...?

Mr. Gord Johns: Yes.

Dr. Kristi Miller-Saunders: Yes. One of the things that we have done is develop a means to measure different kinds of stress in hatcheries as well. The way that we culture fish is fairly without habitat, essentially, and one of the issues that has come up is that hatchery fish don't behave the same and don't survive the same as a wild fish. If we can find ways of creating hatchery fish that have a very low level of stress and that behave more like a wild fish, we would potentially not only increase their potential for survival but we would decrease the domestication effects of hatcheries.

The FIT-CHIP applications could identify the optimal window of timing when salmon are ready to enter the marine environment so that we can identify the smolt window, and so that when they enter the marine environment they are able to deal with the change in salinity, which is a very stressful period of time.

We can identify whether fish are experiencing a viral disease state in the hatchery, for example, in a way that's non-invasive, that doesn't actually require the death of the fish to sample it. We can identify whether the practices that we use in hatcheries are stressful on the fish. If we start seeing indices of stress in the fish, we can mitigate those different activities to try to find the least stressful way that we can be growing salmon and releasing the healthiest and least-stressed fish.

The Chair: Thank you, Mr. Johns.

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

Mr. Mel Arnold: Thank you, Mr. Chair. I'll go to Ms. Miller-Saunders again.

Are you concerned that the finding of mouth rot by your team indicates a greater risk to wild salmon populations than DFO believed to be the case when the risk assessment for that pathogen was done?

Dr. Kristi Miller-Saunders: Well, our finding is for Tenacibaculum. Mouth rot is the disease caused by Tenacibaculum in farms.

The work we did was after the CSAS process, so they did not have the same level of information available to them when they performed the CSAS process. I do think it is important, and as was said in every CSAS process, as new information arises, new scientific data, they will reconsider the level of risk that they have determined in the CSAS.

I do fully expect that the new data coming out of our program, which not only suggests that there is a population-level risk...and that's something that they weren't able to look at very holistically with empirical data in the CSAS process because they simply didn't have multiple years of data to look at variations of each of those agents with them and at survival. We had that data. We were able to do that. That makes us quite unique in terms of the research programs on our coast. Now that we know there is a potential population-level effect, they need to go back and look at their estimation of less than 1% impact on sockeye salmon.

Mr. Mel Arnold: Thank you.

In your view, were the nine risk assessments used to inform the Discovery Island decision correct in their conclusions that those nine pathogens posed less than minimal risk for wild Pacific salmon?

Dr. Kristi Miller-Saunders: I was personally involved only in the PRV CSAS and my colleague Andrew Bateman was involved in the Tenacibaculum, so I can't really speak to what went on in the room with all nine of those.

I can say that in the PRV CSAS, they were very heavily reliant on the challenge studies that have been performed in DFO. They were reluctant to consider one critical flaw that I flagged numerous times in the CSAS, which was those challenge studies used mortality and clinical signs of disease as the end point to be able to declare that PRV causes disease. Nowhere in the world has mortality been demonstrated in a PRV challenge, even in Norway.

Why would we expect that mortality and clinical signs of disease should be present in a challenge in B.C. when it isn't present in Norwegian challenge studies? Challenge studies for PRV generally rely on the incidents of the pathological lesions that occur in the fish. The early studies performed, which a lot of the CSAS were based on, didn't do a lot of pathology in their analysis.

I think there was an error on the side of the uncertainty in that they felt more certain in the results of the challenge studies than they should have.

● (1705)

Mr. Mel Arnold: Thank you.

If the minister were to ask you if she could say with confidence today that fish farms in the Discovery Islands pose less than minimal risk to wild Pacific salmon, what would your advice to her be?

Could she say with confidence that they pose less than minimal risk?

Dr. Kristi Miller-Saunders: If you're talking about minimal risk to sockeye salmon specifically in the Discovery Islands, I would say she should give pause and not make that sort of declaration until we have fully ironed out the role of Tenacibaculum in the sockeye salmon declines.

Mr. Mel Arnold: What is the science evidence that Pacific fish farms pose more than minimal risk to wild Pacific salmon?

Dr. Kristi Miller-Saunders: There are many different types of evidence. Certainly one that wasn't explored in the CSAS was the sea lice. Simon Jones talked about that briefly here. Certainly there are challenges with resistance to the drug and the ability of the industry to keep the lice levels down.

In terms of the work that we've done, our evidence centres around two pathogens—PRV and Tenacibaculum—but we're not done. Those are the ones that we've actually performed the models on to look at those risks. There very well may be others.

One thing we are embarking on now is looking at environmental DNA, which is a way of looking at the concentration of infective agents in the water column. We will actually be able to look at whether or not we can recognize the shift in the pathogen communities in the water column when farms are switching to a disease state before that disease state causes significant mortality. This would be potentially a tool that the regulator could use to determine what kind of mitigative actions they could take before there's major loss or before there is more risk to wild salmon.

The Chair: Thank you, Mr. Arnold.

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

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

I wanted to talk about the role of the province. One of our witnesses said something to the effect that the province of B.C. kind of vacated the field in certain areas, particularly when it came to habitat, and that we had one DFO officer in Kamloops trying to cover an amazing amount of territory.

Ms. Reid, does that sound like something that you heard along the way?

Ms. Rebecca Reid: I can't speak to the staffing levels in B.C., but I think that we are always challenged to have enough habitat people on the ground, given the significant territory they have to cover.

Mr. Ken Hardie: The staffing level was the DFO person in Kamloops, basically by themselves.

Let's turn this on its head a little bit. What's the role of the province, particularly in the inland waters, that complements or is supposed to complement the work of the DFO?

Ms. Rebecca Reid: The province has responsibilities for fresh water, with the exception of the management of salmon. When you're looking at agriculture, land types of decisions, water flow and water availability, those are areas where we do interact with the Province of B.C. It has responsibilities for steelhead management, for example, so there's another interaction. We work with the province from a habitat perspective quite carefully and significantly. We also work with it in the marine environment—for example, for aquaculture for our tenures. That's the interface between DFO and B.C. when it comes to land and water.

Mr. Ken Hardie: I don't want to put you terribly on the spot, but would it appear that the province is somewhat challenged keeping up its end of the work that needs to be done?

Ms. Rebecca Reid: As I said, there is a ton of work to be done. We work collaboratively with B.C. We have MOUs with it. We do our best to work together. The BCSCRIF, for example, is jointly funded, so Canada and B.C. together set those priorities and have put money aside to support this. I think those are examples of how we're working with it effectively.

● (1710)

Mr. Ken Hardie: Do they need help? Do they need more resources to provide a balance and properly complementary role to the DFO?

Ms. Rebecca Reid: I think you'd have to ask them that, but we've had some great working relationships with them, including at the Big Bar site, where they have been, hand in hand, helping us support that very significant project.

Mr. Ken Hardie: Again, over time and in a number of studies where we talk about the health of fish stocks, and particularly salmon, there have been a lot of discussions about activities that are going on: damage to riparian areas; residential and farming and industrial activities close to the banks of the Fraser River, etc. Is there dialogue between the DFO and the province when the province or some of the regional districts are looking at approving projects that could have a negative effect on salmon?

Ms. Rebecca Reid: We do have an MOU with the province. It has the riparian areas regulations that they put in place. They have responsibilities, as do we. DFO has responsibility for authorizing habitat destruction, so there is an interface between us where we need to work together. I'll leave it at that for now.

Mr. Ken Hardie: Is there a register of decisions that have been made that have resulted in habitat destruction?

Ms. Rebecca Reid: A register...? I'm not sure. Certainly we document all the authorizations that we develop. There is a database that collects that information, yes.

Mr. Ken Hardie: Is there science on the impact of farming, and particularly runoff from farms into, say, the Fraser River?

Ms. Rebecca Reid: Absolutely. That's not my area of expertise. I don't know if any of the panel members would view that. There certainly have been a lot of studies. I've seen them myself.

Mr. Ken Hardie: That would be something that the DFO would do or have a handle on.

Ms. Rebecca Reid: There would be the interface where B.C. would be looking at farm runoff, as an example, and ways to mitigate it. We would be looking at the management of the fish, the impact on the habitat.

Mr. Ken Hardie: There are no ongoing discussions between you and British Columbia so we're all working—

The Chair: Sorry, Mr. Hardie, your time is up.

Mr. Ken Hardie: I'm sorry about that.

The Chair: No problem.

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

Mr. Blaine Calkins: Thank you, Mr. Chair.

I'm going to go back to finish up on a conversation with Dr. Miller-Saunders. We were talking about the nidovirus in the hatcheries. When did you first discover this? When did you first find out? When was it common knowledge that this virus has been present in some of our hatcheries?

Dr. Kristi Miller-Saunders: About two and a half years ago we discovered the nidovirus. We did a study where we looked at the distribution of the nidovirus in the Quinsam system, where we had samples in the hatchery, both of wild fish and hatchery fish. We followed them through their migration out into the marine environment and first observed the nidovirus in wild fish after they'd come in contact with hatchery fish in the early marine environment. Then we saw a rapid decrease in the prevalence of the virus within the first three weeks or four weeks in the ocean, which could be either mortality or because they have cleared the virus. At that particular point, when fish are so stressed in trying to adjust to a new salinity environment, we are very interested in the potential for that being mortality.

Mr. Blaine Calkins: Has that virus, do you think, always been there and we've just found or discovered it because we just looked for it? What's the baseline? Are we starting to establish a baseline? Give me a sense of where this whole thing is at, because it all seems relatively new to me, and I'm not sure that it's not always been there.

Dr. Kristi Miller-Saunders: We are trying to establish a baseline. One of the ways you can determine how long a virus may have been here is through sequencing. You look at the depth of the sequencing phylogeny for the virus, and we do know that there are different variants. We do see some depth in the sequences that suggest that they've been here for a period of time.

We are planning to carry out more sequencing and do a more robust phylogenetic analysis like we've done with PRV. We'll be having a paper on that coming out in a couple of weeks where we can really look more holistically at the distribution across the province and in fish from Washington as well, because we capture them along our coast, and try to get an idea of the depth of how long that virus may have been here and whether it likely evolved here on this coast.

● (1715)

Mr. Blaine Calkins: Is there any suggestion that the movement from fresh water to salt water might help the salmon when it comes to fighting the virus? Have we been able to collect any samples of any of the material or tissue in salt water and compare it with what you found in juveniles or returning salmon in fresh water?

Dr. Kristi Miller-Saunders: We did a little bit of work with the early version of our FIT-CHIP a couple of years ago. One of the things that we did see in the fish was a shift in the timing of osmoregulation. Because the virus infects the gill—and we've been able to show that through viral imaging under the microscope as well as our molecular work—we are concerned that the virus may disrupt the ability of fish to shift to becoming full smolts. If it does disrupt their ability to smolt, it could disrupt their ability to adapt to the salinity in the environment, and that in and of itself is a huge detriment to survival.

In all our work in FIT-CHIP's data thus far, osmoregulatory failure and osmotic stress appear to be the most closely linked with survival, of all the stressors we've looked at—more so even than temperature.

Mr. Blaine Calkins: Do you think this virus is stress related and that changing some of the rearing structures at a hatchery might help with this virus?

Dr. Kristi Miller-Saunders: I think one thing that could potentially help that's been happening for the last couple of years, in part from the department's work on PRV, is getting the hatcheries to make sure that they're disinfecting their eggs as much as they can to remove the potential for viral transmission, vertical transmission, from the females to the progeny. That certainly could decrease the level of the virus.

One reason that a hatchery might carry a virus more than wild fish is just the high density environment, so it's easy to spread. We don't really know a lot about vertical transmission of this particular virus, but it is possible that vertical transmission is a major source of transmission, and that, if they were to treat the eggs well, they could reduce the incidence of the virus in the hatcheries.

Mr. Blaine Calkins: To your knowledge—

The Chair: Thank you, Mr. Calkins. You're a little bit over the time.

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

Mr. Robert Morrissey: Thank you again, Chair.

I must say I've been most impressed with the level of competency we've seen before this committee of the DFO personnel who have appeared from the scientific and research community.

Dr. Miller-Saunders, I'm impressed with your passion for the science that you're doing here and the cause that's at hand. I truly hope that the groups that come together utilize the great resource that has been on display before this committee, namely, within the scientific branch of DFO, on a host of very.... We may not agree; we may not like the message, but it's clear, from the witness I've been listening to here, that you're bringing it forward in a non-biased stance. I think that's extremely important. The decision-makers simply have to listen.

I would like you to comment on the following, because we often hold Norway up as the gold standard on getting it right. You made a comment earlier that we are ahead of Norway. I would like to know where we're ahead of Norway and in which particular areas.

Dr. Kristi Miller-Saunders: Well, one of the difficulties that Norway has in studying disease impacts in wild fish is that there are so few fish out there for them to capture and study. They've been limited to looking at migrating adults that are returning to spawn or at juveniles that are going out, but they are really unable to catch fish in the ocean because they're just not dense enough.

My work with them has been to recapitulate some of the tracking studies that have been merged with FIT-CHIP and infectious agent monitoring, and also to look at the role of exposure to farms. They have been doing tracking studies on where fish go and their migratory behaviour, but they've never been able to link physiology, disease and those kinds of aspects in those studies. Our program focuses on non-lethal detection of infection and stress, so we're able to carry out these studies on fish populations of conservation concern without mortality to those fish. That's where I think Canada is absolutely ahead of the game. It's not only because of my research but also the work that I do with universities, which are really leading the charge when it comes to the tracking studies. This is a game-changer, to be able to actually study these processes in a non-lethal way. It's like taking a saliva test in a human.

● (1720)

Mr. Robert Morrissey: Is this new, Doctor? Is this something recent?

Dr. Kristi Miller-Saunders: It's completely new, yes. Our first publication on the merging of tracking studies with non-lethal physiological samplings came in the science paper that I published back in 2011. That was the very first time this kind of technology had been utilized. Our technology has evolved a lot since then and our genomic technology is much more targeted to specific signatures of stress and disease. It's a lot more powerful than what we had back in 2011 and it's going to be a game-changer in terms of what we understand.

Mr. Robert Morrissey: Do you have more ability today or going forward to focus on that level of research?

Dr. Kristi Miller-Saunders: I certainly hope so. I do have some funding from the Pacific Salmon Foundation to continue in that level of research. I know that the Pacific salmon strategy has a placeholder for that kind of work, but whether or not that work actually gets funded, I don't know yet.

Mr. Robert Morrissey: You feel it's very important to fund that level of scientific research.

Dr. Kristi Miller-Saunders: Well, it's a bit self-serving for me to say so, but yes, I do.

Mr. Robert Morrissey: Yes. Well, it seems extremely important. Could you comment? In answer to one my colleagues' earlier questions, you referenced advice that the minister may want to pause something as it relates to fish farming in—I forget where— a sensitive area on the Pacific coast. Could you expand a bit on why you stated that?

Dr. Kristi Miller-Saunders: I believe the question to me was about what I would say if the minister suggested that there was no more than a minimal risk and, therefore, would reverse the decision on the farms in the Discovery Islands. My response was that since the CSAS's were concluded—not very long ago—we have new data. Thus, before we holistically decide on the level of threat that farms pose to our wild populations, we really need to look carefully at that data.

Mr. Robert Morrissey: Okay. Thank you.

The Chair: Thank you, Mr. Morrissey.

We will now go to Mr. Blanchette-Joncas for two and half minutes or less, please.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Chair.

My question is going to be for Dr. Miller-Saunders first, but I'd also like to hear from the other witnesses, if time permits.

As the Pacific salmon study draws to a close, what do you see as the next steps in terms of conservation of salmon populations?

What should be the priority after this study? What do you think the most urgent thing is?

[*English*]

Dr. Kristi Miller-Saunders: I think that we need to get away from the idea that simply pumping out more fish from hatcheries is going to reverse the declines. I think that we need to recognize that the marine environment is where the year class strength for many of these populations is determined, which means that the marine environment is where we need to consider taking the most action.

I think that having mark-selective fisheries for hatchery fish would mean that we would have less fishing pressure on our wild fish, so if there are enough fish to be exploited, then the exploited fish are not our wild stocks.

I think that we need to employ the newest technologies that we can to understand the synergistic and cumulative effects of different kinds of stressors and diseases, as well as the role of prey availability and predator impacts, to make decisions that are informed by models to identify the factors that we can modify anthropogenically to turn things around.

I know that there's a lot of concentration on pinnipeds. My lab actually did some of the work on pinnipeds. The molecular work supporting the diet work was done in my lab. There are many scientists within the DFO who have questions about the numbers that have been generated in terms of the impacts on salmon because a lot of the early studies were focusing mostly on pinnipeds that were feeding in estuaries. However, the vast majority of the pinniped population is not feeding in estuaries. If you can extrapolate what you see in terms of the numbers of salmon that are being consumed in estuaries compared to what is being consumed in all of southern B.C., those numbers may not match up.

I think that we need to be careful. I think that there is a potential that we're looking for the one thing that we can control to blame. I am concerned that we may be misguided in that particular decision.

● (1725)

The Chair: Thank you, Mr. Blanchette-Joncas.

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

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

Ms. Reid, in terms of the government's commitment to reconciliation, case law and the United Nations Declaration on the Rights of Indigenous Peoples, my question is this: Will you enact the government to government to government relationship? Will that be actioned in the creation of the Pacific salmon secretariat and restoration centre of expertise?

Ms. Rebecca Reid: We haven't had a chance to consult with indigenous groups yet on what the governance looks like, but we fully intend to work with them as partners. That needs to be developed based on their own ideas and interests, and those discussions need to take place.

Mr. Gord Johns: Okay.

Ms. Miller-Saunders, I agree with Mr. Morrissey. We sure hope that you get the resources that you need to continue your important work.

If the minister approves the transfer of farmed fish into the Discovery Islands, should they be screened for Tenacibaculum, given the low returns?

Could you also explain how the effect of naturally occurring viruses is different from that of viruses coming from fish farms?

Dr. Kristi Miller-Saunders: Well a lot of viruses coming from fish farms are also naturally occurring. We have to be careful about thinking that they are two completely separate things.

In terms of.... I'm sorry. I've just lost track of what your question was.

Mr. Gord Johns: If the minister approves the transfer of farmed fish back into the Discovery Islands—

Dr. Kristi Miller-Saunders: Tenacibaculum.... Sorry, sorry, sorry.

Tenacibaculum is not going to be an easy one to control because Tenacibaculum is found in marine fish, as well as salmon and farmed fish. It isn't only found in farmed salmon. The issue with farmed salmon is that it may be considerably increased in terms of the abundance of Tenacibaculum released into the water column. Certainly, the early eDNA studies, environmental DNA studies, show that Tenacibaculum is concentrated around farms.

I think that we do need to look again at treatment effects and what we can do in terms of decreasing the loads of that particular bacterium on those farms. As well, our data actually do show that we're seeing Tenacibaculum present in farmed fish before they've moved them out into the ocean. Likely when they are introducing salt water into the hatcheries, they're already introducing that bacterium into their fish.

You know, the easiest way to control... Well, it may not be easy. However, if the water going into a farm and the water exiting a farm was all filtered, you know, like in closed containment systems or systems on land, we wouldn't have any of these problems because sea lice wouldn't infect farmed fish because sea lice would be filtered out of the water column. Therefore, they wouldn't affect our wild fish as well. You could do that with a lot of things like Tenacibaculum. Viruses will be harder, but the fact of the matter is that if farmed fish were less stressed, if they weren't stressed by sea lice and all the treatments and everything associated them, they wouldn't have the same potential to develop disease. Disease wouldn't ensue to the same degree if we controlled what comes in and what goes out of farms.

● (1730)

The Chair: That expires all of our time for today's committee meeting.

I want to thank the departmental officials for appearing before the committee today. I agree with that comments by committee members that it's been probably one of the most informative meetings we've had on this subject for quite some time.

Thank you to everybody for playing their part in providing the committee with that valuable information.

I remind everybody that we're back again on Wednesday. A big thank you to the clerks, analysts and our translation people.

I wish everybody a good evening.

The meeting is adjourned.