Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River

Commission d'enquête sur le déclin des populations de saumon rouge du fleuve Fraser

Public Hearings

Audience publique

Commissioner

L'Honorable juge /
The Honourable Justice
Bruce Cohen

Commissaire

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701, rue West Georgia
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APPEARANCES / COMPARUTIONS

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Tim Timberg Geneva Grande-McNeill	Government of Canada ("CAN")
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No appearance	Pacific Salmon Commission ("PSC")
No appearance	B.C. Public Service Alliance of Canada Union of Environment Workers B.C. ("BCPSAC")
No appearance	Rio Tinto Alcan Inc. ("RTAI")
No appearance	B.C. Salmon Farmers Association ("BCSFA")
No appearance	Seafood Producers Association of B.C. ("SPABC")
No appearance	Aquaculture Coalition: Alexandra Morton; Raincoast Research Society; Pacific Coast Wild Salmon Society ("AQUA")
Tim Leadem, Q.C.	Conservation Coalition: Coastal Alliance for Aquaculture Reform Fraser Riverkeeper Society; Georgia Strait Alliance; Raincoast Conservation Foundation; Watershed Watch Salmon Society; Mr. Otto Langer; David Suzuki Foundation ("CONSERV")
Don Rosenbloom	Area D Salmon Gillnet Association; Area B Harvest Committee (Seine) ("GILLFSC")

APPEARANCES / COMPARUTIONS, cont'd.

Phil Eidsvik	Southern Area E Gillnetters Assn. B.C. Fisheries Survival Coalition ("SGAHC")
Christopher Harvey, Q.C.	West Coast Trollers Area G Association; United Fishermen and Allied Workers' Union ("TWCTUFA")
No appearance	B.C. Wildlife Federation; B.C. Federation of Drift Fishers ("WFFDF")
No appearance	Maa-nulth Treaty Society; Tsawwassen First Nation; Musqueam First Nation ("MTM")
No appearance	Western Central Coast Salish First Nations: Cowichan Tribes and Chemainus First Nation Hwlitsum First Nation and Penelakut Tribe Te'mexw Treaty Association ("WCCSFN")
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No appearance	Métis Nation British Columbia ("MNBC")

APPEARANCES / COMPARUTIONS, cont'd.

No appearance	Sto:lo Tribal Council Cheam Indian Band ("STCCIB")
No appearance	Laich-kwil-tach Treaty Society Chief Harold Sewid, Aboriginal Aquaculture Association ("LJHAH")
No appearance	Musgamagw Tsawataineuk Tribal Council ("MTTC")
Ming Song	Heiltsuk Tribal Council ("HTC")

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THE REGISTRAR: Order. The hearing is now resumed.

MARC NELITZ, recalled.

KATHERINE WIECKOWSKI,
recalled.

MR. ROSENBLOOM: Thank you very much, Mr. Commissioner. Just before commencing with my continuation, if I may just speak personally for a moment on the loss of our colleague, Don Brenner. You, of course, Mr. Commissioner, knew him in the capacity of Chief Justice of the bench. In my case, I knew him as a counsel. I did a number of aviation cases, which he was always on the defence side, from the PWA crash to the Air Rainbow in Nanaimo. He was a formidable foe in every case that I had against him, and I know that the bar suffers a tremendous loss with his passing over the weekend. And I just thought I'd put that on record. Thank you.

Having said that, I would like to continue my cross-examination of this panel. I have limited time, and I will do my best to get through this as quickly as possible.

CROSS-EXAMINATION BY MR. ROSENBLOOM, continuing:

Q Firstly, focusing still on you, Mr. Nelitz, you and I had an exchange on Friday and I had suggested to you that you consult with your colleagues who had more of a grasp or specialty within lake habitat work. Did you have an opportunity to do that, and if you did, are you able to answer my questions as posed to you on Friday, that it would have been advisable, if the terms of reference permitted it, to provide this Commission with habitat analysis in your report as it related to recreational activities in some of the CUs.

MR. NELITZ: Yes, I did consult with others on my team, and in our determination we don't believe that it's a significant gap of the terms of reference

that it's not included. So we essentially went through our questions of Stewart-Oaten in our report, in terms of looking at the plausibility of the mechanisms of effect and spatial overlap of the existing nursery lakes and recreational activities, also considering temporal trends in juvenile productivity across those lakes where we have data, and given those combination of factors, came to the determination that it's very unlikely that recreational activities are important in contributing to the declines. And so therefore I don't believe it's a significant gap in the terms of reference.

Q And in giving that reply, you are focused in part on the Cultus Lake CU, are you?

MR. NELITZ: We're talking about the Fraser aggregate.

Q And you're only talking about the Fraser aggregate. I'll come to that in a moment.

I'd like to ask Mr. Lunn to put before us the transcript of last day, which is March the 10th, at page 45. You had an exchange with Mr. Timberg, and I'm wondering how your reply today jives with what you said in response to Mr. Timberg at page 45, which Mr. Lunn will have before us in a moment. I apologize, I didn't give him notice in advance. And if we go down to line 29, you're talking at this point about the intermediate stressors of which I think Mr. Timberg identified habitat analysis as one of those stressors. You said, at line 29, question, I should say Mr. Timberg said:

> Q All right. And if you had considered these intermediate measures that we just spoke about or these other habitat indicators, would that have affected your outcome?

Your response:

> My suspicion is no. Without having those data and having a better sense of those measures, it's hard for me to conclusively say whether it would have or not.

Now, I suggest to you if I interpret that response correctly, that's not very comforting to me and, I would assume, to the Commission, if indeed you, as

a specialist in habitat work, are saying you are uncertain as to whether such an analysis of the intermediate measures might be consequential to this Commission. Your response.

MR. NELITZ: I think there's some confusion here in terms of the term "intermediate measures". So in the context of what's being presented here in my testimony, I was considering the intermediate measures in terms of habitat variables, so habitat condition, water temperature, gravel quality, things like that. The way that I'm understanding your -- the way that you're talking about recreational activities as intermediate stresses, so there's stresses on those habitats. So that's kind of one step removed from impacts on those habitat conditions. So in this context, I was talking about the habitat variables themselves, not the stressors.

Q I see. Well, that will take time for us to analyze that response of yours and to make sense of it at the end of the day in terms of our final submission. I'd like to move on --

MR. NELITZ: All I'm saying is I think what I'm saying today is still consistent with those statements that I made earlier.

Q Thank you. Because of time limitation, I want to move on in the context of your approach to this report, report number 3, you repeatedly said to us in response to questions on Thursday of how you had been mandated to deal with this analysis on an aggregate basis and not on a CU basis. Now, I have reviewed the "Statement of Work", Appendix "D" to your report, and if Mr. Lunn would be good enough to put it up, although I'm going to refer to one paragraph there. Frankly, I don't see where your terms of reference limited you to an aggregate analysis of the habitat issues, and so firstly would you be kind enough to inform us where that is dictated in the terms of reference.

And for your assistance, once Mr. Lunn has it up, it's an appendix to the report as filed. So Exhibit 562, and at 562 the terms of reference is, I believe, Appendix "D". Do I have that correctly, Mr. Nelitz?

MR. NELITZ: Sorry, repeat that last bit?

Q I just want to give instructions to -- here we go, Mr. Lunn.

MR. NELITZ: I have it on page 130 and 131 of the report.

Q Yes, thank you. And if you would go to paragraph 3.3, under "Scope of Work", it reads:

> Once the status of the CUs and sub-stocks within CUs has been determined, then hypotheses will be developed to explain the trends and status of the CUs, focusing on industrial and urban stressors pertaining to the freshwater part of the salmon life cycle, as well as fishing pressure.

Now, again I'm not a scientist, but from my reading of that, it specifically instructed you to do an analysis, possibly on an aggregate basis, too, but also on a CU basis. Do you disagree with me?

MR. NELITZ: I would say that both of our interpretations of that section would be acceptable. The hypotheses that we used or we developed to explain the trends and status have to look across CUs. So individual CUs are a part of looking at that pattern. But we don't look at a specific CU and try to determine the cause-effect linkages and explain what's happening in an individual CU. It requires much different data, a lot more data-intensive data gathering and analysis, and that wasn't part of what we were looking at.

Q When you say that wasn't part of, where do you point to in the terms of reference, to suggest that you were ordered to limit this analysis to an aggregate basis?

MR. NELITZ: From our point of view, it was based on what is going to provide us insights into understanding the declines of the aggregate. And so if we have limited data on productivity of -- we have limited data on productivity across the CUs, so in the first place we could not have done it across all the CUs individually.

Q But might you have done it in respect to some CUs that were deemed to be critical in terms of abundance issues?

MR. NELITZ: Given the scope of what we had to do and the number of things that we had to address, I don't think it was possible, and also would not

have helped us gain, provide insights into the aggregate situation.
Q Yes. And I don't want to appear to be critical to you, sir, but do I hear you to say that it was your decision to approach this on an aggregate basis, as opposed to being directed to do so in the terms of reference.
MR. NELITZ: I can't remember or recall specific conversations, but I'd say we certainly talked about our analysis with the Commission in terms of how we were scoping it and planning it out, and it was deemed acceptable in those conversations.
Q I want you to appreciate where I'm coming from, and I want to refer to testimony given at this inquiry.
MR. ROSENBLOOM: And, Mr. Lunn, if you would be good enough to pull up the transcript of December the 3rd of last year, page -- I apologize, you'll have the page number in a moment. Page 21. This is testimony of Dr. Hyatt. I assume you know who he is.
MR. NELITZ: I do.
MR. ROSENBLOOM:
Q Dr. Hyatt speaking at this inquiry, at line 26 said:

> Well, let me start with the notion of why Strategy 3 --

- speaking obviously of the WSP Strategy 3 -

> -- may be germane to this inquiry. The inquiry was stimulated, in part, by a dramatic event that occurred for one conservation unit of sockeye on the Fraser River; principally, the run of Chilko sockeye, which in the 2009 return year showed a dramatic deviation from expected return.

And then it goes on from there.
The point I want to make with you, sir, is do you not agree that it would be in the interest of this inquiry that there be a habitat analysis conducted in respect to some or certain CUs that have been earmarked by the scientists as being of concern and may be explaining the 2009 situation.
MS. BAKER: Mr. Commissioner, that's not a proper

question for this witness. This witness is not here to opine on what the scope of this inquiry is, or what evidence should be called before this inquiry.

MR. ROSENBLOOM: Indeed, not to inform the Commission of what should be the scope of the inquiry.

Q But I'm asking you as a habitat specialist whether it would be advisable for the Commission to possibly request some further research, be it by your firm or wherever, that would focus on certain CUs and habitat stressors.

MS. BAKER: Again, he's asking the witness to define what work the Commission should be doing, and that's not appropriate for this witness to do.

MR. ROSENBLOOM: Well, let me spin it a different way.

Q Do you believe it would be beneficial, being a habitat specialist, to have some analysis done on an individual CU basis, at least in respect to certain priorized CUs?

MR. NELITZ: If I can ask a question of you, for what purpose?

Q For the purpose of trying to explain the issues of abundance or lack thereof in 2007, 2008, 2009, which was the very purpose of this inquiry.

MR. NELITZ: Yes.

Q Your answer is yes.

MR. NELITZ: Yes.

Q Thank you. If I may go on. One of the themes of your report number 3 is a deficiency in data, and as I read it and correct me if I'm wrong, deficiency of data for your purposes in doing your analysis, in both habitat and stock enumeration. You would agree with that?

MR. NELITZ: Yes, that's correct.

Q Yes. Now, would you further agree with me that that deficiency of data makes it very difficult to apply and implement the WSP and to make harvest management decisions in the absence of that kind of data?

MR. NELITZ: Well, I guess for one I want to say that I don't think it's appropriate for me to comment on the data weaknesses in terms of harvest management. That's not within the scope of what we were looking at with our report, and don't feel that that's appropriate to comment on that. In terms of your question about those weaknesses and how they might affect implementation of strategies

2 and 3, related to habitat and ecosystem indicators, I think that those weaknesses do make it difficult to implement those strategies, and I think DFO is working on trying to address some of those (indiscernible - overlapping speakers).

Q And in fact -- I'm sorry, yes. And in fact, you say you don't want to make comment about, but didn't you precisely make comment about it in report number 3, which is Exhibit 562, Mr. Lunn, under your "Recommendations" at page 59, the bottom three lines of page 59. The bottom three lines, going on then to the next page:

> To improve our understanding about population status across Conservation Units scientists need more information about the abundance and distribution of small lake and all river CUs, though we recognize that filling this gap may be impractical for river CUs. Existing programs for monitoring fry and adults are essential for understanding status, but historically resources have been dedicated to large lake Conservation Units. This emphasis is inconsistent with the Wild Salmon Policy which places importance on protecting diversity of populations. Ensuring conservation of small CUs could have dramatic effects on harvest policies and in-season management.

So you are connecting the deficiency in the database as having implication in terms of implementing the Wild Salmon Policy?

MR. NELITZ: Yes.

Q All right.

MR. NELITZ: In terms of how -- I'm not suggesting one direction or the other how it might affect fisheries in general, but just saying that there are linkages, yes, there are (indiscernible - overlapping speakers).

Q Well, there are linkages that could affect, using your very words, have dramatic effects on harvest policies and in-season management.

MR. NELITZ: Yes.

Q Meaning it could lead to a closure of a fishery that should otherwise or would not otherwise have been closed if there had been proper data, right?

MR. NELITZ: We didn't say that in the report, so I wouldn't want to say that here what the appropriate management actions are to take.
Q All right. Well, we'll deal with the interpretation of your paragraph at a later period of this inquiry. But that leads to a focus on the recommendations that you have made in your report. And in an exchange with Mr. Timberg, you were asked by him as to the costing of the implementation of those recommendations, and I believe you said, and nobody faults you for this, you didn't really have any idea what those costs would be, correct?
MR. NELITZ: That's correct.
Q All right. Now, you may or may not be aware that the Wild Salmon Policy dictates that there is not to be any additional funding for the implementation of WSP. Are you familiar with that?
MR. NELITZ: Anecdotally I've heard from others that those are --
Q Right.
MR. NELITZ: -- some of the constraints that have been put on implementation of the Wild Salmon Policy.
Q If I had more time, I'd go into it by citing it, but assuming for a moment that I speak accurately to you in respect to the policy, assuming there is no funding specifically for the implementation of WSP, would you agree with me it's obviously highly unlikely that your recommendations could possibly be implemented?
MR. NELITZ: Yes, I think that's unlikely in the current environment for funding and support for Wild Salmon Policy.
Q And appreciating that fact, would you also join me in agreeing that to continue to pursue the implementation of WSP without the carrying out of recommendations such as yours, is terribly prejudicial to the resource and its management?
MR. NELITZ: Can you repeat that question?
Q Yes. I may not frame it exactly the same way the second time. Would you not agree with me that if your recommendations and others that are being brought forward cannot be funded because of the policy of the WSP that everything is to be done within the existing financial envelope, that that situation leads to a serious consequence in the

management and harvest of the resource.
MR. NELITZ: I feel that's a tough -- in terms of serious consequence, I find it hard to assess that, what that consequence might be. So it's hard for me to imagine that on the spot here, so I'm not sure if that's answering your question.
Q But you appear to be a strong advocate for the implementation of your recommendations, of course.
MR. NELITZ: I'm an advocate if -- I'm putting pieces together here that I see being presented. So I see a Wild Salmon Policy which has certain goals and objectives in terms of what they're trying to achieve. And we have a situation with the decline of Fraser sockeye salmon. And so we're trying to frame our recommendations in the context of the decline, recognizing that there's set goals and objectives through the Wild Salmon Policy to address some of those things. I'm not saying that those are our goals and objectives, that that's what we should be doing.
Q Right.
MR. NELITZ: I'm not saying that I advocate for the Wild Salmon Policy. That's others who have put that policy forward. I'm just recognizing the situation in the Fraser and the opportunities that are there to address some of those concerns.
Q But you have made a series of recommendations, which is precisely what you were paid to do, and you brought your expertise to that task. The fact is that by failing to pursue the recommendations as you proposed them, there are obviously consequences, aren't there.
MR. NELITZ: Yes.
Q And the consequences relate to the overall harvest management and to the good health of the resource.
MR. NELITZ: Among other things, yes.
Q Yes. I have just two more areas. I'm cutting my examination short and providing some other questions I have to other counsel that will come following me. You say in your report, and I could refer you to it, that -- it relates to peer review, and I am just going to give you a quick quote. If you want to see it in your report, I'm happy to cite it. It's at page 6. You say in part at page 6:

However, it should be noted that the

delineation of the CU boundaries put forward by DFO have not been subject to the peer review process in the traditional sense of the term. It is our understanding that CU delineation will be independently evaluated in the near future.

This might be, Ms. Wieckowski -- sorry, the pronunciation of your name?

MS. WIECKOWSKI: Wieckowski.

Q Sorry, I should know better. I don't know which of you wishes to answer this. I'm surprised that there wasn't a peer review. Does that surprise you, and do you believe it is absolutely essential that there be a peer review of that area of work by DFO?

MS. WIECKOWSKI: Just to clarify, there was a peer review within DFO of the CUs and that is ongoing. It's an iterative process. But this speaks to, and this is based on our understanding from feedback from the reviewers of our work here, is that there has not yet been, but is in the process of coming, a review of the CUs by people outside of DFO. So that's what is implied by independent review.

Q I see. Thank you, I understand. Lastly, there is reference in your report to a sentence that I was intrigued by and I would ask for your interpretation. In your report, Project 3, at page 12, and I am taking all these questions out of context because I don't have the time to frame the question in context, but if you have any problems with it, tell me. Bottom line under "Habitats", 2.2, you say:

> Being highly specialized, there have been suggestions that lake-type sockeye salmon populations could be considered evolutionary dead ends.

And then you cite from Wood in 1995 and 2007, and Wood et al in 2008. That sentence intrigued me. Can you explain what that sentence means?

MR. NELITZ: I think the points here were raised, so let me say first, though, that there is some debate around this. I wouldn't say that there's conclusive beliefs in either direction. But the

statements here are comparing the river-type CUs and the lake-type CUs. River-type CUs, the characteristics, the life history characteristics tend to be more plastic, more variable in terms of where they're spawning, the habitat types that they're using, whereas lake CUs are much more fixed in terms of the specific locations that they use and habitats that they use. And so there's some debate and discussion that given the flexibility and the plasticity of the river-type CUs as compared to lake CUs, that the river types might be more resilient to disturbances, given that they're able to move locations if a certain location is stressed or disturbed, relative to lake CUs.

Q But I don't see your sentence as simply being a comparative analysis. I see you saying that in respect to lake sockeye CUs that an evolutionary perspective, there can be dead ends. And I wanted to understand what that means, dead ends.

MR. NELITZ: So I believe what is being -- so I was not the lead on this, but I certainly understand what was written here, or certainly I'm aware of what the author wrote here. In an evolutionary sense the lakes can pose -- if a lake is disturbed and that component of the population is removed, there aren't opportunities for that CU to then move to another location, say, for example. They don't have as much of an ability to move from that location to another location to ensure that that population persists. Whereas if you look at the statement or the sentence immediately prior to that, it talks about river-type CUs that is more generalized in their habitat requirements, meaning that they have that flexibility. So given some disturbance event, say a slide, for example, or some kind of major perturbation of the habitats, river CUs evolutionarily are adaptable or able to move locations, whereas lake CUs don't have that same kind of flexibility and plasticity. That's the discussion that's referred to in these few sentences.

Q Do I read into your response that that school of opinion would believe that with certain lake CUs, no matter what remedial steps are taken, it is a dead end?

MR. NELITZ: A dead end...

Q Meaning that no matter what remedial steps are taken, it is unlikely to resuscitate the stock.
MR. NELITZ: I don't interpret it that way.
Q You don't.
MR. NELITZ: And an evolutionary time scale is what we're talking about, much longer time scale than --
Q Right. Well, rather than taking up more --
MR. NELITZ: -- resuscitating the stock, and in terms of looking at shorter-term declines and over across a couple of decades.
Q Well, rather than taking up more time of the inquiry, you cite these two Wood studies. I don't know if they are already somewhere in Ringtail. If they're not, could I ask you to inform your counsel, Commission counsel, of these studies so that counsel can provide us with the citations or wherein, wherever we might find these studies that speak to this very issue. All right?
MR. NELITZ: Certainly.
MR. ROSENBLOOM: Thank you. I have no further questions, thank you.
MS. BAKER: Thank you. Our next questioner is Mr. Prowse for the Province.
MR. PROWSE: Yes, Mr. Commissioner, D.C. Prowse for the Province.

CROSS-EXAMINATION BY MR. PROWSE:

Q I think I'll ask a couple of follow-up questions from what my friend, Mr. Rosenbloom, has just asked. So one is on the Wild Salmon Policy and your recommendations. And we have had recommendations from you and also from the last report last week, with different projects, if I can call it that, or for research or other things, often involving outside resources, some of which are in the millions of, tens of millions of dollars. So my question is if the federal government were willing to invest money in additional research beyond what's being done now, would you have a recommendation as to whether some of that money should be used for internal DFO work on the Wild Salmon Policy projects, as opposed to outside work of other kinds of research?
MR. NELITZ: I just want to be clear that our recommendations relate to filling some of the gaps

in the science, to help us have a better understanding of some of the cause of the decline, and discriminating about across the different life stages, and how the impacts on those life stages might be contributing to those declines. So to make judgment calls or around whether to fill those gaps, it's more appropriate to do that within by funding certain components of the Wild Salmon Policy, or to fund independent research projects. I feel it's a bit of a value judgment in terms of how to allocate between those two options. My suspicion is that it would be a combination of both, that certainly that there are the mechanisms within the Wild Salmon Policy that I think are there to address some of the issues that we have brought up in our recommendations. And likewise, I think there is some of the things can be dealt with through independent research or independent studies. So I think it's a bit too much to say kind of on the spot, like which, what's the proper balance across those.

Q Thank you. And I guess a related question has to do with whether as a result of the work that Ms. Wieckowski did -- is it Dr. Wieckowski?

MS. WIECKOWSKI: (Shakes head in negative).

Q Caught now in appellations. The Wieckowski work. Whether there is an implication that there may be more cost effective ways of doing some of that work, rather than the science approach that's been embodied in the work that DFO itself has done. Is that an implication of a possibility or an option that could be explored?

MS. WIECKOWSKI: I think what you're making reference to is a particular part of the work I did where it's referring to the work of Dr. Holt in relation to diversity metrics, where they don't have metrics that speak specifically to measuring genetic diversity, but rather are looking to capture diversity indirectly by looking at distribution of salmon and the difference of habitat types that they use for various purposes. And so I think that those efficiencies are something I think that are worth exploring in, if there is a finite budget or finite resources available, where it's possible to have surrogate indicators or metrics that speak to other things, that might be more -- such as gathering genetic

samples, which is very costly. There are other ways to perhaps capture that, that are equally defensible. I'm not here to comment on what those may be, and I think DFO is in a better place to comment on that, based on their expertise.

Q And, Mr. Commissioner, if Mr. Lunn, could you please bring up Exhibit 573. So I'm not sure whether -- I want to refer to the Selbie information. It may be, on my copy I had a reference at page 67, does that make sense? So Selbie is at Section "D", item 12. Yes, thank you.

MR. LUNN: That's what you're looking for?

MR. PROWSE: Yes, thank you.

Q Yes. So in your report you have referenced your work on the Selbie paper, and first of all, who are the researchers? If we can just turn back to the beginning of that section. Sorry, the two pages before the chart which you brought up. Yes. So are you familiar with the authors of this report and just what their expertise is and where they work?

MR. NELITZ: Many of them, yes.

Q And can you tell us what they are, just give us a quick overview?

MR. NELITZ: Mike Bradford, research scientist focused on habitats for salmon across B.C.; Merran Hague, a modeller in research support for other researchers at DFO; Erland McIsaac was my supervisor for my Master's, again a sockeye habitat researcher, looking at stressors such as forestry; Dave Patterson, dealing with water temperatures in the main stem Fraser on migration of sockeye.

Q And Daniel Selbie?

MR. NELITZ: I haven't met Daniel, so I don't know him. I know another person on our team spoke with Daniel as part of our work, but I can't really speak to a lot of what he does.

Q All right. And are all these authors with DFO?

MR. NELITZ: As far as I know, yes.

Q All right. And so you in your report summarize their findings and basically accept their findings, and then go beyond them in terms of having better data and doing further analysis; is that correct?

MR. NELITZ: That's correct.

Q And you explain that you thought it was important for you to recognize that work going forward.
MR. NELITZ: Absolutely.
Q And so turning then to the table that's two pages in, Figure 1. So the paragraph tells us that an:

> Absence of a link between land-use and population trends is not unexpected.

So that was the key conclusion they came to, and that they came to, is that right, one of them?
MR. NELITZ: There is a latter part of this report that I think better characterizes some of their conclusions in terms of it's unlikely that freshwater influences are explaining the declines, but this certainly summarizes this piece of that work.
Q All right. And the reference to the next sentence says:

> Sockeye salmon are likely less vulnerable to such habitat changes compared to coho salmon because sockeye often spawn in lake-buffered streams, and compensatory (and variable) mortality in the lake may mask spawning ground impacts.

So I guess there's two parts of that sentence. You've referred in your report to the lake-buffered streams? Sorry, the lake, yes, it does say "lake-buffered streams. So can you explain the importance of the lake buffering and lake-buffered streams?
MR. NELITZ: Certainly. So this is a big piece of our work, in that when we assessed impacts on spawning habitats, we discriminated between two general locations of spawning, so we identified those locations that were downstream of lakes, because of this issue that lakes can buffer upstream disturbances. And then we also identified locations that were tributary, spawning tributary to lakes or other tributary rivers.
So it's the idea that lakes, if there's a disturbance in a headwater upstream of the lake, that whether it's sediment, whether there are temperature impacts or flow impacts, given the large volumes of these lakes, that if sediment

comes in, that it will settle out before being passed through the lake outlet. Similarly, temperatures, if there's heating effects that come into a lake, that given the large surface areas of lakes and the exposure to climate, that those factors are going to overwhelm any kinds of disturbance that might have occurred due to disturbance upstream. So it's recognizing that lakes can have a buffering capacity, or a buffer against impacts, upstream impacts.

But certainly I'd say that we went one step further than what Selbie did, and we quantitatively discriminated between those lake-buffered streams and the tributary ones, and whereas they just did a yes/no categorization. And ours was at a much finer scale than that.

Q And can you explain that, that can you just amplify what you just said. In what respects was yours then at a much finer scale, and how does that --

MR. NELITZ: They essentially looked at is the CU or the stock lake-buffered or not. So it's kind of a yes or no, a binary discrimination. Whereas we looked at a continuum from zero to one. So fully lake buffered being a one; zero lake buffering on the spawning habitats being zero. And so we had the full continuum represented.

Q All right. And your conclusion nonetheless was that there wasn't a variable impact in each case?

MR. NELITZ: So this was not important in helping us, so this variable was not important in helping us understand the patterns of the decline across the CUs.

Q All right. So it didn't get to the population type level.

MR. NELITZ: That's correct.

Q And the next sentence talks about:

> Moreover, lakes, with larger dilution volumes, and more varied habitat, may further buffer sockeye from land use impacts during rearing, relative to streams.

I'm not sure whether you've covered that in your last answers or not.

MR. NELITZ: I think it's related. So the sentence before was talking about spawning habitat, so

spawning downstream of lakes. This is talking about rearing juveniles within lakes. So similarly there will be some buffering of some of the upstream impacts, though certainly that the potential for an effect is greater there than on the downstream spawning.

Q All right. And then below Figure 6, Mr. Lunn, is the heading "Conclusions". Yes. is this the paragraph that you were referring to earlier?

MR. NELITZ: Yes.

Q So the phraseology they've used is that:

> We were unable to find any quantitative evidence to support the hypothesis that the declines in the productivity of Fraser sockeye salmon were related to changes in freshwater habitat conditions in the natal and nursery environments.

So that goes to your main point; is that correct?

MR. NELITZ: Yes.

Q And the language there, I think you found -- why do you find the language there preferable from your point of view? What helps us from that use of language as opposed to what they were saying earlier, or...

MR. NELITZ: I guess my impression was that they were talking about the relatively likelihood in terms of that it would be unlikely. I don't see reference to a level of likelihood here, so that I just prefer it. I prefer it to be in terms of a relative likelihood because in terms of testing for cause and effect in science in general, we can't say with certainty if there's no effect. We can say in terms of the relative likelihood that it's unlikely. So that's why it's my preference to say that, versus conclusive or definitive statements.

Q And they refer to their analyses being preliminary, and you've told us of one difference of approach that you took that went beyond what they did. Are there others that are significant changes, where you went beyond what they had done?

MR. NELITZ: Well, I think we, as you just said, we went further in terms of identifying specific spawning locations. We also went further in delineating the land areas that have the potential

to influence those habitats, those in-river habitats. So whereas they used a kind of downstream point of interest and looked at a very large-scale area, we were much more refined in looking at local habitat uses and local areas of disturbance. I'd say we -- and they also used some very generic data sources on disturbance, and we used some more root data sources on some of the disturbances and stressors.

Q All right, thank you. Now, my friend, Ms. Baker, took you, I think, through the summary of highlights, and got you to explain them in your own words, and I'm not going to try to improve on that. And in particular I'm not going to try to get you to explain the statistical theories and details. I'll leave that to others braver than me. But I would ask you to turn to Tables 20 to 22, and those, Mr. Lunn are at page 562 of the report -- sorry, at page 111, I believe, of the report, which is Exhibit 562.

So this table, I think some of it is summarized and discussed around sections 4.1 and 4.2 of your report, these tables that lead to Table 19?

MR. NELITZ: 4.3 I think is the specific section we reference them, but, yes, in section 4.

Q And the prose that we see here I take it is a result of the analysis that I assume was done by computer and other analytical methods; is that how this works?

MR. NELITZ: So, yes, the analysis is the result of some analysis of spatial data. But what's contained in this table is also a summary of the state of the science and what we understand about cause-effect linkages between stressors and habitat changes and potential for impacts on populations. So it's a combination of both of those.

Q All right. And so again the analysis is to go through something that may be recognized in the literature and elsewhere as having either effects, has affected other species, or has affected sockeye or whatever the case may be. And then in most cases you then end up with your quantitative analysis that leads to the general conclusions that are in Table 19 and in your report that you already expressed.

MR. NELITZ: Yes.
Q So dealing with Table 20, "Forest Harvesting" is the first subject you deal with, and it's something, as you say, that there are a variety of plausible mechanisms, and this is a study that has been studied, and that is the subject of regulation by DFO and by others; is that right?
MR. NELITZ: Yes.
Q And the conclusion in (7) is that:

> Contrasting conditions do exist among CUs but a multiple regression analysis does not support the hypothesis that forest harvesting has had a significant impact on Fraser sockeye salmon population parameters.

So that is a statement of your conclusion with respect to this important variable, and again the emphasis in part is on the word "population", right?
MR. NELITZ: Yes, that's correct.
Q And with respect to the "Mountain Pine Beetle", your report shows pretty dramatic incursion of mountain pine beetle for those of us living in the Lower Mainland who may not see it and experience it on a daily basis, is that right, and over time.
MR. NELITZ: Yes. Certainly in terms of the proportion of land areas that have a potential to influence sockeye habitats, in some cases the level of disturbance was quite high. And it's a recent, relatively recent phenomena, kind of mid-2000s.
Q Right. And so part of the issue here is that because the effects are recent, they haven't -- well, in part perhaps because the effects are recent, when you're looking back over a 20-year decline that you're trying to explain, the more recent effects haven't had any quantitative results yet.
MR. NELITZ: In terms of our assessment of the data, essentially looking at the trend in the decline, and the pattern of increase in mountain pine beetle, they don't coincide. The timing of those things don't coincide. Correct.
Q All right. And then "Roads" is a third topic that you deal with, and again there are well-recognized mechanisms by which roads and road density can impact fish habitat; is that correct?

MR. NELITZ: That's correct.
Q But again the conclusion on page 112 under item (7) is that:

> Contrasting conditions do exist among CUs but a multiple regression analysis does not support the hypothesis that road density has had a significant impact on Fraser sockeye salmon population parameters.

So that was your conclusion, again the emphasis on the word "population".
MR. NELITZ: Yes.
Q And then turning to Table 21, with respect to "Agriculture", on the strength of the effect at item (2), so that's on page 113, it says:

> The strength of the impact is expected to be generally low for all habitat types. Although agriculture and urbanization has the potential to strongly affect spawning streams, none of the watersheds have high levels of these land uses.

Maybe you could explain that to me. Are we really saying that most of the CUs we're looking at are in the Upper Fraser, is that why?
MR. NELITZ: Well, the CUs range from CUs that are in the Lower Mainland to the headwaters of the Fraser. If you want me to explain these statements, I think the first sentence is just a generalization about across all habitat types, the nursery spawning migration, that it's relative to other stressors generally considered low.
Q Okay.
MR. NELITZ: As impacts across those habitat types and CUs. However, if there is the potential for a strong link, our belief is that it's most likely to be realized on the spawning habitats, which is what the second sentence is referring to. But again that, as we've through our assessment on those spawning habitats, the level of stress is relatively low.
Q All right. So when you actually, so you do the CU analysis and when you look at the CUs which you're trying to get contrast out of, for most of the CUs it's relatively low, compared to other stressors.

MR. NELITZ: Yes.
Q All right. And I think I'll ask you to just carry on in item (2). So you refer to mitigation measures on some land holdings. Can you explain what that might mean, or did mean?
MR. NELITZ: I believe, well, certainly I'm aware of certain kinds of riparian restoration, for example, which can help stabilize banks in some agricultural locations, so things like that which can help mitigate the impacts of those land uses on sockeye spawning.
Q All right. And then the last sentence says:

> Migration corridors are bordered by extensive urban and agricultural land use, but these appear to have little impact on migration activities.

So can you explain that?
MR. NELITZ: Well, it's partly referring to the mechanisms of effect, given what we're looking at. So our belief is that migration corridors tend to be larger rivers, Fraser, say, Quesnel, Chilko, things like that, and so the larger the river, the less likely it is that a physical disturbance in a riparian zone is going to either block passage, say, for example, or increase temperatures significantly, relative to other factors that are influencing those migration corridors.
Q And with respect to "Water Use", again the conclusion at item (7) on page 114 is that there are contrasting conditions but the:

> ...multiple regression analysis does not support the hypothesis that higher levels of water use have had a significant impact on Fraser sockeye salmon population parameters. Water use varies substantially among CUs but declines in sockeye salmon abundance have occurred in both high and low water use areas.

So because you don't get that differentiation, then you conclude that it's not having the differential impact of the population level.
MR. NELITZ: Yes, that's correct.
Q And with respect to "Mines", so at 113, item 2,

basically there are well-recognized hazards of mines, but the expectation and the strength of the estimated effect is generally weak because there's a low level of activity, and secondly because there are prohibitions under the ***Fisheries Act*** which are acceded to. Is that a fair summary of that part?

MR. NELITZ: Yes.

Q All right. And then Table 22 continues the analysis for a "Small hydro", "Large hydro" and Log storage". And on the "Small hydro", basically you don't -- item (7) says not applicable, and I gather that's because as stated in items (1) and (2) there are no, or there are few operational IPPs that have impacted thus far.

MR. NELITZ: That's correct.

Q And with respect to "Large hydro", which again is well-recognized and I think has historically been a problem, your conclusion really is at item (5), that:

> The Bridge-Seton and Nechako projects have both been in operation since the 1950s. Both have had known historical impacts on migrating sockeye salmon (direct mortality of smolts and adults at Bridge-Seton, and thermal stress on adults at Nechako). For both projects mitigation measures have been enacted with apparent success so survival should have improved in recent years relative to historical conditions.

So that sort of summarizes the situation there.

MR. NELITZ: Yes.

Q And for "Log storage" the item (4) tells us that there could be impacts, both on out-migrating smolts, and migrating adults. And then concludes that:

> Given the weakness of the expected response, declines in marine survival of sockeye salmon are not likely to be the result of log storage activity.

MR. NELITZ: That's correct.

Q All right. So I wanted to very briefly ask a question, you've been both qualified as experts in

structured decision-making, and I'm aware that you've both done work, in effect, on the Wild Salmon Policy, for I think the David Suzuki Foundation which is a published report that I think is referred to in your footnotes; is that correct?

MR. NELITZ: Yes, it is.

Q The Commission has heard quite a bit of evidence now about collaboration and integration and cooperation for such things as watershed planning. Is this something that your experience suggests is important? This is collaboration amongst people who in effect are participants here, different governments, First Nations, people with a stake in the industry.

MR. NELITZ: I think it's important when there is a resource that is affected by the decisions of many different agencies. So the decisions or actions that those agencies take have impacts on a common resource. So when you're having situations like that, it certainly, in our view, can improve the situation, can identify efficiencies and areas of overlap, and try to reduce redundancies and things like that, and share information, and ensure that there's a stronger link between the actions that agencies are taking and the consequences of those actions on the resource.

Q So there has been a little bit of evidence before the Commission about the Integrated Salmon Dialogue Forum, which is, I think, referenced in one of your earlier reports, and that is in the process of sunsetting. In fact, on April 18th and 19th, I believe they're having in effect a wrap-up and legacy session, what they call widening the circle. Are you familiar with the ISDF, either of you?

MR. NELITZ: I'm familiar with it in our report. I can't speak to the details of it. Do you know, do you remember...?

MS. WIECKOWSKI: Are those forums that are organized by Simon Fraser University where they're the facilitators?

Q Yes, Glenn Sigurdson and Barry Stuart.

MS. WIECKOWSKI: I'm familiar with them and have attended several of them.

Q And are there, in your view, ideas about they might serve as a model for collaboration going

forward, the legacies from some of those sessions you've attended?
MS. WIECKOWSKI: Having only attended as an observer and not as someone who is involved in setting the agenda and the discussions and the panels, and the topics that are discussed in those forums, I can't really comment on how that has worked as a model.
Q I think I've exhausted my time. I noted that you were involved in, I believe, San Diego, which looked it was possibly a collaborative process, but not clear to me whether it was or wasn't. If it was, are there any lessons from that, that you would share with us?
MS. WIECKOWSKI: Can you clarify? I'm not sure what you're referencing.
Q I thought you were involved in a project in San Diego, which looked like a multi-stakeholder process to deal with --
MS. WIECKOWSKI: I think it's Sacramento.
Q Was it Sacramento?
MS. WIECKOWSKI: Yes.
MR. NELITZ: Somewhere in California.
MS. WIECKOWSKI: Yes.
Q Are there lessons that in terms of collaboration from that process that you could share with us?
MS. WIECKOWSKI: Yeah, I think the primary lesson, and I'm not the lead of that work, and so I can only speak based on my involvement, but in terms of the progress that was made developing the decision support tools for the Sacramento River, that the greatest steps forward involved the Department of Water Resources working with and setting, are putting forward their management objectives and what they were trying to accomplish within their institutions and bringing those into our work, which was for a different client. And so it was working with both parties that it was able to move forward and made it more useful.
Q Thank you.
MR. NELITZ: If I can add to that point, I think a similar related model in B.C. to some of the things that we've been working on in the Sacramento, and by "we" I mean ESSA, is related to the BC Hydro water use planning process in terms of developing tools to inform decisions and having multiple audiences and organizations involved in coming, setting the objectives, and assessing the

consequences of different decisions and alternatives. So that's more an example that's close to home that I'd say it's consistent with what we're doing in Sacramento.

MR. PROWSE: Thank you. Finally, Mr. Lunn, if you could just bring up page 134 of Exhibit 562. And basically this was commentary by part of the peer review process by Professor Reynolds, Department of Biological Sciences of Simon Fraser. And in the middle of the page there he basically says that you've done the most comprehensive analysis and looked hard:

> ...to support the freshwater habitat theory, and does not find it.

So I took that as an endorsement of your report and its conclusions. So thank you very much.

THE COMMISSIONER: What page is that, Mr. Lunn?

MR. LUNN: Page 134.

THE COMMISSIONER: Thank you.

MS. BAKER: Mr. Commissioner, the next counsel is Mr. Harvey, but I would suggest we take the morning break now and then begin with Mr. Harvey, followed by Ms. Gaertner after the break, if that's acceptable.

THE COMMISSIONER: Thank you.

THE REGISTRAR: The hearing will now recess for 15 minutes.

(PROCEEDINGS ADJOURNED FOR MORNING RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: Hearing is now resumed.

MR. HARVEY: Yes, Mr. Commissioner, for the record it's Chris Harvey for the Area G Trollers and the United Fishermen and Allied Workers' Union.

CROSS-EXAMINATION BY MR. HARVEY:

Q Most of my questions I think will be directed to you, Mr. Nelitz. I apologize to Dr. Wieckowski. I'm not ignoring you and your contributions, but it's just that the questions I wish to follow up on seem to fall in Mr. Nelitz's area particularly but you, of course, are free to intervene.

Mr. Nelitz, do you agree with me that half of

the life cycle of Fraser sockeye occurs in fresh water and most of the total egg to adult mortality of Fraser sockeye occurs in the egg to smolt fresh water stage?

MR. NELITZ: Yes.

Q So your study -- your area of study is very important for that reason alone. And do you agree also that stressors that occur in fresh water can manifest themselves and cause problem in the later marine stages?

MR. NELITZ: There are some hypotheses mechanisms of that happening, yes.

Q All right. Now, under the terms of reference of this commission the commissioner is directed to consider DFO policies and practices with respect to the Fraser sockeye fishery and develop recommendations relating to the Fraser sockeye fishery and I think you've acknowledged that the fishery, the Fraser sockeye fishery, is dominated by a few large stocks?

MR. NELITZ: That's my general understanding, but I'm certainly not an expert in the Fraser River fishery.

Q All right. I mean, I understand that three major stocks account for more than half of the Fraser sockeye production, that's the Quesnel, the Chilko and the Late Shuswap.

MR. NELITZ: That's my understanding, as well.

Q Yes. So if you are trying to explain the decline of the fishery in the aggregate, you would want to start by focusing on the major lakes then, would you not?

MR. NELITZ: Decline of the fishery?

Q Fishery, yes.

MR. NELITZ: Which I would add is different than the terms -- or the analyses that we were looking at which is looking at decline in the productivity of the aggregate Fraser.

Q Yes. And you've itemized a lot of individual CUs because of that, but I'm referring to the terms of -- not your terms of reference, but the terms of reference of this commission to look at the sustainability of the Fraser sockeye fishery.

MR. NELITZ: Yes.

Q And if you're doing that, you'd want to focus on the major stocks, would you not?

MR. NELITZ: Well, I think -- I guess it depends on the

specific question you're trying to analyze, so some of the discussion came up earlier. I think other CUs may be important, as well, though, so just looking at, say, for example how the Cultus, the concerns around Cultus have affected the fishery, that there are implications of smaller CUs on the fishery overall. So I guess I'm just -- I'm not sure on what kind of question you're specifically trying to ask and through an analysis, but I would think that, yes, those CUs would be important. But I would also think that other CUs would be important in understanding that, as well.

Q Yes. All right. And I think that's apparent from your report, but like Dr. Hyatt in that passage that Mr. Rosenbloom read to you, I interpret the decline in the overall fishery as being the reason for this commission, and so I'm going to confine my questions to ecological factors affecting the larger stocks. And in that light, you would agree with me that the ecology -- ecology, as such, includes the relationship between juvenile sockeye in this context and their food supply?

MR. NELITZ: Yes.

Q And you've studied six stressors: forestry, mining, urban development, et cetera. But you'd agree with me that for a juvenile salmon in the freshwater rearing area, an insufficient food supply would be a very significant stressor?

MR. NELITZ: Yes.

Q As would an increase in predation?

MR. NELITZ: Yes.

Q There's a passage I'd like to refer you to in the -- towards the end of Exhibit 562, the technical report number 3, page 147, and I'm going to read the comment of this reviewer and ask whether you agree with it starting near the bottom of the page:

> In summary, it is possible that subtle climate driven changes in the ecology of the nursery lakes may be producing less food, or food of lower quality than historically, which is creating higher mortalities in juvenile sockeye during their migration to the open ocean as they are nutritionally deficient in energy reserves.

> This may be the explanation to statements given at the Nov 30-Dec 1/10 workshop and in various Cohen Commission science reports that "…This observation indicates either that the primary mortality agents in the sockeye occurred in the post-juvenile stage, or that certain stressors that were non-lethal in freshwater caused mortality later in the sockeye's life history" (Peterman et al., 2010)
>
> Nutritionally deficient juvenile sockeye may be more susceptible to variations in food quantity and quality in Georgia Strait, to ward off microbial pathogens and parasitic sea lice from open net pen fish farms, and variable ocean productivity on their early ocean migrations in Georgia Strait and on the continental shelf.
>
> In other words, some juvenile sockeye may have left home on an empty stomach, or a diet of junk food, and were poorly equipped to deal with the rigors of smoltification, migration and predator/disease avoidance.

Would you agree with the general thrust of that comment?

MR. NELITZ: I would agree that Dr. Ken Ashley has put forward a plausible hypothesis of how changes in food supply in the nursery lakes may be affecting sockeye.

Q And I see from your response at page 148 that you acknowledge the plausibility of that but you are aware of the -- and then you make reference to the Selbie analysis that Mr. Prowse drew to your attention and you say that that analysis found no detectable changes over time. I've looked at that analysis, but it seems to me that the emphasis should be on "over time" because the food sources in the freshwater system were found to have recovered before the next dominant cycle, but they were definitely depleted by the dominant cycle in, for example, the Quesnel -- I think it's the Quesnel that Selbie deals with in particular.

Would you like to look at the Selbie report?

We had it earlier. It's in Exhibit 573, I think.
MR. NELITZ: Yes. Yes, no, I understand your statement and yes, I would agree, that's correct.
Q Yes. All right. Well, we needn't look at it then in the interests of time. Because what -- what the evidence shows, I think, the analysis in these larger lakes, is that when there's been an escapement, a spawning escapement that is over the optimum, the food sources are found to be depleted towards the Fall of the year so that when the fry go into their overwintering type of hibernation, that they are often malnourished; is that a fair way to put it?
MS. GAERTNER: Sorry, Mr. Commissioner, Brenda Gaertner. I'm wondering if he -- if Mr. Harvey could tell us where that evidence is or where it comes from? That's an interesting summary and I'm just -- if it's Dr. Selbie's evidence or the evidence that's been before this commission.
MR. HARVEY: All right. Well, I -- yes, I can get to it. I perhaps --
Q Perhaps Mr. Nelitz would comment on the general broad statement that I've made and if it's -- if it's too broad, you'll say so.
MR. NELITZ: Yeah. I'm certainly not a -- I'm not a limnologist and so I don't feel fully qualified to comment on specific changes in food web dynamics and the timing of that and how that coincides with the health of smolts going into overwintering stages and the evidence that's available to look at that, to support that.
Q All right. So you -- you can't -- you can't comment, or can you, as to whether further limnology studies of the nursery lakes with respect to the quantity and quality of planktonic food should be made?
MR. NELITZ: We've made statements in our report that we support limnological programs and studies and some enhancement of that above the existing monitoring that's ongoing and that's based on others -- based on a review of the data and the expertise of others in the team which I would say is much stronger in limnology than myself.
Q All right. I could find only two paragraphs in your report as such dealing with this question and that's, if we could look at it in Exhibit 562 at page 17, I'd like to just refer you to paragraph

2.2.3 "Indicators of rearing habitat quantity/quality" and I'll just read a portion, then ask you a question about it. You say after the heading of:

> Nursery lake area and productivity (measured and estimated): The Fraser River is the world's largest single producer of sockeye salmon, being surpassed only by the combined sockeye salmon production from several river systems flowing into Bristol Bay in Alaska (Northcote and Larkin 1989). The Fraser system's exceptionally high productivity is due to the presence of many large lakes (66% of B.C.'s nursery lake area) that are accessible to anadromous fish.

And then you refer to Hume and Shortreed, two papers, I guess, one by Hume in '96, one by Shortreed, 2000. And you say:

> Further, most of these lakes are sufficiently productive to sustain a zooplankton community considered capable of supporting high juvenile sockeye salmon densities.

You refer to another paper. Then you say:

> It is generally assumed that most Fraser sockeye salmon stocks are recruitment limited --

That is the spawning levels have not -- are below optimum; is that what that means, recruitment limited?

MR. NELITZ: That's my understanding of that, yes.

Q Yes.

> -- with freshwater rearing habitats often capable of supporting juvenile sockeye salmon densities far higher than presently occur (i.e., a greater number of spawning escapements would produce additional smolts).

And then you have a footnote. And you say in the footnote:

> Though we also acknowledge an opposing density dependent hypothesis which suggests that escapement may already be too high in some rivers...

And I want to ask you this. You refer to that as a hypothesis, but surely it's not a hypothesis that there -- the basic concept that there has to be a limit to the density of salmon fry that any lake can sustain.

MR. NELITZ: Yes.

Q And with respect to the evidence and in response to Ms. Gaertner's request, I'd like to refer to the first of the papers that you referred to in the passage I read, that's the Hume et al 1996 and I've asked -- circulated that on Friday and asked Mr. Lunn to bring it up so that -- first of all so that you can identify it. Is this the paper that you refer to in that paragraph that I just read?

MR. NELITZ: One moment. Yes, it is.

Q Okay. I'd like to refer you to the second page of it, page 720, towards the bottom of the left-hand column, start there with the paragraph beginning:

> Because most Fraser sockeye stocks were recruitment limited for most of this century, increasing escapements within the constraints imposed by the commercial fishery have been a primary goal of Fraser River sockeye managers. Owing to uncertainties about the cause of the 4-year cycle of abundance, these rebuilding efforts have been largely restricted to the dominant and (to a lesser extent) subdominant cycle years. The rebuilding efforts have been successful on some Fraser system lakes, and particularly so on the lakes in this study.

This study, I think, covers Chilko, Shuswap and Quesnel; is that correct?

MR. NELITZ: Yes, it is.

Q

> During the rebuilding period, when escapements were relatively low, rearing capacity of the lakes was not a concern. Rather, optimum escapement estimates were based on estimates of spawning ground

capacity (Roos 1989).

And that's, I believe, the book that's in evidence here at Exhibit 75, the Salmon Commission's book.

Since the 1980s in Shuswap and Quesnel Lakes and 1990 in Chilko, dominant and subdominant brood year returns and escapements have been very high (Fig. 1, the 1958 return to Shuswap Lake was also high, but subsequent returns dropped considerably and have been building ever since). Determination of escapement levels that will maximize subsequent adult returns is now crucial to the efficient management of Fraser sockeye stocks.

Now, I'd like to ask you first with respect to the 1958 return to the Shuswap, do you agree with me that that was an early example of what's often been termed over-escapement?

MR. NELITZ: I don't know. I can't comment on that.

Q You can't. All right. With respect to the statement that determination of escapement levels that will maximize subsequent adult returns is now crucial, do you agree with that statement?

MR. NELITZ: Yes.

Q Okay. And I'd like to continue reading:

Escapements lower than the optimum will result in reduced adult returns. In any brood year, escapements higher than the optimum entail foregoing harvestable sockeye and will produce (at best) no increases in harvestable sockeye in subsequent brood years. If high escapements result in excessive fry recruitment and if the high escapements are consecutive, substantial and long-term declines in total stock size may occur, resulting in considerable economic loss.

Since the mid 1980s we have been conducting studies on these three lakes. Our studies are the first that have included detailed investigations of every major lake trophic level (from the microbial community to planktivorous fish) as well as measurement of salient physical and chemical variables.

> This ecosystem approach has enabled us to produce the first estimates of optimum spawning escapements based on a lake's productivity and on its ability to rear juvenile sockeye.

Now, the reference there to the first estimates of optimum spawning escapements, do you agree with me that the writers must be referring to the first estimates done on a scientific basis? Because we've heard in evidence here that prior to 1985 the Salmon Commission had estimates of optimum spawning escapements based on experiential or empirical knowledge?

MR. NELITZ: I can't -- I'm not familiar with and can't comment on the contrasting forms of evidence by which those optimum spawning escapements were derived. I don't know the quality or can't compare them at all in my own mind.

Q All right. At page 730 of this paper, page 730, the bottom left-hand column gives the conclusion about halfway through that paragraph:

> Predicted optimum total adult escapements --

This is the result of the paper -- could that be blown up a bit. The middle of -- yes, that's it. It's about halfway through that paragraph, the sentence beginning:

> Predicted optimum total adult escapements equivalent to *S*MAX for Chilko, Quesnel and Shuswap lakes were 0.62, 1.06 and 1.85 million respectively.

And then they give it in EFS, that's effective female spawner terms, as well. The 1.85 million for the -- that these analysts found on this basis to be the optimum for the Shuswap, I just note is almost -- is very close to what the Salmon Commission described as optimum, the optimum escapement of 1954 that led to the '58 record return and it's very much spot on the 2006 escapement to the Shuswap which led to the 2010 return. But I take it this is not something that you considered in your review of ecology factors in the freshwater system?

MR. NELITZ: Can you phrase that as a question, please?
Q Well, the question is did you focus in your paper at all on the optimum carrying capacity or optimum in terms of optimum spawning escapement, optimum escapement levels in any of these three major lakes?
MR. NELITZ: No, we did not, in part because Selbie et al, through their work for the Pacific Salmon Commission workshop did look at optimum escapement and recent observations of spawners relative to those optimum escapements.
Q Well, that -- there's nothing in the Selbie paper that contradicts the data in this paper, is there?
MR. NELITZ: I haven't done a comparison of the two to know for certain --
Q All right.
MR. NELITZ: -- if that's true or not.
Q All right. If we go back to page 728 there's a graph that illustrates, I think, what happens, two graphs there. Take the bottom one, the Chilko Lake, you see the -- along the bottom is effective female escapement, so as the escapement increases, we move from left to right and the vertical axis is the macrozooplankton, in other words, the food supply, and the bottom line is Chilko Lake not fertilized and it shows how the zooplankton levels drop off dramatically as female spawner escapement increases and they drop off less dramatically when fertilization is applied to the lake. That's -- and I think you mention fertilization in the course of your evidence. That's something you're familiar with?
MR. NELITZ: I'm familiar with fertilization, yes.
Q And you're familiar that fertilization was applied in the Chilko Lake for a number of years in the '80s and '90s?
MR. NELITZ: I'm familiar that it was applied there. The specific years, I'm not familiar with.
Q Yes. It's covered in -- at page 724 of this paper, there's a short paragraph on lake fertilization. If we could turn to page 724. It just says -- 724 under the heading "Lake Fertilization" it makes reference to the fertilization program, says it was:

> ...widely used and successful sockeye enhancement technique in British Columbia.

> In the mid-1980s Chilko Lake was identified as a...candidate...Consequently, nitrogen and phosphorus fertilizers were applied to the lake for 6-week periods...

Now, you mentioned fertilization in answer to a question from Mr. Timberg, you referred to carcasses of salmon effectively adding nutrients, but you were not intending to suggest, were you, that we should use one of the most valuable fish species in the world for fertilizer as opposed to nitrogen and phosphorus?

MR. NELITZ: I'm not suggesting we -- my intention is not to suggest any management actions, so that could be one management action and there may be preference for that over artificial means. I'm not suggesting either of those as being preferable or not.

Q All right. I'd like to go back to your report, Exhibit 562, and turn to page 62 of the report.

THE REGISTRAR: Mr. Harvey, did you wish to mark that before you move on?

MR. HARVEY: Oh, I'm sorry. Yes, I do. Could that be marked, please?

THE REGISTRAR: That would be Exhibit 575.

> EXHIBIT 575: Hume et al, Juvenile Sockeye Rearing Capacity of Three Lakes in the Fraser River System - 1996

MR. HARVEY:

Q All right. Exhibit 562 page 62, the graph at the top of the page is quite a dramatic graph showing the -- am I interpreting it right, showing the drop in productivity from 1952 to 2008 or 2009, I suppose?

MR. NELITZ: That's correct.

Q The first big drop is after the 1958 escapement that I mentioned earlier, and then there's a rebuilding and then a gradual drop-off in the '90s to the present. The phenomenon of over-escapement and depletion of food supply in the rearing lakes after an excessively large escapement is referred to as a density dependent effect, is it not?

MR. NELITZ: That's correct.

Q Yes. Do you agree that this commission should consider the possibility of density dependent

effects as being a possible major contributor to the downward trend that we see in this graph in the 1990s?

MS. BAKER: Again, Mr. Commissioner, this is the same objection I had to Mr. Rosenbloom's earlier questions. It's not for this witness to identify what the commission should be looking into or not looking into.

MR. HARVEY: All right.

MR. NELITZ: I would add -- I agree with what was just said, but I would add it's also my understanding if you look at the preface of our report - and it should be at the front of all reports, technical reports, that there are 12 projects listed here and Project 10, Fraser River Sockeye Production Dynamics, is a study which I believe investigates some of the questions and observations you have around changes in production dynamics of the Fraser --

MR. HARVEY:

Q Yes.

MR. NELITZ: -- populations.

Q All right. Thank you. I believe that's set for sometime in April.

MS. BAKER: I'm sorry. If I could just interrupt for one moment. If, Mr. Harvey, you could give some indication of how long you'll be because you're at the end of the estimate you had indicated earlier.

MR. HARVEY: If I could have another about six minutes, I think I can do it, five minutes.

MS. BAKER: Five.

MR. HARVEY: All right.

Q Just this closing point, if the cause of the 2009 failure does not arise in fresh water, it would, of course, have to be found in the marine phase of the sockeye life cycle; I expect you'd agree with that?

MR. NELITZ: Yes. Or, I would add, on the smolt out-migration.

Q Oh, yes. All right. But there's -- I'm going to just ask you -- give you some evidence against marine phase causative factors and ask you to comment on it. First of all, we have the pink and the chum salmon fishery which has been increasing in abundance, while sockeye has been decreasing. The pink and chum have different freshwater habitats and a different time that they spend, a

lesser time that they spend in fresh water. So that would be an indication weighing against a marine cause and pointing more to a freshwater cause; would it not?

MR. NELITZ: I think there are -- this question relates to some of the work that I think Project 10 and as well Project 6, the cumulative impact analysis and looking at changes in dynamics of other species and how that might be informative to providing insights, I feel that it's more appropriate for experts in those -- who's done the analysis in those projects to comment on that specific point than myself.

Q All right. I won't ask you any questions about it. There's a further paper, a further paper -- I should have done this earlier, at page 17 you refer also to a paper by Shortreed in 2000 and I'd like Mr. Lunn to bring up a paper that I circulated over the weekend and perhaps you could turn to the second page of that, Mr. Lunn. Is that the Shortreed 2000 paper that you refer to on page 17?

MR. NELITZ: One minute, please? Yes, it is.

Q And I'm just going to ask you to refer to one passage on page 507 and then I'll sit down. The last four lines of the first main -- first full paragraph on that page starting with:

> Conversely, the cost in lost production from not enhancing a stock could be assessed.

And he says:

> Furthermore, when escapements exceed that required to maximize smolt production, the economic cost of the foregone catch can also be determined. In short, a reliable rearing capacity model would be a powerful tool for fisheries managers concerned with maximizing and sustaining B.C. sockeye salmon.

Would you agree with that last sentence, that a reliable rearing capacity model would be a powerful tool for fisheries managers? Or is that something...?

MR. NELITZ: Yes, I think it's a powerful tool from the point of managing the fishery.

MR. HARVEY: Yes. All right. I have no further questions, thank you.
THE REGISTRAR: Do you want that last document, Mr. Harvey?
MR. HARVEY: Oh, yes please. Yes, could that last document be marked, please?
THE REGISTRAR: 576.

EXHIBIT 576: Shortreed et al - Using Photosynthetic Rates to Estimate the Juvenile Sockeye Salmon Rearing Capacity of B.C. Lakes - 2000

THE COMMISSIONER: I just wanted to ask Mr. Nelitz what he understands to be the reference to a reliable rearing capacity model. What is that?
MR. NELITZ: In the context of some of these papers, there -- in this paper specifically they're talking about this photosynthetic rate model in terms of estimating capacity of lakes to produce smolts and the spawners required to produce those smolts. That's my understanding of -- in terms of reliable, I haven't done the -- I think the previous paper does a comparison of alternative models. This paper is talking about the photosynthetic rate DFO -- this is the leading model, my understanding the leading model the DFO is using in terms of their management, so the most -- I'm relying on the assessment that they've done in terms of which is the most reliable, most accurate. But certainly the photosynthetic rate model is the one that's the leading candidate, my understanding at this stage.
THE COMMISSIONER: Thank you.
MR. HARVEY: Mr. Commissioner, could I just give a definition to that? See whether this is correct.
Q The -- it's often referred to as PR, isn't it, photosynthetic rate?
MR. NELITZ: Yes.
Q And is that -- is that the process by which carbohydrates are synthesized from carbon dioxide and water using light as the energy source?
MR. NELITZ: I'm -- I don't want to be misrepresenting that model. I'm not that familiar with it.
MR. HARVEY: All right.
MS. GAERTNER: Mr. Commissioner, before Mr. Harvey sits down, I just want to raise this concern around the

timing of documents and disclosure of them. Mr. Harvey let us know he was going to use those articles over the weekend, which does not give us time as participants to look at those documents, imagine what he might use them for, and imagine what else might be useful for the commissioner to hear that in context, and so I just want to put that on record. I know we're going to talk about this more. I'm hoping we'll talk about it amongst counsel, but this is increasing as we go along and I just want to note that we don't get opportunities to put that kind of context to you as a result of that.

MS. BAKER: Mr. Commissioner, the next counsel will be Leah Pence for the First Nations Coalition.

MS. PENCE: Pence, first initial L., for the First Nations Coalition. With me is Ms. Gaertner. Just as a context, as Ms. Gaertner may have mentioned to you offline, the First Nations Coalition is a group of First Nations who participate in this inquiry, including Council of Haida Nation, some of the Douglas Treaty Nations and then a number of different First Nations organizations all the way to the Upper Fraser, as well as the provincial organization, the First Nations Fisheries Council. And our clients are really most interested in participating in this inquiry for the forward-looking recommendations that will come out of it on the sustainability of the Fraser River sockeye salmon.

Mr. Commissioner, my estimate today is an hour, so I anticipate that I'll start my questions and need to continue after lunch. I have five areas of questioning.

CROSS-EXAMINATION BY MS. PENCE:

Q I'd like to ask you some questions about the role of values within management objectives and within science. I'd like to ask you questions about methodologies for assessing CUs and those will be for CU status and those will be directed to Ms. Wieckowski; the distribution metric as one of the assessment tools for CUs; some questions about the context of this project and the work of Peterman et al and the context of looking at this within the aggregate. And then I'll close with looking

at some of the gaps in the information that you were having to deal with and some of the dialogue that you had with the peer reviewers and next steps.

Ms. Wieckowski and Mr. Nelitz, on Thursday in your testimony you took care when answering questions to separate out what can be called the scientific perspective for management values, and I think it was Ms. Wieckowski, you noted in response to a question from Mr. Timberg about the determination of benchmarks that ultimately where you set a benchmark is a value-based decision based upon your perception and what your risk tolerance is.

And I wonder if Mr. Lunn could pull up Exhibit 8 which is the Wild Salmon Policy. And to go to page 17 because what I'm struck with is just how similar what you said on Thursday is to what the text of the Wild Salmon Policy says and it's the second paragraph on page 17. And reading from about halfway through, it says:

> There is no single rule to use for determination of the lower benchmark. Rather, it will be determined on a case-by-case basis, and depend on available information, and the risk tolerance applied. The determination of the risk tolerance to apply is a value judgement that requires consultation with First Nations and others affected by this choice.

My question is would you agree that one of the central value judgments that will have to be made in the context of the Wild Salmon Policy is where to put the benchmarks and so I mean where to put the -- where to separate the amber from the red and amber from the green?

MS. WIECKOWSKI: Within the context of Strategy 1, I would say yes.

Q Okay. Thank you. And from both of your perspectives, as persons who are qualified and as experts on policy implementation and management frameworks and strategic and structured decision-making, can you note for us some of the other examples of these value-based decisions within the Wild Salmon Policy, so moving beyond just Strategy

1 1? Where do you see those value judgments that
2 are embedded in the Wild Salmon Policy?
3 MS. WIECKOWSKI: I think more generally speaking, the
4 objectives and goals of the Wild Salmon Policy in
5 and of itself are value judgments in terms of what
6 society values, what DFO as a -- as the managing
7 group for salmon, what they see as the priorities
8 are with regards to salmon management, more
9 specifically within each of the strategies and
10 that translates down to each of the strategies
11 those high-level value judgments of the objectives
12 and goals of the policy in terms of what sort of
13 indicators one even puts forward because those
14 indicators ultimately need to inform whether or
15 not objectives are being met. And translating
16 down from those indicators, the metrics and the
17 benchmarks that you're going to be using to
18 evaluate those indicators.
19 Q So if I've heard you right, the metrics for
20 monitoring CUs contain value judgments; is that
21 right?
22 MS. WIECKOWSKI: They receive direction from -- they're
23 trying to meet -- they're not value judgments in
24 and of themselves. The value judgment is put with
25 the objective or the goal of the policy and
26 there's then the best means to be able to inform
27 that objective or that goal, whether or not one's
28 achieving that goal. And so choosing a specific
29 metric isn't necessarily the value judgment. It's
30 received direction from something that was a value
31 judgment.
32 Q Okay. So choosing the metrics kind of -- the
33 value judgments that are stated in the objectives
34 of the Wild Salmon Policy will trickle down when
35 you're setting metrics or when you're looking at
36 habitat indicators; am I understanding you right?
37 MS. WIECKOWSKI: Correct.
38 Q Thank you.
39 MR. NELITZ: If I can add to what Ms. Wieckowski said,
40 so I think there are value judgments related to
41 assessing habitat status under Strategy 2. The
42 ecosystem components that are being considered as
43 part of Strategy 3, it's a value judgment about
44 what ecosystem is valued. Say, for example,
45 there's riparian vegetation in communities which
46 also derive benefits from some of the nutrients
47 from salmon, so are those things that are --

there's a choice in terms of what components of the ecosystem are you going to value and incorporate in the decision-making. As well, I think, it's the value judgment in terms of Strategy 4 and integration, so if you're trying to integrate agencies, data collection, decision-making, things like that, around fisheries harvest, that's a value judgment to do that.

But if there's also a choice, a value judgment, to integrate decisions around land and water use, that's also another value judgment. And which components of land and water use do you want to be integrating decision-making around and integrating the science? So I'd say that there -- that those are some additional points, I think, within the Wild Salmon Policy where there are value judgments embedded within it.

Q Thank you. I want to move now to some questions about how values are often directly or indirectly presented in any given scientific work. And I take from your evidence last week that both of you feel strongly about the importance of science as a tool for decision-makers as distinct from science being a decision-maker.

And is it correct that your views are that science, including the science conducted by DFO would only get stronger and more objective when its role within structured decision-making processes is both clear and transparent?

MR. NELITZ: Yes, I would agree with that.

Q And would you also agree that when embarking on a scientific undertaking, be it this report or testing another hypothesis, the answer or conclusion that you reach will be largely dependent on what question is asked and how that question is framed?

MR. NELITZ: Yes, I agree.

Q Given this, can you speak to the benefit of having all those who are necessarily part of a decision-making process be involved in setting the questions or the terms of reference or the science agenda and of asking the questions be involved in asking the questions of scientists? Put it for either of you.

MR. NELITZ: Well, ultimately the importance of including the different parties is if they're having an influence, direct influence on the

resource, whether that be direct or an indirect effect, so if there are, say, certain government -- provincial government agencies that affect -- that make decisions around land use and those land uses affect sockeye and other -- and fish habitats, then -- and we're trying to protect those fish populations, then it's important to try to include that, because that's one of the mechanisms by which the population is being affected, so you need to include that audience in the framing of the question to ensure that -- well, I shouldn't say just in framing the question, but also in the whole process for managing and collecting the science and managing the resource, so that -- so, for example, if the data don't exist, the data aren't being collected to help us clearly establish whether there's a link between land uses and sockeye production, then that gap, because say they weren't included in the process of asking the right questions or the questions that are of the most interest, then that's a gap and that's -- and so it leads to challenges on -- in the science that we're unable to definitively test for some of these cause/effect relationships.

Q Thanks.

MR. NELITZ: So that's one example.

Q That leads well into my next question, which is I'm assuming you'd agree with me that really the data that's available then is largely responsive to what collection has been the emphasis of concern historically and then what data is being funded -- what -- the collection of data being funded today. Do you agree with that?

MR. NELITZ: I would agree with that, though I would also add that in terms of reaching our conclusions, like I think there are some weaknesses in the data, though the evidence that we evaluate didn't come into our conclusion, still that it's unlikely that freshwater influences are a contributor.

Q And I'm also curious to hear some of your thoughts on uncertainty. Would you agree that the existence of uncertainties does not necessarily preclude action or decision by management agencies?

MS. WIECKOWSKI: I'd agree with that.

Q Would you agree that rather it's the uncertainties that inform the risk tolerance considerations and that it's the uncertainties that must be explained by the scientists or others to the decision-makers, including the implications of not taking action in light of uncertainties?
MS. WIECKOWSKI: I'd agree that uncertainties inform people's risk tolerances in terms of what is a key uncertainty to one person, they might not be willing to take certain actions given that uncertainty, whereas someone else may be, so it does inform risk tolerance.
Q Thank you. I'm going to move more specifically now to the report, Exhibit 562.
MS. PENCE: And Mr. Lunn, if you could please pull up page 130.
Q Ms. Wieckowski, one of the things that you were tasked with doing and which is outlined in the statement of work was to critically evaluate these alternate methodologies for determining CU status. Perhaps we don't need to look at it specifically, but it is there in 3.2. And so we've heard how you looked at the Faber-Langendoen methodology and the Pestal and Cass and the Holt et al.
MS. PENCE: And actually, sorry, Mr. Lunn, if you could go to page 95, I think that'll be more helpful.
Q So I'd like to take you to Table 2 and speak with you in a little more detail about some of the differences and the methodologies, those three methodologies. If you could scroll down -- yeah, so the data needs and availability section is what I'm going to be looking at.
Would you agree that in terms of the data considered, the Pestal and Cass methodology is the only methodology that explicitly mentions the use of traditional ecological knowledge or TEK?
MS. WIECKOWSKI: I would agree with that.
Q And would you agree with me that the Wild Salmon Policy explicitly notes as a principle, and it's Principle Number 3, that resource management decisions will reflect the best science, including aboriginal traditional knowledge? I can take you to the part of the Wild Salmon Policy if you want to verify that. It's page 9 of Exhibit 8. But really, what I'm wanting to get to is a question to you and that -- given that one of your tasks was to critically evaluate these different

methodologies for determining CU status, can you offer your perspective on the failure of the other methodologies - and that's the Holt et al and the Faber-Langendoen ones - to include this consideration of traditional ecological knowledge?

MS. WIECKOWSKI: I think it's premature of me to at this point say whether or not it's a failure of the Holt method in the sense that it's not actually -- it -- the Holt method nor the Grant method are actually -- they have not actually been put forward as the ultimate methods by which DFO will be using to assess status. So I can't comment on that at this time.

Q Okay. So speaking hypothetically if either the Holt et al method or the Grant method was ultimately put forward as the final method for determining CU status, would you then view it as a failure if they didn't explicitly include consideration of TEK in the data collection stage?

MS. WIECKOWSKI: If the Holt method and the Grant method in and of themselves with no other inputs were the way that status was assessed, it would not be in accordance with Principle 3 of the Wild Salmon Policy.

Q Thank you. And do you have any suggestions for this commission on how any methodologies chosen for determining and assessing CU status - and this is for both of you - could incorporate TEK in its data?

MS. WIECKOWSKI: Sorry? Can you repeat the first part of that question?

Q Do you have any suggestions on how whatever methodology is ultimately chosen for assessing CU status could best incorporate TEK?

MS. WIECKOWSKI: Off the top of my -- off the top of my head, I can't really speak to this because I think it's an incredibly difficult thing to do because you're combining different perspectives and different world views and it's not something to be taken lightly and to just throw out a couple of suggestions. I think there's a lot of good work out there that speaks to what you're trying to get an answer to.

Q Thank you. I heard that.

I'll move now to complexity and feasibility of the various methods that you looked at, and I think that's at the previous page, at page 94 of

that same table. So what I took away from what you said on Thursday, Ms. Wieckowski, and from the section of Table 2 is that the Holt et al approach is by far the most data-intensive and statistically intensive method of the three methods that you evaluated; is that correct?

MS. WIECKOWSKI: Yes.

Q And at this point in time before the Grant et al paper is finalized and peer reviewed, this would appear that the Holt et al method is the direction the DFO may be heading; is that correct?

MS. WIECKOWSKI: Not being aware of any other methods out on the table, I would say yes.

Q Thank you. I want to put an observation to you and have you comment on it. It's our client's observation that with potentially contentious issues such as moving from monitoring salmon in red timing groups to monitoring them and thinking about them in terms of CUs, DFO has a tendency to gravitate to the approach that is scientifically precise and quantitative as possible; is that a fair observation? Do you agree with that?

MS. WIECKOWSKI: I don't feel I can actually comment on that.

Q Okay. Perhaps you could comment on this one then. Is it your opinion that DFO is heading down the precautionary path and heading to a fulsome implementation of the WSP in a manner that reflects the words of that policy with the methodology that's proposed in the Holt et al paper?

MS. WIECKOWSKI: Not being knowledgeable of other aspects of Strategy 1, I can't -- I don't feel I can give a fair assessment of whether or not they are. I would say that definitely within Holt's method there -- it speaks to multiple parts of Strategy 1 within the Wild Salmon Policy.

Q Okay. So maybe I'll go just a little broader then. Would your analysis in the report, in Report Number 3, support the conclusion that less quantitative methods for assessing CUs yield results that could be just as helpful to resource managers as the more quantitative and data-intensive methods?

MS. WIECKOWSKI: I think if done -- qualitative methods or less quantitative methods, if done in a way that is robust and defensible and transparent, I

think those are -- and have the potential to be useful to answering management questions in the absence of more rigorous quantitative analyses.

Q Thank you.

MR. NELITZ: I would add to that though we do say in our report that there's -- we certainly believe there's value in doing a more structured comparison of results from different methods and seeing how consistent they are and so if you have something that's very rigorous compared to something that's less rigorous, but they're giving you similar results, then maybe just in terms of feasibility and implementability, you might want to go -- given the constraints you have, you might want to go with a less rigorous method, so but certainly we recommend and mention that in the report about having that structured comparison being done.

Q Thank you.

MS. WIECKOWSKI: And I think even within Holt's method, there are various points in which she specifically speaks to this point about in the absence of being able to define quantitative benchmarks or using more scientifically robust methods, more qualitative methods are a good substitute in the interim.

Q Thanks. I'd like to move to a discussion with you about a statement at the bottom of page 9 of your report. It's been brought to your attention earlier. And it's in regards to the distribution metrics. And I think it was in a conversation that you were having with Mr. Timberg on Thursday that you said that one of the shortcomings, so not necessarily oversights, but shortcomings, of the Grant et al method for assessing the status of CUs was its failure to include distribution as a class of indicators. Did I understand that correctly?

MS. WIECKOWSKI: Correct.

Q And so I wonder if you could explain for me and for this commission just what distribution as a class of indicators really looks at.

MS. WIECKOWSKI: Well, referring back to the metrics that Holt et al put forward, it looked at the distribution of sockeye across different types of spawning habitat. It spoke to -- I think there are four classes of -- or four metrics that they were using. It -- one option was to look at the

distribution of the population from a numbers perspective, so whether the population was more -- or if there was four spawning habitats but 90 percent of the population used one of those spawning habitats, so looking at that spatial distribution. There were also -- there's also metrics that could be used looking at the historical distribution of spawning, for example, or rearing and how that relates or how that compares to current distributions.

Q And I think I heard you also today talk about how distribution metrics can be used as surrogate measures for diversity; is that right?

MS. WIECKOWSKI: Yeah. There's -- it sort of tries to speak to genetic diversity or life history diversity and...

Q And would you agree that distribution metrics are also important for making observations about phenological changes, so changes -- like distribution and temporal trends, changes that are happening that way?

MS. WIECKOWSKI: Could you define --

Q Well, my understanding of a phenological change is the salmon are reacting -- like changing the time in which they migrate, that sort of thing. And would the distribution metric help in explaining that, as well, or look at that at all?

MR. NELITZ: I'd say we talk about this at the beginning of the report, so insofar as some of the -- a recent study from Bristol Bay and looking at the diversity of sockeye there, they certainly found that there was -- that the freshwater and watershed variation and variability contributed to the overall diversity and resilience of the aggregate complex. So that -- so I would agree insofar as looking at that evidence.

Q Okay. And would you agree that distribution metrics are also relevant to the type of assessments that COSEWIC does?

MS. WIECKOWSKI: Yes.

Q And would you agree that distribution metrics also provide a link to First Nations rights and that many First Nations communities, they're dispersed throughout the watershed and particular communities rely on particular CUs so, you know, the Carrier people in the Upper Fraser may rely more on the Takla/Trembleur and the Nadina that

spawn in their territory, so looking at distribution can also then have a link to the exercise of First Nations rights?

MS. WIECKOWSKI: Yes.

Q Thank you. Would you also agree that the gathering of local ecological knowledge and traditional ecological knowledge regarding the distribution of CUs, both historically and in the present day, is a task that's do-able and consistent with the Wild Salmon Policy and international standards?

MS. WIECKOWSKI: Can you maybe condense your question down into something more...

Q I'll try to break it down a bit. I guess I'm seeking your agreement on whether local ecological knowledge and TEK, the gathering of this is something that's required under the WSP and is required under international standards and it would help move forward our database of knowledge about distribution metrics?

MS. WIECKOWSKI: I'm hesitant to use the word "required" because I don't know whether there's implications associated with that word, but definitely --

Q Would it be helpful?

MS. WIECKOWSKI: It sort of falls into the Principle 3 that we were -- have been referencing within --

Q Okay.

MS. WIECKOWSKI: -- the Wild Salmon Policy.

MS. PENCE: Thanks. And I'm noting the time and it is 12:30. I'm about halfway through my questions --

THE COMMISSIONER: Okay.

MS. PENCE: So if we could break now and continue.

THE COMMISSIONER: Thank you.

MS. PENCE: Thank you.

THE REGISTRAR: Hearing will now adjourn until two o'clock.

(PROCEEDINGS ADJOURNED FOR NOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: The hearing is now resumed.

MS. PENCE: So for the record, again, it's Leah Pence for the First Nations Coalition.

CROSS-EXAMINATION BY MS. PENCE, continuing:

Q Before we left for the break, we were talking about the distribution metric so I'm just going to pick up that conversation with you again, Ms. Wieckowski. Would you agree that CUs could now or could become more resilient to a variety of factors that could cause decline, including climate change if they were broadly distributed?

MS. WIECKOWSKI: I think just to clarify, the distribution metric looks at distribution of the sockeye within a CU so it's not necessarily distribution across CUs because all CUs, by definition, have sockeye in them. This is for the sockeye CUs.

Q Mm-hmm. So with that clarification and looking at distribution within CUs, as well, would you agree that the species, the CUs, and the fish within the CUs can become more resilient to a variety of factors that could cause decline if they're more broadly distributed both within and amongst CUs?

MS. WIECKOWSKI: I would agree that the underlying theory or support behind diversity speaks to that, that the greater the diversity, the greater the ability for a species to withstand climatic events or shifts in various factors. Whether or not that -- what the implications that has for sockeye species specifically, I don't know.

Q Okay.

MR. NELITZ: And I would add to that in terms of some evidence.

Q Mm-hmm?

MR. NELITZ: Again, we talk about it in our report a little bit, but certainly from some of the analysis of the Bristol Bay complex, there are some suggestions that that's the case, that the more diverse sockeye as an aggregate, the more resilient the ecosystem can be, as well as human communities, as well.

Q Thank you. And so then given that, would you agree that it's specifically because distribution, as a class of indicators, that it considers the various factors we were talking about before the lunch, that being spatial distribution, diversity, connection with First Nations, access to the resource and importance for COSEWIC, that then the distribution metric is then a significant or

important metric for analyzing the status of salmon, specifically, sockeye salmon?
MS. WIECKOWSKI: I think it depends what it is that your objective is you're trying to manage for. If one of the -- if within your mandate you are trying to manage for diversity, then distribution would be an important component of that.
Q And if you're trying to manage for biodiversity then it would be?
MS. WIECKOWSKI: Yeah.
Q Thank you. I want to move now to discussing some of the bigger questions about the context of the project, and most of these questions, I think, will be for you, I think, Mr. Nelitz. And I note that at several points in your report, and this is, in particular, at pages 3 and 4, you note that the findings in your report need to be considered or read in conjunction with the findings of the Peterman et al report. And you also say that it needs to be read in conjunction with the Selbie Appendix C, and we've looked at that a bit today.
MS. PENCE: But I wonder, Mr. Lunn, if you could please pull up Exhibit 73.
Q So Mr. Nelitz, when you're saying that we need to read technical report number 3 in conjunction with Peterman et al, are you referring to this Exhibit 73 Peterman?
MR. NELITZ: Yeah. Yes, I am.
Q Okay. Thank you. And I believe, in your report, you drew attention to three findings in Exhibit 73 that are relevant, and the first being the finding in section 3.1.2 of this report that suggests that the recent declines are likely due to mortality in the post-juvenile stage, or that a non-lethal stressor in the freshwater environment is causing mortality at a later life stage. Is that one of the key points in this report you highlighted?
MR. NELITZ: Yes.
Q And the second one that I noted was you note that the direction of recent trends and magnitudes of decline in productivity varies across stocks. And we've spoken about this in some detail now. Varies across stocks and based on this, it's unlikely that a single mechanism could explain declines in productivity across stocks. Is that right that that's the other -- the second piece that you noted from the Peterman and from the

Selbie work?
MR. NELITZ: Yes, that's correct.
Q And the third one that you noted that we need to keep in mind when reading your report is that changes in the physical and biological conditions of the Strait of Georgia have led to an increase in mortality during marine life stages. Is that the third one that you highlighted for us?
MR. NELITZ: At the time, that's what Peterman et al report was indicating as a likely contributor.
Q Okay. Thank you. And I just want to engage in a little, or have you engage in a little bit of a dialogue with this first finding. How does your report address or inform or respond to this first finding that there is a non-lethal stressor in the freshwater, that although it isn't killing fish when they're juveniles, is leading to their mortality later? Does your report get into what that non-lethal stressor is or what does your report say in response to that?
MR. NELITZ: I'd say we're largely absent on that topic. I think some of the mechanisms that were hypothesized believed diseased parasites was one of those. This idea of density dependence, as well, and how that might affect productivity, delay density dependence, I should say, was another issue. It looked at it in more detail in Peterman et al and I believe some of the other studies that are going to be submitted as part of the evidentiary hearings will be addressing some of those.
Q Thanks. And how does your report support, or inform, or address the second finding regarding the variation across stocks and the fact that it's unlikely that a single stressor or mechanism will be able to explain the declines in productivity across all stocks?
MR. NELITZ: So to the extent possible, we looked at the combination of factors in the freshwater environment to look at how there might be multiple factors interacting in the freshwater environment. So looking at the cumulative level of stress on a conservation unit, as well as looking at -- and it's just still the models, looking at the interaction among different stressors and so in that extent, we did look at these interactions, but beyond that, in terms of looking at factors at

other life stages in the marine environment, say, for example, we did not look at that, in part, because other studies were going to be looking at those cross issue or those cross life stage issues.

Q Thank you. And I just want to pick up on some discussions that we've had already today a little bit with Mr. Rosenbloom, and also on a discussion you're having with Ms. Baker from Thursday, is that when you were talking with Ms. Baker about the scope of the work that you were doing, you said that essentially, you were taking Figure 1, which is that graph that we've seen a number of times now, with the decline from the 1950s to now, and you were trying to see if there was a relationship between the stressors and habitat on the declines of the productivity. Or I think you said you were trying to explain the X variable on that graph. Did I understand you?

MR. NELITZ: Explain the Y.

Q Sorry.

MR. NELITZ: We were using the different X variables to explain the Y.

Q Explain the Y, thank you. So my question is given the scientific commitment to biodiversity, how is looking at and trying to explain the decline in production of Fraser River sockeye salmon on the aggregate still useful?

MR. NELITZ: So can you rephrase that a little more clearly for me?

Q Given the scientific commitment to biodiversity, how is looking at and trying to explain the decline in the production of Fraser River sockeye salmon on the aggregate still useful and important here?

MR. NELITZ: Well, I'd say that the commitment to biodiversity is a value choice and not necessarily a scientific one. There's certainly alignments between conservation of the stock, protection of the stock, resilience of the stock. There's some science there that suggests it's important, but I think it's important -- if we look at some of the points we were trying to illustrate in our discussions on Thursday that in terms of how we interpreted status, if we only looked at a few -- the status of only a few CUs, only considered the ones that are close to extinction, the small

stocks close to extinction, that doesn't help us to explain that pattern that you were talking about in Figure 1.

So it certainly -- that pattern is explained by more than just a small subset of the CUs so I certainly think that there needs to be consideration. In terms of understanding the science and what's going on, there certainly needs to be a consideration of a broader number of CUs. But we need to look at as many -- cross as many CUs as possible in terms of understanding that decline.

Q Okay. Thank you. So we need to look at the strengths and weaknesses of as many CUs as possible?

MR. NELITZ: Where we have consistent data across those CUs as possible because that's also important. To do this kind of analysis, there needs to be a consistency and understanding across the CUs.

Q And I take it from your earlier statement that it's also important to look at the vulnerabilities and uncertainties at specific life stages of the CUs, as well?

MR. NELITZ: Yes. That's what we did in our work to the best we could.

Q Okay. So Thursday, when you said that it's plausible that changes in the freshwater environment can have effects on production of Fraser sockeye and that the strength of those effects can be large in some cases, I just want to make sure that I'm understanding what you were meaning. Were you meaning that it's plausible that some of the stressors you were looking at, for example, forestry, or urbanization, or water use, could have very specific effects on specific CUs?

MR. NELITZ: I think that's part of what I was meaning. Also saying that we know there are mechanisms of effect of the stressors on the habitats --

Q Mm-hmm?

MR. NELITZ: -- and that those can lead to increases on mortality at different life stages. In terms of the analysis we did, given the plausibility and the documented links there, given our analysis, we were not able to detect an effect of those kinds of impacts at the population level, which is referring back to the Figure 1.

Q Thank you. And I just want to make it just a slight bit more real, just for me, probably. If we could go to Table 12, please, of the report, Exhibit 562, and it's at page 103. And I'm going to look at the Shuswap complex. And so looking at Table 12, the stressors of urbanization and water allocation, and placer mines, am I reading it right to think that those three stressors could be quite substantial for the Shuswap complex and it's plausible that these stressors are having an effect on the production level of this particular CU? Am I reading that graph right?

MR. NELITZ: So this summary table is aggregating and summarizing a lot of the analyses throughout the whole report and so we try to provide a simple way of summarizing it, summarizing the level of individual stress within a stressor and across stressors. So the double positive signs indicate the highest relative level of stress --

Q Mm-hmm?

MR. NELITZ: -- across all CUs. So in the Shuswap, there, for urban area, water allocation and placer mines, suggesting that of all CUs, the Shuswap was at the higher end of stress on intensity of stress for those stressors.

Q On a relative level?

MR. NELITZ: On a relative level, yes.

Q Okay.

MR. NELITZ: So that's kind of what we quantified through our work. Looking at the aggregate across all stressors, that that Shuswap complex has the highest cumulative stressor rating. In terms of our analysis, that cumulative level of stress, when we used that as a variable in our analysis, it didn't come out as a predictor of the decline. So for example, the Shuswap, we have not seen declines in productivity in the Shuswap.

Q Okay. Thank you.

MR. NELITZ: So given the evidence that we looked at, it's not possible for that to be, a cumulative level of stress to be explained in the pattern of decline given that we haven't seen the declines there on the Shuswap.

Q Okay. I want to go just to highlighting some of the gaps in the information that you were having to work with and recognize some of the challenges inherent in this work, then. And I wanted to see

if you'd agree that the following areas were all substantial data gaps or limitations. Lack of information on juvenile production. I believe you said that your conclusions were based on only a handful of juvenile production data?

MR. NELITZ: Yes.

Q Okay. So that's a key gap. Another one would be lack of information on many weak or less-abundant stocks?

MR. NELITZ: Yes.

Q Another would be lack of time series data for almost all of the human stressors?

MR. NELITZ: Yes.

Q And lack of data on intensity and disturbance; is that right?

MR. NELITZ: Of some of the stressors, yes.

Q Of some of the stressors. Lack of habitat data across all CUs?

MR. NELITZ: In a consistent way across CUs, yes.

Q Lack of data on the effect of the stressors across the lifecycle?

MR. NELITZ: Sorry, lack of effect of the effects of a stressor?

Q Across the lifecycle.

MR. NELITZ: So -- by across the -- I would say that we have a poor understanding of how stressors can cascade from one life stage and lead to population level changes.

Q Okay. And then there's a lack of information on some of the licensing under provincial control, such as water licences and the amount of water used over certain periods of time.

MR. NELITZ: Water licensing is one of the examples that --

Q Okay.

MR. NELITZ: Okay.

Q And are there other key data gaps that we should be aware of that I haven't highlighted?

MR. NELITZ: No, I think that you've captured most of the ones we talk about in the report.

Q Okay. And my last --

MR. NELITZ: Oh, sorry, there was a -- yeah, one other thing I remembered, one gap, but given that there's still a little uncertainty around smolt out-migration, having an understanding of the timing of smolt out-migration, which I do believe we talk about in the report, but that's also an

important gap.
Q Okay. Thank you. The last area of questions I have is a bit of getting into some of the dialogue you had with the peer reviewers.
MS. PENCE: And Mr. Lunn, if you could pull up page 150 of the report, please.
Q I believe the reviewer here was Eric Taylor, and one of the things he notes -- yeah, and he notes that he's struck by the lack of comparison to other systems, such as the Skeena, or the Barclay, and your responses emphasizes that this wasn't really within the scope of the project. But I wonder if you now have anything to add to this discussion with Mr. Taylor regarding the outstanding work on comparisons with other systems. You've noted, perhaps, comparisons with Bristol Bay, and that's in another report, and the outstanding works, also, on cumulative impacts. What can you tell us now about how your report might interact with those two pieces?
MR. NELITZ: Certainly, I know -- so I can comment on what I know generally about some of the other studies as part of the evidentiary hearings. So I am aware that I think it's Project 10, the Fraser Sockeye Production Dynamics, I know that there was -- and I think we talk about it, actually, in that reference, there, in our appendix, where they were looking at changes in production across stocks outside of the Fraser, as well. So certainly, I think that's a very informative piece of work, and the findings from that will be very important to hear about. And Project 6 is looking at the cumulative issues across all life stages to the extent possible. So given we were constrained -- we were constrained to the freshwater, we couldn't look at integrate all of the other studies, diseases and parasites, contaminants, things like that.
Q So we'll just look to those reports for those pieces.
MR. NELITZ: That would be my suggestion.
Q And at 1:34 of the report, these are some comments from John Reynolds, and the Province drew our attention to a little bit of what he said, and I believe it's about halfway down, it says:

I agree, the Province drew our attention to

that that Dr. Reynolds agrees with you that the changes in freshwater habitats are unlikely to be the main cause of decline in productivity.

So that's kind of the looking back piece, looking back and trying to explain the declines. But our focus in this inquiry is now looking forward to the future sustainability and biodiversity of Fraser River sockeye salmon, and I take it that you'll agree with me that the protection of freshwater habitat remains -- or habitats, plural, remains important to the conservation of Fraser River sockeye salmon because they contribute to their overall diversity and resilience.

MR. NELITZ: Yes.

Q And I'm actually quoting that right from your report, and that's probably -- that's Roman numeral V1 so you are explicit about that, aren't you?

MR. NELITZ: Yes.

Q Thank you.

MS. PENCE: Mr. Commissioner, given some of the data gaps that the witness has acknowledged that he was working with in making this report and the relatively brief analysis of some of the stressors in this report, for example, agriculture or urbanization only have two pages each, we don't feel that it will be helpful to examine these witnesses on the substance of those particular effects and stressors at this time and we'll await upcoming hearing days in the inquiry to get into the detail of that analysis. So those are my questions for these witnesses. Thank you.

MS. BAKER: Thank you, Mr. Commissioner, the next questionnaire will be Mr. Phil Eidsvik. Mr. Eidsvik has estimated 20 minutes, and I wonder if we might take the break a little bit early, then, when he finishes, perhaps at 10 to 3:00, and then go to 3:00, and that should give us enough time to finish in the afternoon.

MR. EIDSVIK: I apologize, Mr. Commissioner. I got caught a bit unaware as I expected her to take more time, and I was in the process of thinking up something brilliant. It's Philip Eidsvik for the Area E and Fisheries Coalition.

CROSS-EXAMINATION BY MR. EIDSVIK:

Q Now, in the general findings of the report, I think we can kind of push -- so far as the stressors that you considered, we can push that off as a factor as being responsible for the decline of Fraser sockeye, fair enough, as a general summary?

MR. NELITZ: As we say, it's unlikely that those are contributors.

Q Okay. I'll go with that, "unlikely" sounds good. So for the purpose of the Commission's investigation into the reasons for the decline of Fraser River sockeye, we can kind of stop there with your report, that part's done? I mean, you may not have identified the reasoning why they've collapsed, but we can tick off, mark this thing and that part's done, look somewhere else; fair to say?

MR. NELITZ: In scientific investigations, there isn't a proving of no effect. That its an assessment of data to say something about the relative likelihood. So given new evidence, something that we didn't consider, an assumption that was wrong on what we made might alter those. It seems, as we've said in our report, it's unlikely given the evidence that we considered that it is a contributor. The way that I would think about it in terms of practicality of what do you do with that information, I would put it at -- out of the priorities of things to be considering, I would have put it low down on the list of things to be considering.

Q Okay. That helps. That's my check mark. It's the low priority. So then you went to the next step of examining (indiscernible) CUs. Now, does the classification of Fraser sockeye into red, green or yellow according to the CUs help explain the decline of Fraser sockeye?

MR. NELITZ: Do you want to take that?

MS. WIECKOWSKI: I think the usefulness of the CU status assessment, it's a way of -- the CU status, in terms of whether or not a CU comes out as red, yellow, green is a function of the freshwater, it's a function of the marine, it's a function of all the stressors that -- and vulnerabilities of the stock and so it's a way of summarizing all the

information that the Commission as a whole is looking into. Whether or not it helps explain the decline, it's not a cause and effect relationship, it's a means to inform management about the relative status of the CUs.

Q Maybe I'm asking my question really badly, which wouldn't surprise me. I'm just trying to think, if you were to -- wanted to say, "Well, what happened to Fraser River sockeye in the past 20 years," and you went and looked at red, green, yellow, could you find the answer there?

MS. WIECKOWSKI: No insofar that it's -- the CU status is looking at status and trends. It's not looking at the mechanism underlying what is driving those status and trends.

Q Yeah.

MS. WIECKOWSKI: That's what all the individual other research projects are trying to address.

Q Okay. That helps a lot.

MR. NELITZ: If I could also clarify for the record. I don't believe we are making the statements of the red, amber, green in our report. Certainly, that's an interpretation of the Wild Salmon Policy of status. So just to make sure that's clear.

Q But in your report, there is documents relative to red, green, yellow?

MR. NELITZ: Yes.

MS. WIECKOWSKI: Yes.

Q Okay. You looked at the methodology that the others used to establish red, green, yellow? Okay. Now, how much is the drop in productivity from 92 to 209 a factor in placing an individual stock red, green or yellow, can you tell me that?

MS. WIECKOWSKI: I think that comes down to the different types of methodologies and what it is that you want your CU status to be representative of. So this was a discussion that we had on Thursday with regards to if you're interested in status from a risk of extirpation, for example, the indicators that you use will be different than if you're interested in status from purely another -- with another goal in mind. And so it's not --

MR. NELITZ: Well, if I can add to that, I think the --

Q Sure, go ahead.

MR. NELITZ: -- more specifically speaking to the methods, productivity measures were included in the Holt -- and you can elaborate on this, the

Holt and Grant, I believe. Anyway, you --

MS. WIECKOWSKI: There are productivity measures within each of the methods and so it's one of multiple factors that are used in terms of rolling up into an overall score, but the relative weight that you would put on productivity differs, depending on what you value and what you -- you know, the relative weight you would put on productivity, versus, for example, distribution versus habitat condition. That is a value judgment and so the degree to which your status assessment will reflect productivity alone is dependent on what it is you are trying to manage for, or what it is your objective is in terms of assessing status.

Q So let me see if I understand this correctly. If I'm being a bit confusing, it's my own fault because this is complex science so it takes me a while to get my head around it. So included in the red, green or yellow are a bunch of factors such as productivity. Some scientists may weigh it more than others. Maybe habitat, some scientists may weigh those factors more than others?

MS. WIECKOWSKI: To clarify, I don't think it's the scientists that would weigh one more highly than another, that's more of a management decision in terms of what -- when you say "status," how you define status is a management decision and it's a valued decision.

Q But sorry, I -- and maybe I'm mistaken, but in the various papers I've seen talking about the status of the individual CUs, everybody's talking red, green and yellow. And aren't those scientists doing that and that advice is provided to the fisheries managers, or have I got that wrong?

MS. WIECKOWSKI: They are, but they've taken guidance from the managers in terms of what is important in terms of rolling up on status, or from the policy -- like, from Wild Salmon Policy, or from whatever -- they've taken guidance from external sources. But the degree to which none of the methods have conclusively come out and said that this is the way we're going to weight all the different indicators relative to each other. And that will ultimately be a decision that is made by management.

Q Okay. So that helps me a lot.

MS. WIECKOWSKI: Right now, they're all equally weighted.
Q Okay. They're all equally weighted. So at some point, a manager may come along and say, "Let's weight habitat at double the value of biodiversity," or *vice versa*?
MS. WIECKOWSKI: It's possible.
Q Okay. Okay. That's all I'm thinking. But inherent in the calculation today of what's red, green and yellow, we have issues such as productivity and habitat, other things like that; is that fair to say?
MS. WIECKOWSKI: No, because within the Holt et al method they don't actually specifically include habitat indicators because of overlap of Strategy 2, and then within Grant's method, there's no habitat indicators. And then within Pestal and Cass's method, they've distinguished -- there's three groups. They've got status, they have vulnerability, and then they have habitat conditions so they're evaluating all those things separately and it's then a decision -- they're leaving it up to managers or whoever is using that information, then, to decide on how to act with -- how to prioritize actions based on that information. They're not combining it themselves.
Q Okay. Now, everybody's used productivity in all three models?
MS. WIECKOWSKI: Yeah.
Q Okay. So -- but it doesn't understand -- or, sorry, the models don't get at the reasons for the drop in productivity? And the reason why I'm asking that, and I think it goes to the earlier discussion with Mr. Harvey, is you could have an area where there was overescapement that resulted in the drop of productivity, that resulted in a red light, or an amber light; is that possible? Let's say if you had overescapement in 1982, you had overescapement in 1986, and so you had a decline in productivity showing, and that influences where you're going to put that particular stock on, whether it's green, amber or red; is that correct?
MS. WIECKOWSKI: Again, going back to the point of how all those indicators are weighted across from each other, I don't know -- I can't speak to the extent to which productivity was weighted over another

one unless -- if it was a decision that was made based on someone's value judgment. So I don't know the degree to which productivity in and of itself is influencing all the status scores that Grant et al, for example, has developed or put forward.

With regards to Pestal and Cass, the productivity is not something that they take into consideration within status. It's something that they look at from a vulnerability perspective and so their scores don't -- for status, don't reflect productivity. It's something -- that score is -- the score for vulnerability takes into account productivity.

MR. NELITZ: If I can add a few points? So --

Q Maybe you can help me here? I'm very confused.

MR. NELITZ: Yeah. Think about the way status is derived as a long formula and you have variable A, plus B, plus C, plus D, plus E, and so on and where kind of Y equals, the Y is your status. And so there's a lot of inputs into that formula. So when you ask a question like about the overescapement, it's -- like, I'm trying to think, like, I need to integrate how all of those variables are added up and to come up with some consideration of what would be -- if we changed Variable A, what would -- how would that change the status?

In the current methods and results from those methods that we looked at, take the example of the Quesnel because I think that's one of the examples where there is discussion -- or there is considerations that overescapement may be an issue. The Quesnel is rated at the low end of the scoring that feeds into status. So meaning it's in a good state relative to others.

Q Okay. That helps a little bit, and then all those variables, we talk about A, B, C, D, E, F, G, they're all going to be determined by fishery managers or the politicians will say, "We want to put a higher value on A than D"?

MR. NELITZ: So the scientists would provide the data that is going to feed those variables. The formula and the weightings of those different variables is going to be decided upon by policy and managers, and the -- and how certain actions are prioritized. So if there's a heavy weighting

on adjusting harvest policy, say, for example, relative to habitat policy, then you could consider that in that formula.

Q Okay. Now, so productivity, then, is undeniably a factor in whether -- one of the factors on whether a run fits into green, red, or amber? Productivity is a factor, we just don't know how much a factor it is; is that correct? Does that sum it up?

MR. NELITZ: Correct.

Q Okay. So in the case of overescapement, we could have productivity crash, yet it will create a feedback loop that says that productivity is low, therefore, it should be red, and unless we look at the reason for the crash, we could be operating in the red, but really not understanding why? Anybody want to try that, either one of you?

MS. WIECKOWSKI: I think there are other elements of DFO's management that addresses the why question and so I think to look at just status in a vacuum and not acknowledge all the other research and all the other initiatives that DFO has on the go with respect to how they manage sockeye is -- I don't think it does it justice. And so to say that they don't -- to say that we wouldn't know why I don't think is an adequate way to capture.

Q Okay. Maybe you can help me, then. In the models today of green, red and yellow, can you tell me where overescapement is plugged into that? We've heard evidence of overescapement. There's been considerable discussion about it. There's been papers written on it. Can you tell me how that's incorporated, taking account of the effect of overescapement, how it's accounted in -- how it's accounted for in the current green, red, yellow models that we've assigned to each CU?

MR. NELITZ: I'd say based on our understanding, it's not -- it doesn't seem like it's an explicit consideration that there's, like, an overescapement factor. But it may be embedded within the way that productivity, say, is captured. So there might be some rules around, okay, when would the productivity variable be changing in such a rate that it would be representative of an overescapement situation versus some other situations?

Q You can see the problem I'm getting at, though, if

overescapement's a big factor and we say something is red because productivity's declined, and then we say red means stop, then we're caught in this box where we don't really understand what the reasons are for it. It may be that we should have fished harder on it. And do you kind of get that, what I'm talking about? Excuse my awkward way of phrasing things, but I hope I'm getting my problem across to you.

MR. NELITZ: I understand your need for clarity around understanding how overescapement is captured within the status, the designations and the determinations of status, and that makes sense to me.

Q Okay.

MR. NELITZ: I understand what you're driving at there.

Q Thank you. And I'm just going to go to an example, and I'm going to be fairly quick.

MR. EIDSVIK: Mr. Lunn, could you bring up Mr. Roos's book for me and go to page 395.

THE COMMISSIONER: What exhibit number is that, Mr. Eidsvik?

MR. EIDSVIK: Seventy-five.

THE COMMISSIONER: Seventy-five? Thank you.

MR. EIDSVIK:

Q And I'm at page 395. And I just want to go through a couple of things because I'm trying to understand how the CU works and the possible implications of it. And if we go to the Chilcotin run, for example, in 1974 --

MS. BAKER: Mr. Commissioner, I'm not sure that notice was given of this document. Was there notice given of this document?

THE COMMISSIONER: It's an exhibit.

MS. BAKER: I know it's an exhibit, but we've asked them to identify ahead of time so the witnesses can at least have a look at what these documents are.

MR. EIDSVIK: I don't think I need to go in any specific year because it's just trends and I'm sure they'll be able to answer the question on trends. Because the trends that I'm going to show are through everything.

MS. BAKER: Perhaps he can just establish whether or not they've seen the document before and know what it is.

MR. EIDSVIK:
Q Have you ever read Mr. Roos's book on the rebuilding of Fraser River sockeye?
MR. NELITZ: I've looked at Roos's book and we certainly used some of the information there in our report.
Q Okay. And you'd be familiar with escapement levels over time when we go from year -- roughly, year to year, trends?
MR. NELITZ: In detail, specific to CUs and there's one thing to kind of look at the data, but then also to understand, and describe, and reiterate patterns of --
Q Okay. I'm not going to --
MR. NELITZ: -- of escapement is certainly more than I've done in looking at this document.
Q Yeah, good. I'm not going to get into that with you. I think my questions are pretty easy. And if we're looking at the Chilcotin run in 1974 --
MR. NELITZ: Let me be clear, I haven't looked at this table in detail so --
Q That's okay, I don't think you need to. If we look at the Chilcotin run in '74, and we see that the Chilko Lake, we have 128,000 escapement in 1974, and 151 in 1978. That's just a common trend. Sometimes escapement goes up and sometimes it goes down; is that correct?
MR. NELITZ: Escapement is variable --
Q Okay.
MR. NELITZ: -- for a variety of reasons, yes.
Q Thank you. Now, if we look at the south end of Chilko Lake, which is the next number in the column, we see escapement in 1974 as 1,464 and then 1978, it was 7,339. So on one part of the Chilko run, we had a stock that jumped considerably, and another part of the Chilko run, we had a stock that declined almost by 50 percent. How do you -- and I'm trying to understand, in the context of placing a number on sockeye in a conservation unit, how do you account for the differences within a conservation unit? Like, obviously, each conservation unit is made of a bunch of streams. In some years, one stream's going to have lots of fish. Maybe -- but another stream might have a decline in fish, as we see here. How does that result in -- or influence red, green, amber, or does it at all?

MS. WIECKOWSKI: I believe that some of the distribution metrics that have been developed and are in the preliminary stage of being developed within Holt et al's methods speak to that, looking at the proportion of the run and how that is distributed across. And so I think the -- you're asking how that's incorporated into the CU status assessment. It comes in through distribution metrics.

Q Yeah. Well, I guess I'm trying to understand it in my head, and when I look at escapement data, I see a number of streams in any particular CU. Now, if 10 streams -- if there's 20 streams, 10 decline in one year while 10 go up, how does that affect red, green, amber?

MR. NELITZ: If I can add one point? I'd also -- I'd say, as well, that certainly the way that some of the metrics are being calculated, that there is a consideration of the long -- how does an individual year or few years of anomalies fit within a longer-term pattern of decline? So is it something we've seen over a longer term, or several generations, or multiple cycles of sockeye in the Fraser, or is it a single event that's anomalous? And, sorry, I think that kind of gets at -- it's not just in an individual year, but it certainly looks at a longer-term pattern, and it's some of those longer-term patterns that are integrated into the status assessment.

Q Yes. Now, going back to productivity, if we had done a CU assessment in 1992, I don't know if you're familiar prior to 1992, you can answer me maybe, we had a history up until then of increasing productivity. Probably, we'd have fewer CUs in red and more in green, given that we had a steadily-increasing productivity, escapement and run size from about '64 on, or am I reaching too much there?

MS. WIECKOWSKI: I think you might be reaching a little bit too much and also another thing to take into consideration is we only have data on productivity and abundance up until the '50s. We don't have very good data prior to the '50s. And so where your baseline is, what you're comparing everything to relative changes drastically depending what your frame of reference is. So what looks like it could be an increasing trend or a decreasing trend

in one time period, if you look at a larger time period, it could be the complete opposite of which.

Q What we saw from the early '60s to the late '80s, early '90s, an increase in production, increase in escapement, increase in run size now looks different from 1992 to today?

MR. NELITZ: I think part of what I struggle with in trying to respond to your question is that it's a bit of -- we need to kind of go back and try to recalculate some of the status assessments that would have been -- would have occurred at a certain point in time. My impression is given the data that's available and the time series associated with that might be able to do that as a retrospective analysis, and so you could look to see how robust are designations of status given changing conditions and how might those status designations change.

Q Okay.

MR. NELITZ: So I certainly think that's possible, but to give a response to how many reds would there have been in the '90s versus how many reds at this point in time, I think that's too much to expect on the stop to provide insights into that kind of -- those kinds of questions.

Q Yeah. It just goes back to the question I started off with. Where we may be looking at a whole number of factors, but a decline in productivity gets included as a factor, yet, the decline in productivity, the reasons for it aren't captured within your study. So I'll move on at this point because I'm almost done anyway. You talked about ecosystem management in bears, and this bear thing's always been in my head, and I'm trying to understand how do you incorporate bears into ecosystem management? Bears and salmon. Tell me about bears and salmon.

MR. NELITZ: I'm not suggesting that that needs to be a management goal or a management objective, but I'm saying that if there's a policy which, the way that I interpret Strategy 3 of the Wild Salmon Policy, is that there are other ecosystem benefits of salmon carcasses, the biomass from that, the nutrients from the carcasses that other ecosystem components receive benefits from those things, and so that there are -- and there are documented

linkages between salmon carcasses and those other ecosystem uses. So if there is effects on the numbers of spawners that are on the spawning grounds, then it can also have effects on those other ecosystem components.

Q And I guess my question is, and maybe we'll get into this later, if you're a fishery manager and you've got to put a million fish up the river, do you put a 1,100,000 to compensate for bears? How do I know what number extra I have to put up for bears?

MR. NELITZ: I'd say that is a good management question and not as much of a science -- I can't answer that from a scientific point of view to say how would you set escapement goals based on what you're trying to manage in terms of other ecosystem benefits. Strategy 3 is tasked with addressing some of those things and --

Q So then is ecosystem really a marketing strategy that we can't measure? Because you say you can't do it as a scientist, measure those kind of benefits. I'm curious --

MR. NELITZ: I'm just saying I don't think that's appropriate, given what we've done, for me to comment on that. I'm saying that there is some evidence and there are studies out there that look at the linkages between salmon and those other ecosystem benefits. On the spot, I'm not clear on what the tools are you would use, as a manager, to try to, say, set escapement goals, or whatnot.

Q That's very helpful. Thank you. Thank you for your questions.

MS. BAKER: Thank you, Mr. Eidsvik. He's right on time, at 2:50, so if we could take the afternoon break now, this might be a good time, then we can finish with Mr. Leadem and any re-examination.

THE COMMISSIONER: How long will Mr. Leadem be?

MS. BAKER: Mr. Leadem has said he'll be about half an hour, and then I'll have some re-examination.

THE COMMISSIONER: I wonder if, Madam Reporter and Mr. Register and Mr. Lunn are agreeable, we could just press on, if that's -- sure, why don't we do that. Thank you, Mr. Eidsvik.

MR. LEADEM: Thank you, Mr. Commissioner. For the record, Leadem, initial T. I appear as counsel for the Conservation Coalition and for both of you who may not be aware what the Conservation

Coalition is, it's a group of NGOs and we're primarily focussing upon this inquiry to determine how best to preserve and conserve the salmon resource in our province, the sockeye salmon resource.

CROSS-EXAMINATION BY MR. LEADEM:

Q And I want to begin by examining your report, some of the conclusions contained in the executive summary of your report.

MR. LEADEM: So if I could ask Mr. Lunn to please pull up Exhibit 562 and Roman numeral II, please.

Q And you perhaps can help me here. I know that there's been -- and I apologize, I was not here on Thursday, and I know there's been a correction to what I'm going to read to you, and then I want to get some clarification from you about what it is that you're saying here. And I'm focussing upon the last couple of sentences in the first full paragraph on that page:

> Based on the results of the best available assessments, we found that --

I guess it should read now "15", right?

MR. NELITZ: Correct.

Q

> -- 15 of 36 conservation units have a poor population status and are distributed across all timing groups.

And then you itemize some of the conservation units there. And then you go on to say, in the very last sentence:

> The status of 11 CUs is unknown.

So if I go back to your first sentence, then, if we know that 11 CUs is unknown, then the number is actually 15 of 26 known conservation units have a poor population status. Is that -- do I have that right, by a process of arithmetic?

MR. NELITZ: Yes.

Q And when you say they have a poor population status, you don't really define "poor population," but I take it from that -- can I extrapolate from

that, Ms. Wieckowski, that essentially those conservation units are in trouble, that we have a population that's in decline for those 15 conservation units? Do I have that right?

MS. WIECKOWSKI: So again, we -- where we got 15 from was going to Figure 5 in our report where there are 15 CUs that fall to the right of the vertical line going through three on the severity -- on the X axis --

Q Yes?

MS. WIECKOWSKI: -- on severity, and so there are three CUs, or, sorry, 15 CUs that are exhibiting strong declines in status. And so we have just used a binary classification of poor and good for the purposes of this report because we felt that was a reasonable and appropriate thing to do.

Q Right.

MS. WIECKOWSKI: Ultimately, where you're going to draw those benchmarks, though, we didn't feel comfortable drawing those benchmarks to further degrade down to a red, yellow, green status and so it's a value -- it would be a value judgment as to where you put those benchmarks.

Q All right. So later on in your report, when you refer to looking at freshwater, and this, I guess, is the second part of your report, if you're looking at habitat indicators and stressors, in freshwater, you come to the conclusion that based upon the habitat stressors that you examined, that they do not explain the decline for the population of the sockeye salmon in 2009. Do I have that right?

MR. NELITZ: Declines in productivity of the population.

Q Right.

MR. NELITZ: And so I just underline productivity.

Q And the difficulty I'm having is to try to reconcile what you found with respect to the conservation units, where you say that 15 of the conservation units exhibit poor population with this finding that freshwater is not necessarily going to provide you with a clue to what's going on with the salmon. I'm just having difficulty reconciling your approaches.

MR. NELITZ: Yeah, if I can -- one thing that I'll -- that will hopefully try to clarify this, if you think about the pattern we were trying to explain,

as I've said several times, it is represented through Figure 1, which is a measure of the productivity of the aggregate and individual CUs. And so we looked at a bunch of freshwater influences and how it might explain that pattern.

Another piece of the work that we did is classifying different CUs in terms of how well or badly they're doing. And so we were not explicitly -- which -- and that classification is a function of many factors, the A, B, C, D, E, F, G that I was mentioning, of which freshwater is one of those things, but there are other factors and things that are happening across other stages of the lifecycle that are influencing that status.

Q Right. And that's where --

MR. NELITZ: So we did not explicitly look at do all of our freshwater variables explain the classification of the different CUs. We did not look at that explicitly in terms of what we did.

Q Okay. That's what I'm driving at. So you cannot take from your report that there may be something in the freshwater habitat that is affecting some of these 15 vulnerable CUs; do I have that right? You can't rule that out, can you?

MR. NELITZ: Can you rephrase?

Q Certainly. If you accept, as I do, the finding in your report that 15 out of the 26 conservation units that we know something about exhibit poor population -- are you with me so far?

MR. NELITZ: Poor population status.

Q Poor population status, right. You cannot rule out that a factor in that decline, or a factor that contributes to that poor population status may be something that's occurring in the freshwater habitat?

MR. NELITZ: Rule it out definitively?

Q Yes.

MR. NELITZ: No.

Q Now, you examined a number of freshwater stressors, and I'm going to tell you or read off a list of several other freshwater stressors, and I'm going to ask you if you gave any consideration to those freshwater stressors in the confines of your report. And for whatever reason, you may or may not have examined these. River temperature, did you take that into consideration as a freshwater stressor?

MR. NELITZ: It's being considered as part of another study.
Q All right. Now, temperature in the lakes, did you consider that?
MR. NELITZ: No.
Q Food supply in the lakes, did you consider that?
MR. NELITZ: Not explicitly. We did look at productivity measures, but...
Q Flow changes; in other words, changes to the flow in the Fraser River, did you consider that explicitly?
MR. NELITZ: No.
Q Sedimentation, did you consider that explicitly?
MR. NELITZ: No. And again, I believe that was being captured by another study.
Q Linear facilities, such as roads, highways, railroads, power lines, pipelines, did you take that into consideration explicitly?
MR. NELITZ: Roads, as a very broad category, yes, which would not have -- so other linear developments, like transmission lines, train -- railway tracks, would not have been included.
Q All right. Channelization of the Fraser with respect to riprap and other improvements to the zone, to the shoreline of the Fraser?
MR. NELITZ: No.
A Riparian loss, loss of riparian habitat from whatever cause?
MR. NELITZ: To the extent that it is associated with forest harvesting we would have considered it, and in terms of how it might be one of the mechanisms by which agriculture is influencing, agriculture and urban development. So riparian disturbances through those activities, we certainly considered those, but beyond that, no.
Q Okay. Industrial effluent as it effects the water quality in the Fraser, did you consider that?
MR. NELITZ: No. Again, I believe that was part of the terms of reference for another study.
Q Sewage?
MR. NELITZ: No.
Q Disease and parasites?
MR. NELITZ: No.
Q Obstruction to migration, such as nets, roads and bridges, things of that nature?
MR. NELITZ: We did look at obstructions in headwater areas.

Q Conditions in the Fraser estuary?
MR. NELITZ: No. Again, I think that was part of another study.
Q Recreation, lights, noise, things of that nature, did you consider that --
MR. NELITZ: No.
Q -- as a stressor? Predation?
MR. NELITZ: No.
Q Ultraviolet light?
MR. NELITZ: No.
Q Now, my learned friend from the province, Mr. Prowse, had asked you a number of questions and he selectively read to you from portions of your report, and I just want to, by way of an example, focus upon one of those.
MR. LEADEM: If we could have page 113, please, Mr. Lunn, of the report?
MR. NELITZ:
Q Now, before I go to -- this is Table 21. Before I go to the exact passage I want to show you, my understanding is that these are seven generic questions from a report done by Stewart-Oaten in 1996 that concern - thank you, Mr. Lunn - concern seven major questions to arrive at -- well, perhaps you can tell me why these seven questions? What's the importance of these seven questions?
MR. NELITZ: In environmental assessments, sometimes the data aren't available and structured in an idea way that allows for ideal quantitative analyses of those data to determine -- to test for cause and effect relationships. And so recognizing that that's just a reality of how environmental assessment is done in some circumstances, that that doesn't mean -- given those weaknesses, that doesn't mean that there aren't other frameworks or ways that we can assess the evidence to come to some conclusions or determinations or assessments of effects.

And so in our view, in working in this realm, the Stewart-Oaten framework is a structured approach, transparent, it makes our considerations transparent in terms of -- and it's a sequential process for considering alternative sources of evidence. And so we step through each of the questions to collectively evaluate the weight of evidence in terms of the relative likelihood of an effect or not.

Q And I know that one of the reviewers to the report - I think it was Mr. Eric Taylor, is it - took issue with your using this approach and suggested you use an approach called IUCN; is that right?
MR. NELITZ: He did refer to IUCN methods --
Q Right.
MR. NELITZ: -- in terms of putting that forward as a proposal. I don't believe that he was specifically critiquing the Stewart-Oaten framework, but just in general, I think, the way that we analyzed our land use data and just recognizing that it's a different method than the one that he's familiar with.
Q Okay. So this is just one way of looking at the issue?
MR. NELITZ: Correct.
Q Okay. So if I look at Table 21 and if I look, for example, at water use, the middle column, and I looked at question 2, what is the strength of the estimated effect, you have these words:

> There is a potential for strong impacts. In some key watersheds, licensed water use exceeds the natural flow of the stream. Poor data quality makes it difficult to directly assess the strength of Water Use impacts.

And that's what you wrote and that's what you would say is the case today; is that correct?
MR. NELITZ: Yes.
Q And then if I move one column over to the mines column, then I find your words to be:

> The impact is expected to be generally weak because of the low level of activity.

Now, obviously if the activity increases then the impact will be greater, right?
MR. NELITZ: Yes.
Q And then you go on to say, in the second paragraph:

> There are no good data on mines as a source of sediment in the Fraser Basin. However, the effect of mining on Fraser River sockeye salmon is expected to be weak because (a) mines are not prevalent in watersheds used

for sockeye salmon spawning,

And I gather that you drew that conclusion from your GIS analysis; is that right?

MR. NELITZ: Yes.

Q

...and (b) the introduction of sediment into fish habitat is prohibited under the ***Fisheries Act***.

And so what you're relying upon there is basically some of the provisions of the ***Fisheries Act*** which prevent or the deposition or deterioration or deposition of substances into the water system; is that right?

MR. NELITZ: Yes.

Q And you're also aware that under the ***Fisheries Act***, s. 35 specifically, that mines, for example, can be granted authorizations to deposit deleterious substances and to destroy or alter a fish habitat; you're aware of that, are you not, from your work?

MR. NELITZ: Sorry, can you repeat that, please?

Q You're aware of the effect of authorizations that are often granted by fisheries officers under s. 35 of the ***Fisheries Act*** to allow the introduction of sediment into fish habitat?

MR. NELITZ: Yes.

Q And that's not an uncommon thing, is it, in your experience?

MR. NELITZ: Uncommon as a qualifier that I'm not exactly certain about, but my understanding is that it's --

Q But you've heard it -

MR. NELITZ: It happens, yes.

Q It happens?

MR. NELITZ: Yes.

Q I'm moving on, now, to Dr. Ashley's commentary at the back of the report, and I found his hypothesis, at 143, pages 143 of your report, to be interesting. Now, I know at the end of the day you say that Dr. Ashley's hypothesis is a plausible one and should be subjected to further study. I think that's the end result. But for the purposes of your report, you did not feel that you had the necessary information to incorporate

it into the confines of your report; do I have that accurate?

MR. NELITZ: Yes.

Q I just want to make sure that I understand the ramifications of his hypothesis, and perhaps the easiest way to do that is he attaches a couple of diagrams and figures to his commentary. And if I can have you pull up page 144, please, Mr. Lunn?

He starts with a notion that the food web in an interior lake is simpler than a coastal lake. And do you agree with that concept in terms of the food web as he's described it there, or as it's shown there?

MR. NELITZ: I'm not a limnologist to feel confident in qualifying. I certainly trust that Dr. Ken Ashley is one of the leading limnologists in the province and trust that his statements are true.

Q Okay. Certainly you don't have any -- you can't quarrel with the notion that this information is obviously taken from a report by Stockner and Porter in 1988? You don't have any quarrel with it, necessarily, you just can't comment on it because you said that you are not a limnologist?

MR. NELITZ: Correct.

Q All right. Perhaps, given that qualification that you feel that you're not competent to comment on this, I'll simply take you to your response, which I find at page 148, in the bold words at the top of the page, or towards the middle of the page, actually:

> Response:
>
> We acknowledge the plausibility of this hypothesis.

And you go on to say that there's another, "that Selbie et al," and Mr. Harvey took you there and I'm not going to take you there as well:

> examined the data for Quesnel, Shuswap and Chilko Lakes --

So just for those three conservation units, or three run groups, if you will.

> -- to investigate whether changes in growth

and primary/secondary productivity have occurred and found no detectable changes over time.

So let me just stop there. It strikes me that if you're only examining the Quesnel, Shuswap and Chilko Lakes they may be, in terms of the significance to the commercial fishery, some of the most important ones, but in terms of the biodiversity they only represent potentially three conservation units; isn't that right?

MR. NELITZ: Can you rephrase the question, please?

Q All right. What I'm doing, Mr. Nelitz, is this, is that I'm contrasting what you're saying here, that you're relying upon Selbie, and Selbie only has looked or examined three datasets, that being the dataset for Quesnel, Shuswap and Chilko Lake; is that right?

MR. NELITZ: That's correct.

Q And although those datasets that are chosen, the Quesnel, Shuswap and Chilko Lakes may correspond to the most significant commercial runs of salmon as we know them today, it doesn't provide you with the entire picture, does it?

MR. NELITZ: No, it does not, but it certainly would be one piece of evidence that we would consider, whether it's a -- there is a broader pattern.

Q Now, I want to conclude by talking about the Wild Salmon Policy, because a number of participants in this inquiry have focused upon the Wild Salmon Policy, and indeed it may be a policy that's key to bringing together some of the disparate groups that are concerned about the sockeye.

I want to know how, if at all, your report helps us understand the Wild Salmon Policy or how the information that you have in your report can assist the further development of the Wild Salmon Policy? You focus upon freshwater habitat, and we know that the Wild Salmon Policy Strategy 2 examines habitat indicators, does it not?

MR. NELITZ: That's correct.

Q Can we use some of the information in your report to further our knowledge of the Wild Salmon Policy, specifically with respect to Strategy 2?

MR. NELITZ: First, I would say that our report was not written with the intent of providing insights into how to implement or fill in gaps or weaknesses or

whatnot with the Wild Salmon Policy.
Q Okay. So does that mean that your report is not very useful to some of us that want to take the data that you have in the report and try to extrapolate it out and try to understand how we can further the Wild Salmon Policy in terms of its habitat indicators and so forth? We can't do that, is that what you're telling me?
MR. NELITZ: I'd say that some of the methods, the dashboards, for example --
Q Yes.
MR. NELITZ: -- in terms of how we summarize some of the data and report out on conservation units are useful illustrations on how indicators can be communicated and provided in a consistent way across conservation units. I certainly think that our methods demonstrate the feasibility of doing this kind of analysis, a very broad scale, which -- prior to this and the Selbie work - I'd say we go a little bit further than Selbie - but hadn't been done before and so I certainly think that some of the analyses that we are trying to do are consistent with what some of the habitat -- some of the Wild Salmon Policy is trying to do. So certainly I think in terms of demonstrating proof of concepts and methods, I think our report is useful in that regard.
Q And this is my very last area and it's just a personal glitch with me that when somebody says that biodiversity is just simply a value judgment, I have to take a little bit of umbrage with that and I'm going to tackle it this way, that obviously both of you were schooled and took ecology as a course at some stages in your career; is that fair to say?
MR. NELITZ: Yes.
Q Ms. Wieckowski?
MS. WIECKOWSKI: Yes.
Q And so when the concept of biodiversity was raised with you back in those halcyon days of attending university, it was raised as a scientific concept, wasn't it? I mean, it's a well-rounded -- well-founded scientific concept, is it not?
MR. NELITZ: I would agree, and I would also say that having worked more in science and management I am also much clearer on some of the boundaries between science and values in management, and I've

been challenged by other scientists in terms of being clear on what is a value statement and what is not, and I think that it helps me question some of the assumptions, sometimes, and the language that we use around describing some of the scientific concepts and the management concepts.

Certainly I'm not advocating one position or another, but certainly if you were strictly managing for abundance and that was the only thing that mattered, there's nothing in the science that I can point to that says that there's anything wrong with that versus a need to manage for diversity.

Q But I'm going to go a step further, and if I look at the Wild Salmon Policy, which Canada has adopted, there's four main principles, as I understand it, enshrined in the Wild Salmon Policy, and they're hierarchical. And the first one is conservation, is it not?

MR. NELITZ: I believe so, without having it in front of me, I'm going on recollection.

Q We can look at it, it's Exhibit 8, but it's engrained in my mind, certainly, that conservation is the key principle of the Wild Salmon Policy. And to me, and we've heard a lot of evidence on Wild Salmon Policy which you certainly were not privy to, but biodiversity is an underpinning of conservation, is it not?

MR. NELITZ: Yes.

Q And I'll go a step further, and if you can answer this, fine, but if you can't, I'll accept that as well. The convention on the Earth Summit in 1992, in Rio, focused and came up with a convention on biodiversity. Are you familiar with that?

MR. NELITZ: I'm familiar with it, yes.

Q All right. And are you also familiar with the fact that Canada signed the convention on biodiversity?

MR. NELITZ: Yes, I'm familiar with that.

Q So not only is it a scientific principle, not only is it a value judgment, but it also, perhaps, is a legal value in the legal axiom in Canada. I don't expect you to comment on that, because you're not a lawyer, so --

MR. NELITZ: I don't think that's appropriate for me to comment on that.

MR. LEADEM: All right, thank you.

MS. BAKER: Thank you. Just bear with us, we're almost finished. I have a few questions just to clarify some of the answer that were given during the course of cross-examination.

RE-EXAMINATION BY MS. BAKER:

Q My first question arises out of the questions by Mr. Timberg. Mr. Timberg asked if the work was peer-reviewed, if your work was peer-reviewed, and Ms. Wieckowski agreed that it wasn't. And I wanted to just confirm with you that Project 3 was reviewed by three independent reviewers; is that correct?

MS. WIECKOWSKI: Yes, it is.

Q All right. Does that change your answer that you gave to Mr. Timberg?

MS. WIECKOWSKI: Yes, it does.

Q Okay.

MS. WIECKOWSKI: Our work had been reviewed by three independent reviewers appointed by the commission.

Q Mr. Timberg also took you to the Pestal and Cass paper, and talked to you a little bit about the purposes for why that paper was prepared, and I just wanted to confirm with you, if you could turn to that -- sorry, I don't have the exhibit reference.

MR. LUNN: 572.

MS. BAKER: 572.

Q All right. If you could turn to -- start with page -- there's a CAN number at the bottom, CAN0012, and you'll remember Mr. Timberg took you to some questions here with respect to the project outline. Do you remember those questions?

MS. WIECKOWSKI: Not the specific details, but the general sentiment, yeah.

Q Okay. And then if I could just ask you to turn to the next page, which is 0013, and I just want to identify that if you see the bullets on the bottom, or underneath the full paragraph, it identifies in the full paragraph before the bullets that:

> This report illustrates the proposed reports for 3 biological considerations (status, vulnerability, direct human impacts) and outlines future work needed to capture

additional elements, such as socio-economic considerations and information requirements at different stages in the annual planning cycle for sockeye management.

And it says that, "This report covers the following," and there's a number of bullets, but I just wanted to identify the third bullet is:

Initial evaluations of Fraser sockeye conservation units.

Is that correct?

MS. WIECKOWSKI: Yes.

Q And you understood that for whatever purpose this document was prepared, certainly it did set out an evaluation, an initial evaluation, of Fraser sockeye conservation units?

MS. WIECKOWSKI: Yes.

Q Okay. And that's just clarified again, if you turn to the next page, 0014, the methods set out the units of evaluation. It's identified that Fraser sockeye would be evaluated at the level of conservation units, the first paragraph. Do you see that?

MS. WIECKOWSKI: Yes.

Q And moving again, to page 0026, where the preliminary evaluations are summarized, again, it identifies that there was a rough system-wide evaluation of preliminary Fraser sockeye conservation units done according to three biological risk factors. Do you see that?

MS. WIECKOWSKI: Yes.

Q And then, finally, the figures that Mr. Timberg took you to, which are at CAN0070 and 0071, those are Figures 12 and 13, clearly identified that these were status evaluations for the 36 conservation units of Fraser River sockeye, and you can see that in the figure descriptions, Figure 12?

MS. WIECKOWSKI: Yes.

Q And then Figure 13 has the same?

MS. WIECKOWSKI: Yes.

Q Okay. Thank you. Another point coming out of Mr. Timberg's cross-examination, Mr. Nelitz, Mr. Timberg took you to some maps, you'll recall, and took you, in particular, to figures that showed

the urbanization areas, Figure 27, which is at page 80 of your report, and had a discussion with you about what was an urban area and what wasn't, and where did the data come from; do you remember that discussion?

MR. NELITZ: Yes, I do.

Q Okay. I just wanted to take you to the source of your data that you used to prepare that -- or that your team used to prepare that figure. If you turn to the last page of your report, can you confirm -- so it's the very last page, 222. Does that document set out -- if I read report section 3.4, which is the urbanization upstream of Hope section of your report, it has three different datasets that are set out there. Were those, some or all of those, used to prepare Figure 27?

MR. NELITZ: Yes, they were.

Q Okay, thank you. And those were databases maintained by the Provincial Government; is that right?

MR. NELITZ: Yes. And just to clarify as well, I believe some of the specific items we were discussing are urban areas. I believe Pemberton may be one of those. Logan Lake may be another one. And I certainly think that Barkerville, as counsel had pointed out, might be another one. But I stand by that this data layer as a representation of the relative intensity and amount of disturbance through urbanization, it is a good relative measure of that.

Q Okay. Thank you. My next point is back for Ms. Wieckowski. When Mr. Timberg was talking to you about the Grant method and the Holt methods of assessing CUs, Mr. Timberg asked you if the distribution indicator was not as important for sockeye as it was for other species, and you paused and thought about that and then you agreed. And I just wanted to ask you: You agreed that the distribution indicator was not as important for sockeye as for other species, but is the distribution indicator still relevant for Fraser River sockeye?

MS. WIECKOWSKI: Yes, it is.

Q Okay. And why did you answer the question the way you did with Mr. Timberg?

MS. WIECKOWSKI: Well, I was answering the question to Mr. Timberg from a relative perspective where

considering the other sockeye -- or the other salmon species, chinook or coho or pink or chum, the distribution of the CU, the CUs are much larger, and so distribution is more of an obvious metric of interest. And also they're just much more spatially distributed across a larger area. But within a sockeye CU it is still important in the sense that there's sockeye that use different lake-type habitats or whether it be in a river habitat, and so distribution, it's important that just the scale of the distribution is smaller.

Q Thank you. Mr. Nelitz, Mr. Rosenbloom asked you about the use of habitat status reports in your work, and you remember those questions?

MR. NELITZ: Yes, I do.

Q When you answered Mr. Rosenbloom's questions you stated that status reports were available across all conservation units, and I just wanted to confirm, is that correct, or are habitat status reports available for all conservation units in the Fraser River?

MR. NELITZ: That is certainly not what I meant to say, if that's what's on record. I was intending to say that they were not, or they are not available across all conservation units.

Q Okay. And, in fact, you're aware, I take it, that there has been a standard for habitat status reports prepared pursuant to the principles in the Wild Salmon Policy, and that was prepared by Stalberg et al, and Marc Porter was one of the authors of that report, and we have it marked as Exhibit 175 in these proceedings; are you aware of that?

MR. NELITZ: I'm aware there is a template for those status reports, yes.

Q And if habitat status reports for all CUs had been prepared using that method, would that assist in providing consistency of data across all CUs that would have been useful to you in preparing your report?

MR. NELITZ: Well, to be clear, I'm not familiar with the latest iteration or version of those status reports. I'd seen some earlier versions. And in terms of the consistency of information that's available, there would not have been the consistency of information available through those status reports to allow us to do the work that we

did.
Q And Mr. Leadem just now ran through a number of different stressors that were not dealt with in your report, and sometimes you've agreed that they weren't covered and sometimes you agreed that they were -- or you stated they were covered in other reports, and I just wanted to confirm and it may be handy to have your preface to your report handy when I ask you these questions.
One of the stressors that was identified by Mr. Leadem were disease and parasites, and that is being covered in another report; is that correct?
MR. NELITZ: Yes, it is. There was several issues that I didn't directly mention that they were being covered by other studies.
Q Okay. Predation would be one?
MR. NELITZ: Yes.
Q Is sewage being covered in the contaminants report?
MR. NELITZ: I believe so.
Q And channelization and other impacts in the riparian area, are those being covered in Project 12?
MR. NELITZ: I was going to say that's in the lower Fraser. To the extent that those activities occur in the lower Fraser I believe they are being covered there.
MS. BAKER: Thank you. Those are my questions.
Mr. Commissioner, I believe that concludes our evidence for today. Amazingly, we're ahead of schedule. Thank you very much to my friends for cooperating on their timing today. We're finished for today. I'm sorry, I just can't, off the top of my head, remember who's here tomorrow; I just know it's not me, but I'll be back on Wednesday and we'll be dealing with Mr. Ryall then and if my friends could help me by giving me some estimates on their timing for that witness as well. Thank you.
THE COMMISSIONER: Yes, before we adjourn, and Mr. Lunn will, I presume, send out his excellent reminder to us all when he sends out an e-mail tonight as to who's up on deck for the following several days. But I want to thank Ms. Wieckowski and Mr. Nelitz very much for attending last week and today again and for answering the questions of counsel. I'm grateful to you for that, thank you very much.

And to counsel, again, I reiterate what Ms. Baker said; thank you for your cooperation in assisting with the time estimates.

So then we'll adjourn until tomorrow at 9:00 a.m tomorrow. It's a 9:00 a.m. start tomorrow morning. Thank you very much.

THE REGISTRAR: The hearing is now adjourned until nine o'clock tomorrow morning.

(PROCEEDINGS ADJOURNED TO TUESDAY, MARCH 15, 2011, AT 9:00 A.M.)

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Pat Neumann

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Susan Osborne

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Irene Lim

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Karen Hefferland