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

Held at:

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Cour fédérale
701, rue West Georgia
Vancouver (C.-B.)

le merdi 7 décembre 2010

Errata for the Transcript of Hearings on December 7, 2010

Page	Line	Error	Correction
ii		Lara Tessaro's title is missing	Junior Commission Counsel
iv		James Walkus is not a participant	remove James Walkus
iv		Musgagmagw Tsawataineuk Tribal Counsel	Musgamagw Tsawataineuk Tribal Council
60	41	preresources	prey resources
77	45	Mr. Lund	Mr. Lunn
85	42 & 45	Mr. Lund	Mr. Lunn
86	1	Mr. Lund	Mr. Lunn

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Brian J. Wallace, Q.C. Lara Tessaro	Senior Commission Counsel
Tim Timberg Geneva Grande-McNeill	Government of Canada
D. Clifton Prowse, Q.C.	Province of British Columbia
No appearance	Pacific Salmon Commission
No appearance	B.C. Public Service Alliance of Canada Union of Environment Workers B.C. ("BCPSAC")
No appearance	Rio Tinto Alcan Inc ("RTAI")
Alan Blair Shane Hopkins-Utter	B.C. Salmon Farmers Association ("B.C.SFA")
No appearance	Seafood Producers Association of B.C. ("SPAB.C.")
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.

David Butcher, Q.C.	Southern Area E Gillnetters Assn. B.C. Fisheries Survival Coalition ("SGAHC")
Chris Watson	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")
Brenda Gaertner Leah Pence	First Nations Coalition: First Nations Fisheries Council; Aboriginal Caucus of the Fraser River; Aboriginal Fisheries Secretariat; Fraser Valley Aboriginal Fisheries Society; Northern Shuswap Tribal Council; Chehalis Indian Band; Secwepemc Fisheries Commission of the Shuswap Nation Tribal Council; Upper Fraser Fisheries Conservation Alliance; Other Douglas Treaty First Nations who applied together (the Snuneymuxw, Tsartlip and Tsawout); Adams Lake Indian Band; Carrier Sekani Tribal Council; Council of Haida Nation ("FNC")

APPEARANCES / COMPARUTIONS, cont'd.

Joseph Gereluk	Métis Nation British Columbia ("MNB.C.")
No appearance	Sto:lo Tribal Council Cheam Indian Band ("STCCIB")
No appearance	Laich-kwil-tach Treaty Society James Walkus and Chief Harold Sewid Aboriginal Aquaculture Association ("LJHAH")
No appearance	Heiltsuk Tribal Council ("HTC")
No appearance	Musgagmagw Tsawataineuk Tribal Counsel ("MTTC")

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Vancouver, B.C. /Vancouver (C.-B.)
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THE REGISTRAR: Order. The hearing is now resumed.
MR. WALLACE: Good morning, Mr. Commissioner. Brian Wallace, Commission counsel, and we are in the examination of this panel by Canada, Mr. Timberg.
MR. TIMBERG: Mr. Timberg, T-i-m-b-e-r-g, for Canada.

CROSS-EXAMINATION BY MR. TIMBERG, continuing:

Q Yes, I'd like to start this morning asking Dr. Irvine and Dr. Hyatt if they could provide just a brief description of the peer review process at DFO; what's the purpose of it?
DR. IRVINE: Yeah, well, maybe -- is this on? Okay. All right, so maybe I'll start and Dr. Hyatt can add to this. Within --
MR. WALLACE: Mr. Commissioner, I'm sorry to stand up so quickly, but there was examination on this topic and the topic of science and management at DFO in the very first set of hearings, so I'm not sure what this adds.
MR. TIMBERG: Mr. Commissioner, it's -- I'm getting to a point with the Holtby and Ciruna paper and whether the paper was -- whether the final copy included a list of conservation units, and so there are a series of questions with respect to whether it's an open process or the stakeholders participate, and it relates back to Strategy 1, a conservation unit work that was prepared, and I thought it would be of assistance to the Commissioner to have a brief introduction to the role of the peer review process before I get to those more detailed questions.
THE COMMISSIONER: Mr. Timberg, I recall we did cover this quite thoroughly; that is, the role of the peer review process and how it functions and how it operates. I would prefer that you move right to your questions regarding the paper itself.
MR. TIMBERG: Okay, thank you.
Q Mr. (sic) Irvine, can you advise whether the Holtby and Ciruna paper that was peer reviewed, whether it included a list of conservation units?
DR. IRVINE: And I will defer to Dr. Hyatt in just a moment, but I think the important thing to realize is that it's the methodology that's really most

important, the methodology went through a very vigorous peer review. Now, Dr. Hyatt actually chaired the meeting, I believe, that -- where the peer review took place, so I think I'll ask Dr. Hyatt to answer.

Q Okay. So Dr. Hyatt, can you advise whether the Holtby and Ciruna paper included a list of conservation units?

DR. HYATT: So there was a provisional list of conservation units that was provided in association with the methodology. That provisional list was examined as part of the peer review process but, of course, there are area experts who have much more detailed knowledge about, you know, the geographic location, in particular life history characteristics of each of these CU's, and so it was regarded as provisional until, you know, full responses from all of the areas could be vetted and the list could then move to a next level of, you know, somewhat less provisional but firmer.

Over time, this list is expected to change, but I think if you queried the authors of the paper they would -- and anyone who had reviewed it, they would say, "Well, the expected changes would really be on the order of a few percentage," you know, "a very small proportion over the first few years, and as time went on the number of revisions would become less and less as information became more complete."

Q Okay. And so is it, therefore, that it was the methodology that needed to be peer reviewed before you came up with a published list of CU's?

DR. HYATT: Yes, the methodology identifies the criterion and the procedure by which those -- and the particular data sets, the way in which they would be used, such that there's a very standardized way of considering each sort of nominal CU and confirming that, yes, it meets these requirements and it emerges as an entity that we would regard as a conservation unit onto itself.

Q Okay. Thank you. And Dr. Hyatt, can you explain whether the time between the actual review and then the publication of the CSAS paper, whether -- how that gap between the meeting and then the publication, what's the significance of that?

DR. HYATT: Well, there is a process for final -- for formal finalization of the published material that requires, you know, confirmation, editing of the actual text, arrangements to post it on the website, those sorts of due process just to provide the material so that it's widely available. However, once a paper and its methodology or content is accepted, there is advice that goes forward to managers where the advice is time sensitive, for example, such that they have the benefit of that advice coming very close on the heels of the end of each CSAS meeting.

So there are a number of products in addition to the papers, themselves. They're the minutes of the meetings that are available. There is a scientific advisory report in many circumstances that's provided to kind of provide a quick overview and the advice of the committee. So each of these products has a place and, to some extent, its own timeline for provision.

Q Okay. Thank you. Dr. Holt, with respect to Action Step 1.2, I'd like to follow up on some of the questions from last week.

Once you've measured the metrics for a conservation unit, do you know how they will be combined to determine an overall status? And an example would be, if one metric is in the green zone and the other is in the red zone, how do you deal with this?

DR. HOLT: This has been a topic of discussion amongst our Strategy 1 Oversight Group. We haven't come to consensus on how to combine information across metrics. One idea is to develop some methodology that will combine those reds and ambers and greens across -- to come up with an overall. Another is that those -- information from those different metrics should be kept separate, because combining them results in a loss of information.

Q Right.

DR. HOLT: We lose a part of the story. And so it's yet to be decided what the final approach will be, and will likely be a topic for a CSAS paper and review in the next year.

Q So that's ongoing work that you're doing?

DR. HOLT: Yes, that's ongoing work.

Q Thank you. And you mentioned the -- that group --

what's that group that you just mentioned, sorry?
DR. HOLT: It's the Strategy 1 Oversight Group.
Q Can you explain what that group is?
DR. HOLT: It's a group that brings together managers who are obliged to implement Wild Salmon Policy Strategy 1 with scientific staff and stock assessment staff who are working on the technical underpinnings of that strategy to bring them together to provide updates on work on developing tools to help with the implementation and updates on how that implementation is going to discuss what common challenges are across areas in that implementation.
Q Okay. Thank you. And Dr. Holt, I'd like to ask you a question about dealing with a problem of shifting -- or a fact, perhaps, of shifting productivity over time. And so my question is: How do you handle the changing productivity of some Pacific salmon, like Fraser sockeye?
DR. HOLT: So this is a challenge that we face with this Oversight Group. It's a problem, because standard analyses assume that productivity is constant over time. However, if productivity has changed in recent years, for example, has declined in recent years, then we may be overestimating it if we're using a kind of long time series that includes historical periods of high productivity, which may mean that our benchmarks estimated from those longer time series may not be sufficiently precautionary.
Q Mm-hmm.
DR. HOLT: And so in the Fraser River, where we've seen trends or declines in productivity, we've investigated other types of analyses that account -- that explicitly account for that changes in productivity over time, so that explicitly accounts for recent lower productivity when estimating benchmarks.

Another approach is to, instead of using an entire time series of 50 years, to use shorter time series that represent the more recent periods of low productivity when estimating benchmarks.
Q Okay. Thank you. And last week we discussed problems with temporal or geographic gaps in dataset, and we were talking about sort of this uncertainty. And do you have anything further to clarify the work that you're doing to deal with

the gaps in information available to determine benchmarks?

DR. HOLT: Yes, that's another topic, a challenge that's come up in our Oversight Group, how to deal with missing years of data in time series, and missing locations within a conservation unit. So that was a topic of discussion at a recent workshop, an implementation workshop, as well as a recent working group paper. So we're actively working on developing methods to infield those datasets to -- for those data gaps, to respond to those data deficiencies.

Q And just for clarification, your work on indicators and benchmarks was peer reviewed?

DR. HOLT: Yes, it was a CSAP peer review.

Q Thank you. And Dr. Holt, I'd like to ask you about your consultation on your benchmark methodology. Was there any input from First Nations or other stakeholders on our benchmark methodology paper?

DR. HOLT: Yes, there was input at the CSAP meeting in January 2009, when that work was reviewed. There is wide participation, including First Nations. In addition, in subsequent implementation workshops, for example, one in June 2010, participants included representation from First Nations. So there was in put from First Nations in the implementation there.

Q Okay. And have you participated at any consultation on the implementation of the benchmark methodology?

DR. HOLT: So that would be that recent June workshop where we -- where First Nations were invited to participate in that implementation workshop, the Strategy 1. That was June 2010.

Q Okay. Thank you. I'd like to now ask you about setting benchmarks for the conservation units. Have any conservation units been identified as priorities for benchmark determination?

DR. HOLT: The over -- Strategy 1 Oversight Group identified four priorities, one being Fraser River sockeye salmon, and another being Fraser River Chinook, another being Barkley CU's, all species, and Skeena CU's, all species.

Q Okay. And why did the group choose these CU's as priorities?

DR. HOLT: I can speak to the Barkley Sound. It was

chosen because it was a pilot, a Wild Salmon Policy pilot. Fraser River, in part because this process had already started, the Cohen Commission. The rest of the panel can speak to other reasons.

Q Okay. And so perhaps that would be the Fraser River Chinook and the Skeena CU's, if other members of the panel can assist? The question is why -- how -- why these two CU's were identified as priorities for benchmark determination.

MR. SAUNDERS: Yes, Mr. Commissioner, I can add that some of the additional work in the Skeena was because we had additional resources and initiatives that were moving ahead on planning that also wanted to work on benchmarks, so in addition to the work on -- in the pilot and the work that was going on in the Fraser, other initiatives came onside as well.

Q Okay. And the Fraser River Chinook, is that...?

MR. SAUNDERS: Fraser River Chinook, I can't recall the rationale there.

Q Okay.

DR. IRVINE: Well, I can comment. I wasn't actually part of that decision-making process, but Fraser Chinook were the topic of a very early CSAS paper identifying conservation units, and there's also been some conservation concerns raised in the past about early run time of the Fraser Chinook. So I actually don't know if those were the reasons --

Q Right.

DR. IRVINE: -- but they would be logical reasons.

Q Thank you. And just for confirmation, I think last week, Dr. Holt, you mentioned that Blair Holtby was doing work on a rapid assessment method. Is that part of this?

DR. HOLT: So that's one method for identifying further priorities, those that have high conservation concern would be pointed or highlighted in Dr. Holtby's assessment -- synoptic assessment framework.

Q Thank you. And I'm not sure if this has been answered, but has any work been done on setting benchmarks for these four groups of priority CU's?

DR. HOLT: So we've spoken about the Fraser River sockeye --

Q Yeah.

DR. HOLT: -- where we made progress. And Barkley Sound benchmarks have been identified, but they

haven't been formally reviewed.
Q Mm-hmm.
DR. HOLT: In the Skeena, my understanding is that work is underway, but I haven't seen progress -- the specific progress, myself. And I'm uncertain about Fraser Chinook.
Q Thank you. Ms. Stalberg, with respect to Action Step 2.1, you told us about the habitat status reports, which you helped to develop. One moment, please. Sorry, I'll go back to Action Step 1.3; two questions for the panel.

What work is currently being done on the monitoring and assessment of CU's? Perhaps -- I'm not sure, Dr. Irvine or Mark Saunders?
DR. IRVINE: Because I believe the question was what work is being undertaken on the monitoring and assessment of CU's, and I think it's important to point out that we have been assessing the status of salmon in British Columbia for over 50 years, so that there's a long history of stock assessment work that's been undertaken.

As far as Fraser sockeye are concerned, Fraser sockeye CU's, beginning with the International Salmon Commission, and then followed on by DFO, we have over, again, almost 50 years of detailed stock assessment research.

What's different with the Wild Salmon Policy is that this process is formalized and the conservation units are specifically identified, but in many cases the work has been underway for many years. That doesn't mean to say that we have assessment information on all conservation units, we don't, and Dr. Holt talked briefly about how we are -- the work that she's undertaking to kind of deal with these missing data gaps.

So in the policy, itself, it refers to what we call indicator systems, which are systems where there's a lot of detailed information that's gathered, intensive monitoring, where we've usually trying to partition survival into -- or mortality into the freshwater component and the ocean component, and then extensive monitoring, which are surveys over a broad range of area, really, sometimes just looking at presence or absence and looking for major changes.

So this kind of design is being formalized in a WSP conservation unit stock assessment

framework, which Dr. Holtby is working on, and my understanding is that that will be presented for CSAS review sometime this next calendar year, I believe. So there is a more formal assessment framework monitoring process which is being reviewed, and it's something that Dr. Holtby is working -- has been working on for several years.

Q Okay. And is it my understanding from last week that DFO has data on 19 Fraser sockeye CU's; is that the right number?

DR. IRVINE: I think there's data on more than 19. My recollection was that there was sufficient to develop a preliminary status assessment of 19. Is that the case?

DR. HOLT: Twenty-six.

DR. IRVINE: Twenty-six, sorry.

Q Twenty-six, okay. Thank you for clarifying that, Dr. Holt.

And Mr. Saunders, can you explain for the benefit of the Commissioner, this stock assessment framework?

MR. SAUNDERS: Yes, Mr. Commissioner. I think the stock assessment framework has meant a lot of things to different people, but I -- over its development, but I really see it as a CU by CU business plan for matching up priorities and defining what actual stock assessment program we're going to put in place with the resources that we have for each of the CU's.

And as Dr. Irvine pointed out, we certainly have a series of monitoring programs and options that are documented in the policy around indicator systems, intensive monitoring and extensive monitoring. It's a costly undertaking and we've got to be careful in how we -- we employ that in the most efficient manner, and that CU's get the attention that we assign a priority relative to the importance of that CU and the risk that's being visited on it. So it's really a business plan on how to move forward, Mr. Commissioner.

Q Okay, thank you. So what other -- what else would allow for further progress on monitoring as contemplated by Action Step 1.3?

MR. SAUNDERS: Mr. Commissioner, I believe that the development of the stock assessment framework is one of the key elements that's required to move ahead the monitoring, because it establishes the

priorities and, as Dr. Holt mentioned, the work that Dr. Holtby is currently working on to develop a synoptic framework, so a very rapid assessment of the status of as many of the CU's that we have baseline information on, to allow us to have in front of us that overall view of the status to help us prioritize where work is needed and to design a stock assessment approach that is appropriate to -- to move forward.

Q Thank you. So --

MR. WALLACE: Mr. Commissioner. Mr. Timberg, I wonder if the witness is -- it sounds like he's referring to a document that I'm not familiar with, a business plan relating to monitoring. I -- what is the document he's referring to?

MR. SAUNDERS: Mr. Commissioner, I suppose that -- I believe they're in -- I don't think we've referred to them, yet and I don't recall the document number, but we did -- there was a business plan or a stock assessment framework developed in 2004, prior to the development of the conservation units, and it's that document that defined the core assessment activities that we -- that are referred to in the Wild Salmon Policy on page 19, around those issues -- those -- what will be the plan for each CU.

Right now, it does -- the 2004 document describes the approach that we take to stock assessment in each of the regions, or each of the areas within the region, but it hasn't -- it is the part of building the new framework is to update that to refer to conservation units specifically. And so that's the process that Blair -- Dr. Holtby's involved in right now.

MR. WALLACE: I wonder, Mr. Commissioner, if this document has been -- is on Canada's list?

MR. TIMBERG: If I could speak to my -- Mr. Saunders at the break, I'll get back to you on that.

Q Ms. Stalberg, if we could turn to Action Step 2.1, you told us a bit about the habitat status report, which you helped to developed, and you mentioned there was a two-tier --

(CELL PHONE INTERFERENCE)

THE REGISTRAR: I think we have some Blackberries running or operating.

MR. TIMBERG: Okay.
Q Ms. Stalberg, you told us a bit about habitat status reports which you helped to develop, and you mentioned there was a two-tier approach to characterizing habitat: one, an overview report for each CU; and, two, a habitat status report. Can you explain what an overview report is?
MS. STALBERG: Yes, Mr. Commissioner. The overview report is like the title, brief overview of the watersheds within a CU where the population of fish would exist, the general threats to the population within a CU, habitat-related threats, the -- through pulling out of some of the provincial databases early thinking was to provide, say, the area of the estuary, the length of stream that's accessible to them, or the size of the lake that they inhabit.
Q Okay. And have there been any overview reports generated?
MS. STALBERG: Back --
Q Have there been any?
MS. STALBERG: Yeah, back in 2005/2006 we piloted both the overview reports and the habitat status reports. And "pilot" by meaning of testing out a format structure of them. So there was five overview reports generated, I believe.
Q Okay. And was there an overview report completed for Cultus Lake?
MS. STALBERG: Yes, there was.
Q Okay. And what's the present status of these overview reports?
MS. STALBERG: The present status is that they are -- well, we did consult on the two-tier approach early on in the consultations and gained generally positive feedback on this approach. And as far as I am aware, the overview reports have been posted internally on a share drive, and I cannot tell you if they are on the web-mapping application that's available to the public.
Q Okay. Thank you. And can you explain, then, what is a habitat status report?
MS. STALBERG: So through our work with looking at data availability and the amount of effort it would take to pull information out of provincial databases, for example, an even, what it's called gray literature, or literature that is not published, or published literature. A two-tier

approach was determined because there's quite a bit of effort that's required for, then, the habitat status report.

So an overview report, as I mentioned, if there was threats, landscape-level threats, like the land has been converted into urban or agriculture or logged to, say, a benchmark, then a flag might come up, and that would initiate the development of a habitat status report, a more detailed report. Or there could be a priority CU where we want more information than what's in the overview.

So the habitat status report goes into a fair amount of detail on the population of fish, the life history requirements for each life stage, you know, from egg to adult, and then what's required, and then what are the limiting factors per life stage, the highly productive habitats per life stage.

Q Okay.

MS. STALBERG: And then the indicators would be relevant to those particular limiting habitats and highly productive in the life stage. They would be selected and built into the habitat status reports. Any monitoring to gain a status relative to benchmarks. And then the conservation efforts done to date, recommendation, as well as the protection efforts done to protect those highly productive.

Q Okay. And to your knowledge, how many of these habitat status reports were conducted in your tenure related to sockeye salmon?

MS. STALBERG: So we piloted nine, and out of the nine I think one was done for Trembleur Lake sockeye.

Q Okay. And perhaps we should turn to a habitat status report?

MS. STALBERG: Yeah, depicting it would be helpful.

Q And this is at -- Mr. Registrar, if we could have Exhibit 209, please. And if that could just be increased in size? That's not it?

MS. STALBERG: That's not it, no. If you want, we can pull it right out of the Stalberg, et al, paper, and it's Appendix 2.

Q Exhibit 2?

MS. STALBERG: It's in the Stalberg, et al paper, and it's Appendix. 2.

MR. TIMBERG: Okay. Sorry, one moment, please. Mr.

Registrar, I apologize for this, it's also located at Tab 39 in Canada's list of documents, if we can find it that way.

Q Is this the document?

MS. STALBERG: Yes, thank you.

Q And could you explain for the Commissioner what this document tells us? First of all, this is a habitat status report?

MS. STALBERG: That's correct.

Q And for what CU?

MS. STALBERG: It is east coast Vancouver Island Coho conservation unit, and it's specific to the Englishman River.

Q Okay. And what does this kind of document tell us?

MS. STALBERG: This is an example of the habitat status report. The headings in the blue are basically those steps that I just ran over with the group. The life stage of the fish is listed on the far left column, in the mauve, and then what requirements for each life stage are then listed. Moving on to what are the known limiting factors and high value habitats --

Q And Ms. Stalberg, would you agree that what's new about a habitat status report is that you're covering each of the different stages of the salmon's life and you're describing the various habitats from the egg stage, the alevin stage, through to its departure down the Fraser to the ocean and back; is that --

MS. STALBERG: That's correct, or from whatever watershed it's migrating out to the ocean through. So this status report then -- it was an early example to test the thinking, the logic, that line of thought for right from the life stage through to the known limiting factors and high value habitats, and then, well, what indicators do you select that relate to those habitats? And then the performance indicators or status. Well, status would be, figure it out once monitoring was done. Status is, you know, how -- how are you in relation to the benchmark, and that's where it's -- the next step is performance indicator threshold.

Q Okay.

MS. STALBERG: And then next is, as I mentioned, the possible measures to address limiting factors, the

possible measures to maintain productivity, and then the habitat protection and restoration measures undertaken.

Q Okay. And what does the yellow colour designate?

MS. STALBERG: Well, when we -- so in this '05/'06 pilot, what the -- what we did, so Gary Taccogna and others on the Habitat Working Group, including myself, said, "Yeah, this seems like a good approach to drilling into the requirements of the policy and gaining that information in sort of a ready format, but let's test that." So Gary populated this with information he gained through going through that gray literature and the published literature. He populated it and then we said, "Well, right now we don't have the habitat requirements for each life stage."

Actually, I'll step back. So what we did is we said, "Well, let's identify, through these columns, the yellow, what we're going to want to test the contractors" -- or, sorry, yes, "the contractors to test in terms of the logic," because we didn't have, at that time, the our performance indicators, and we weren't doing monitoring. So those lines were struck out, as you can see in the top column. But we left it in there so that whomever was undertaking these, whether they be internal DFO staff or contractors that we were testing these out on, could see the line of logic as well.

Q Okay.

MS. STALBERG: So the yellow highlighted ones were the ones that we did want to be filled in.

Q Right. And so does this template capture enhancement efforts?

MS. STALBERG: Yes. So it captures enhancement and it's meant to be an adaptive management approach as well. So as you see in the last column, it's habitat protection and restoration measures undertaken. So that captures what has been done.

And by starting to itemize these things, these efforts, then you can gain a sense, well, is it really addressing the issue, these limiting factors, or is the same thing being done over and over and we actually need to change our practices?

Q Right.

MS. STALBERG: Or, is it effective and thus the habitat is, over time, no longer limiting? So there's a

need to revisit these every five years and update them with information.
Q Okay. And what's -- I know you left your position in early 2009. Do you know what the plan is, moving forward, on the implementation of Action Step 2.1?
MS. STALBERG: Before I get to that, I just want to mention about these habitat status reports. They're partial in the sense that, as you can see, there's only so many columns that we ask to be --
Q Mm-hmm.
MS. STALBERG: -- populated, so they're partial in that sense. But they're also partial in a sense that we just -- we used internal information for those --
Q Right.
MS. STALBERG: -- that undertook the work. So the approach to these would be really to accrete information. You would look at literature, published, gray literature. You would talk to, you would gain local ecological knowledge --
Q That's helpful, yeah.
MS. STALBERG: -- Aboriginal technical knowledge. So you would build the picture, and then you would, in a sense, test those perspectives with the indicators as well. Because sometimes people have different views on what's going on, and it's very useful to have indicators as objective data to test those views. And so we have, since testing these, the habitat requirements for each life stage --
Q Right.
MS. STALBERG: -- we did run a contract with Ron Diewart, and he published -- or he produced a series of reports for each species on each life stage and what is needed, so that that is, as I believe, on the web-mapping application, and so anybody that wants to do these can then mine those reports of Mr. Diewart's and put in the habitat -- fill in that column on the habitat requirements for each life stage.
Q That's very helpful. And so what's the plan, moving forward, with this Action Step 2.1?
MS. STALBERG: Well, we did, again, consult extensively on this type of approach, the overview and habitat status, and they gained favourable feedback. So through a quite intensive process with the, what's

called OHEB, group, there were --
Q And that's Oceans Habitat Enhancement Branch?
MS. STALBERG: And Enhancement Branch, yes. So there -- there were essential elements of all of the approaches and products that were developed through the Habitat Working Group's efforts for OHEB to take forward. One of them was to continue on generating one or two of these per DFO area per annum, and the reason, even if indicators aren't being monitored to their fullest extent, by still just partially filling in these, it helps with that prioritization of, well, what are those really important habitats that we need to focus in on and protect? Where do we need to direct our restoration efforts? And by posting these on something like a web-mapping application, it also then helps the public, being -- say it's corporations looking at developing in certain areas or partners wanting to do restoration, it helps to guide their efforts in terms of what areas to avoid or what areas to focus on for restoration efforts.
Q Okay.
MS. STALBERG: Oh, and I would add one more thing.
Q Yeah?
MS. STALBERG: And there's also partial or evolution as -- as Strategy 3 begins to refine the indicators, I could see an evolution of these reports. For example, so it might integrate both Strategy 3 and Strategy 2. So over time there might be an evolution of these.
Q Okay. Thank you. And so my next question is: Did the Habitat Wild Salmon Policy Working Group develop any of its own indicators?
MS. STALBERG: Yes. There were two indicators and then, as well, refining some of the others that were suggested through our consultations. So one was for -- specific for sockeye, and that was the coldwater refuge zone and --
Q Can you explain what that is?
MS. STALBERG: Sure. For anybody that might reside in a very hot area, like Kamloops, if your house is not air conditioned, the only thing you might want to do during the day is go to the basement. You want to get refuge from the heat, you go to the basement, where it's cool. You come up when it's cooled down in the evening. And it's analogous to

the coldwater refuge zone. Sockeye, during the day, they go to -- they drop in depth in the lake, and they go to an area where the oxygen concentration is appropriate for them to breath, and there's a certain -- and the temperature is appropriate, and that's -- and then, during the evening, when it's darker --

Q Right.

MS. STALBERG: -- they then migrate out of this coldwater refuge zone and they move towards the surface, where they then feed.

Q All right. Thank you.

MS. STALBERG: So the width of this coldwater refuge zone is important, because if it's narrow it can compress the area where these fish are finding refuge, and if it's wider, they have more space and they're less competing for --

Q These are like hydrotherms in the lake, in the depth of the lake?

MS. STALBERG: You could -- that's part of it, is the temperature. Temperature is a factor, yes.

Q All right. And you mentioned that you had -- there were two and that was one. What was the other?

MS. STALBERG: Yeah, another is permitted waste -- permitted waste discharges, and that one, through our consultations, we gained a wide array of feedback on which indicators to use. One was, well, you could simply identify all of the different industries and their sort of discharges within a watershed where a CU might exist.

And when we started evaluating water quality parameters, there are many, and they are more or less responsive than each other. So we also consulted with an internal expertise on water quality. And after evaluating those challenges with every -- not every, but many, many types of water quality attributes or indicators, the best approach we thought to take would be to look at, well, how many of these permitted discharges occur within the CU.

And that information would be gained from a provincial database. So that's a -- that would be a pressure indicator.

Q Right. Okay, that's helpful. Last week we went to your paper which is -- Mr. Registrar, if we could have Exhibit 175 brought up - and we were

talking about indicators, but we never saw the list of indicators. So I'm wondering if you could, at Exhibit 175, you could turn to Table 3.5? Actually, it'll be near the end somewhere. So it's Table 3.5. Page 36, I think it is.

MS. STALBERG: It's on around page 20 of this Stalberg, et al, doc.

MR. TIMBERG: Oh, I'm being told 36 of the PDF, but that's not the table. You found it.

MS. STALBERG: That's it.

MR. TIMBERG: If that could be enlarged, please. Thank you.

Q So if you could just, for the assistance of -- so this is the list of indicators?

MS. STALBERG: It is, yes. So it extends on page 20 and 21. And it can be sorted in various ways. This is sorted around species, but there are lake, stream and estuary indicators, both pressure and status, and quantity indicators as well. So it's on page 20 and 21 of the document.

Q And does your paper recommend -- oh, and that's exactly what this has done. This, then, recommends certain indicators for certain species or habitats; is that correct?

A Yes. It's which ones are more relevant to some species than others, so --

Q So for our purpose here, we could look at the lake rearing sockeye and estuary rearing sockeye; would that be the right approach?

MS. STALBERG: Yes.

Q Okay. Thank you. Ms. Stalberg, moving onto the development of habitat benchmarks, how did you approach to identify habitat benchmarks used -- and perhaps here, could you just clarify for me the difference between a habitat benchmark and the other conservation unit benchmarks we've been talking about?

MS. STALBERG: Yes. So a benchmark is the same in Strategy 1 and Strategy 2. It's a measure that you can then relate status to. But in Strategy 1 there is a call for two benchmarks -

Q Right.

MS. STALBERG: -- in order to set up those red/yellow/green zones.

Q Right.

MS. STALBERG: That is not articulated in Strategy 2. The benchmarks requested as per the policy in

Strategy 2 are that they be desired levels and/or those where it's set before the productivity of the habitat starts to decrease and there can be some type of intervention action, if needed.

So based upon that, we worked on developing indicators for the -- or, sorry, benchmarks for the various indicators.

Q Okay. That's helpful. So with that clarification, how did you approach the identification of habitat benchmarks to incorporate a precautionary approach?

MS. STALBERG: We have three kinds of indicators: there's the pressure; status; and quantity. So for the quantity indicators, we did not provide a benchmark. And the quantity indicators would be, well, how much of the stream is accessible, accessible stream length. And we did not think it appropriate to put a benchmark per CU on how much stream length is needed, because there is limited -- a limited understanding on the relationship between the production of fish and the habitat. You know, "X" kilometres of habitat will -- stream will produce "X" amount of fish, and the various habitat types, whether it be estuarine or other types. So this was certainly identified as a need to strengthen that correlation and that is not a simple task, and there have been efforts in the past to do that. So that's for the quantity, so there are no benchmarks.

For the pressure and state, where there was information that we could generate benchmarks, and that's, again, available data or some kind of relationship to fish production or habitat productivity, we looked at the published material and experience of the Habitat Working Group as well, and determined the metrics, the way of measuring the benchmark, and then determined a benchmark. And in those investigations we looked at -- so for temperature, for example, the status indicator of temperature was set at -- so it depends on the species --

Q Mm-hmm.

MS. STALBERG: -- but those were set at a precautionary level. The pressure indicator of how many kilometres of road is there per square kilometre within a watershed, that was set at a very conservative level of point four, that's like 400

metres, because there is literature on --
Q And what's the relationship between the road and the conservation unit?
MS. STALBERG: The indicator is that -- well, more the -- there's research that shows road development can contribute to sedimentation within your stream. It changes the hydrology, the way that the water runs off the land base, so that can affect how the peaks and flows within your water are affected. It also relates to, again, landslides, so there can be barriers to migration as a result. So there's a number of risks associated with the fish habitat with road development, and they go up the higher the --
Q Okay.
MS. STALBERG: -- rate. So there was -- where we could, we identified benchmarks. And then, where there wasn't data --
Q I'm sorry, just for clarity --
MS. STALBERG: Sure.
Q -- where possible, you have benchmark for the pressure indicator and the status; is that --
MS. STALBERG: Yeah, pressure and status.
Q Yeah.
MS. STALBERG: And then where there -- there wasn't information --
Q Right.
MS. STALBERG: -- for example, this coldwater refuge zone, so that's a new indicator. There isn't a benchmark for that. What the recommendation is, that you would look at, for example, all the sockeye lakes through measuring this coldwater refuge zone in each one. You would then, say, line them up, a distribution curve it's called, but line them up from the smallest to the biggest, and start to analyze that and see if there is any benchmarks that can be determined. And that same -- so it's called a relative comparison. And another example that that would be applied to would be, say, for total land conversion in a watershed. So there isn't -- there isn't a relationship when you add up what's been logged, what's been changed into agriculture, how much of the land base is urban development.
There isn't a benchmark for rolling up all those kind of data, and so what, again, the Habitat Working Group, what we recommended was,

"Well, line these up," so line all those watersheds up and how much land has been converted, and then test it with LEK, local ecological knowledge, and that can also include ETK, and say, "Okay, so you live here. Now, here's the spectrum of development in watersheds within the CU. Do you see -- are you familiar with any of these watersheds and where the stream condition is?" in a sense, starting to unravel, they're starting to show signs of sedimentation or where there's gross landslides, and through that kind of work then you can start to set benchmark, and you may be able to translate those into other CU's as well.

Q Okay. That's very helpful. So where there wasn't a benchmark, a habitat benchmark identified, what do you do in that instance?

MS. STALBERG: And so that's the process that I explained. There can be -- it's either spatial or temporal comparisons over time.

Q Okay. Thank you. And your paper, then, how is peer review conducted of your paper different from the regular CSAS peer review process?

MS. STALBERG: We did, Mr. Commissioner, take a different approach to the review of the habitat indicators, metrics and benchmarks. I was not confident that the CSAS review process could accommodate something like cost in selecting a suite of indicators, and cost was one of the, if not main, big factors in why other indicator types of programs were not carried through in other jurisdictions. I mentioned some of them last week, I believe, like in Washington State.

So what we did, though, was a peer review process, and we -- there were many similarities to the peer review process that we undertook in relation to the CSAS process. So Mr. Irvine -- or Dr. Irvine and Dr. Hyatt and myself and others on the Habitat Working Group, we collaborated on generating the terms of reference, the agenda, and participants, the representation, and quite importantly, the key -- they're called key reviewers, but the reviewers of the document, so I ensured that we gained a reviewer that had experience in developing indicators.

And then we gained experience -- we had a reviewer that was -- had experience on

implementing a monitoring program. And then, lastly, an interviewer that would need to manage with the results, so, "What do you do with this information?"

Q Right. And you mentioned cost as a factor in identifying indicators. For the assistance of the Commissioner, could you describe your concern about the costs in conducting this work?

MS. STALBERG: Well, a couple of examples, Mr. Commissioner, when -- when we looked -- we were trying to look at lessons learned. So if you recall, I had mentioned that the early PFRCC reports, they're very helpful in identifying indicators in some of the ways of frameworks for rolling them out, but not the lessons learned on where other Pacific Northwest jurisdictions had challenges in implementing the program.

So Gary Taccogna, the earlier habitat coordinator, and then myself followed up with Carol Smith, PhD, that manages the Washington State Conservation Commission. They undertook a monitoring program and they broke out Washington State into 45 basins and they hired nine staff, and over a course of five years they set up -- they tackled five of these basins per -- or, sorry, nine of these basins per year, and they set up teams with local representatives. And just mining data that's already in repositories, so not going out and doing any of the monitoring physically, or using new satellite imagery, it was a million dollars a year.

So that opened our eyes on the cost of doing monitoring. So there's monitoring -- you can do monitoring in three ways. You can just mine existing databases and hopefully they are robust. You can go out and physically do the monitoring, you know, go out, wade streams and take the temperature, or you can do some of it remotely, such as through the satellite imagery.

So that was one example. But then I also followed up --

Q When was this Washington State study done, approximately?

MS. STALBERG: It was in the -- I think it was late '90s, like '97 on. And I can confirm that, if you'd like. And then I followed up with Bruce -- Kirk Krueger and Bruce Crawford, of Washington

State, as well, in the recreation and conservation office, and they were putting together a -- Bruce Crawford was one of the leads for putting together a state-wide monitoring program, and this monitoring program was to gain information on the habitat status, the fish population status, water quality status, so that that information could inform their ***Endangered Species Act*** listings and recovery measures.

And the -- so Bruce Crawford's work, they looked at developing a framework for, I think it was, something like 22,000 monitoring sites across the region, a highly statistical way of monitoring through an EMAP, environmental monitoring assessment process, adopted in other states.

So highly statistically robust, but expensive again. I think I've got a sheet with a summary, here, on costs. They tried to get support -- so it was a couple of million dollars over two years for just the -- some of the habitat monitoring work, not all of it. They tried to get funding from the State legislation -- State legislature for two or three years, and they were turned down. It's just too costly. So they gained $500,000 to do a limited part of monitoring in Puget Sound.

So you can develop a really good program with really good indicators and a framework, but you need to have -- it can be a costly exercise. And so that was factored into our deliberations, as well, on selecting our suite of indicators.

Q Okay. And thank you for that.

MR. WALLACE: Mr. Registrar, just for the record, the witness referred to a peer review process. Am I correct that that's Exhibit 158, that workshop report is referred to -- or provided?

MS. STALBERG: Yes, it is, thank you, yeah. And working through the agenda with Dr. Hyatt and Irvine, so we had the key reviewers, Carol Smith that I mentioned, Dr. Carol Smith, from the Washington State Conservation Commission, she was one of the key reviewers, and we set up the agenda like similar CSAP processes, where there would be a key reviewer that would provide comments, then the authors would provide a response, then there would be a general discussion and moving through.

MR. WALLACE: Mr. Commissioner, the witness has also referred to another document that I'm not familiar

with, I think relating to costing, a summary. Perhaps that could be provided to participants?

MR. TIMBERG: I'll speak to the -- to Ms. Stalberg at the break and I'll provide an update on that.

Q Ms. Stalberg, you stated in your will say statement that the monitoring of habitat status in using your indicators and benchmarks has not yet begun. Do you have an update on that?

MS. STALBERG: In my interview with Mr. Wallace and Lara Tessaro, they did show me a Harrison -- Harrison River Habitat Status Report, and I think there were a number of different habitat status reports relating to it. I believe that was generated after my tenure. But in the quick review that I had with them of the document, what was helpful was that the individual, I think it was a Ms. Pearson, a consultant, that generated the work, she had gone even further in the habitat status reports than what OHEB had noted as saying they would undertake, if you recall, those two habitat status reports per annum, per area, if I've got that right.

So in Ms. Pearson's work, it appeared that she had mined some of the literature out there, and referring to the indicators within the Stalberg, et al, report, she then pulled out information relative to that. I didn't give an exhaustive review of those documents, but I thought that was promising in the sense that there was some monitoring being started.

I don't know if that is being undertaken in other areas and for filling in other habitat status reports, and I also do not know the full extent of what science might be doing in terms of getting ready some of these habitat indicators, like the coldwater refuge zone. I was able to talk with Erland MacIsaac, one of our habitat working group members, last week, and refreshing my memory on some of the work, and he did mention that they are starting to look at some of the initiatives they've started within science that might help advance some of the sockeye-related indicator work. But he would be better able to speak to actually what they have undertaken to date.

Q Okay. Thank you. Moving onto monitoring framework --

MR. WALLACE: It's, I notice, Mr. Commissioner, it's 11:10. Perhaps this would be a convenient time to take the morning break, if Mr. Timberg's moving on?
MR. TIMBERG: That's fine.
THE COMMISSIONER: Mr. Timberg, how much longer will you be?
MR. TIMBERG: I expect -- I've got a few more questions for Ms. Stalberg, and then I expect I'll go until the lunchtime break.
THE REGISTRAR: The hearing will now recess for 15 minutes.

(PROCEEDINGS ADJOURNED)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: Hearing is now resumed.
MR. WALLACE: Mr. Commissioner, for the record, Brian Wallace, commission counsel, and I failed to identify Lara Tessaro, junior counsel who is with me this morning. Mr. Commissioner, just a couple of housekeeping matters, for those who weren't here earlier, we will be sitting today, tomorrow and Thursday until 4:30. A reminder on cell phones, that sound we hear is cell phones interfering with the wireless microphone, so if witnesses would turn off their cell phones, please.

Mr. Lunn distributed this morning a hard copy of an updated exhibit list. There are more available at the front of the room if others require them.

Just for the record, Mr. Commissioner, there are a couple of exhibit duplications that I just want to identify and these will be corrected and a note made on the next version of the exhibit list, but for the record, Exhibits 185 and the 207 are identical. Because numbering would get far too complicated, we're not going to do anything about that. We're just going to identify the fact.

And second point is Exhibit 198 has -- is all of two other exhibits, if you like, so pages 1 to 6 of Exhibit 198 are identical to Exhibit 134 which is the record of decision of the August 9, 2005 Regional Management Committee meeting and pages 7 to 16 of Exhibit 198 contain a black and white copy of Exhibit 170 which is the

presentation made to the August 9th, 2005 Regional Management Committee meeting.

Thank you. Mr. Timberg?

MR. TIMBERG: Mr. Timberg on behalf of Canada for the record. Mr. Commissioner, there were three documents that were referred to in the morning's testimony I'd like to clarify. First, the document that Heather Stalberg spoke about which was Canada's Tab 39, it has, I understand, been marked already as Exhibit 206. I'd just like to confirm that with Mr. Registrar.

THE REGISTRAR: That's correct.

MR. TIMBERG: Okay. Thank you. So that is Exhibit 206. Second, Mark Saunders in his testimony this morning referred to a stock assessment framework in 2004 and that has been disclosed. If, Mr. Registrar, you could pull up CAN058266.

CROSS-EXAMINATION BY MR. TIMBERG, continuing:

Q And I'll ask Mr. Saunders if he can identify this document.

MR. SAUNDERS: Yes, I can.

Q And can you explain what this document tells us about stock assessment framework?

MR. SAUNDERS: Yes, Mr. Commissioner. This is a document that I referred to that as of 2004/2005, before we actually had the -- completed the identification of the conservation units, this was the description of our approach to stock assessment in the Pacific Region. It's an exhaustive document with a tremendous amount of detail. I think it might be worth just having a look at I believe it's Table 1, if you can scroll down. I don't know the page number. I can give you an example of the type of information that it includes. No, it would be further down. Maybe it's -- maybe it's an appendix table.

MR. TIMBERG: This is -- you want the CAN number? We haven't got it marked -- oh, perhaps we can have it marked as the next exhibit, Mr. Registrar.

MR. SAUNDERS: Is there an appendix table down --

THE REGISTRAR: Be Exhibit number 210.

EXHIBIT 210: Document describing stock assessment in the Pacific Region

MR. SAUNDERS: It would be further up where it says "part". Say we are at Part C, maybe Part A. Sorry about this.
MR. LUNN: Further up?
MR. SAUNDERS: I think it's further up, yeah. Well, why don't we just stay there. I'll try -- I think I can re-look at this one. So this is an example of an assessment framework for stock units and as we've discussed earlier, Mr. Commissioner, we're moving away from this idea and refining conservation units as the unit of interest, so the stock unit. And the first column identifies what we were calling an assessment stock unit. I forget what the "F" stands for. So you can see various components of stock units. And then as you move across, it provides information about the background on that stock unit and I don't recall the actual numerical values, but around information to help prioritize our work around its current status and other details to help prioritize the work here. And then as you go across the top there, you can see indicators, extensive escapement, fisheries monitoring, principle impacting fisheries, et cetera, categorical status. So this is all the information around, as we've described before, the various programs -- whether we have an indicator and extensive escapement and fisheries monitoring. So this work is in the process of being updated to -- instead of an AFSU on that left-hand column, we would be talking about a conservation unit and then undergoing a prioritization of work to be done and as well as a description of it, and that would constitute a stock assessment framework going forward.
MR. TIMBERG: And for the record, we're at page 10 of 57 of Exhibit 210 and it's a Table 3 titled "Table 1 for Sockeye Assessment Framework Stock Units".
Q And can you clarify what AFSU stands for?
MR. SAUNDERS: Yeah, I know it's Assessment Framework Stock Unit perhaps. Yeah, there it is, right in the title.
MR. TIMBERG: Okay. Thank you. Second, Ms. Stalberg discussed having brought with her a document on Washington State monitoring program costing and we've circulated, Mr. Commissioner, a copy of this document and if perhaps this could be marked as

the next exhibit.
THE REGISTRAR: Two hundred and eleven.

EXHIBIT 211: Governor's Forum on Monitoring

MR. TIMBERG: And the top of the document it says "Governor's Forum on Monitoring".

And finally, there was a document that Ms. Stalberg mentioned on the conservation -- an overview report of Cultus Lake and this has been circulated, Mr. Commissioner, and it's titled "Conservation Unit Template Cultus Lake Sockeye Salmon" and the bottom, the date is October 2005, and if this document could be marked as the next exhibit?
THE REGISTRAR: Two hundred and twelve.

EXHIBIT 212: Conservation Unit Template Cultus Lake Sockeye Salmon

MR. TIMBERG:
Q Ms. Stalberg, before the break you were talking about what's happening next with respect to habitat status and use of indicators and benchmarks; is there anything else you had to add?
MS. STALBERG: Yes. Simply that we also want to integrate Strategies 2 and 3, so integrating the -- within the policy, Action Step 2.3 says coordinate the monitoring efforts of the habitat indicators with the ecosystem and Strategy 1 fish population status, so what we do want to do is coordinate all of the different kinds of monitoring and so we need to determine what those Strategy 3 indicators will be and then develop a monitoring framework.
Q Okay. Thank you.
MS. STALBERG: That will help to guide actual implementation.
Q Okay. And you -- and can you describe how a guide would benefit monitoring efforts?
MS. STALBERG: Framework -- a monitoring framework?
Q Yes.
MS. STALBERG: So a monitoring framework lays out what indicators are employed where, what intensity. Are they sampled? Is it once a year? Twice a day? It can identify who does what, so for example, Mark Saunders last week talked about the

number of stream-keepers out there, but they may only be interested in monitoring certain indicators and -- or the department is more suited to provide data monitoring on certain indicators, like those sockeye ones through our sockeye research group.

So you need to start generating agreements on who's going to do what and then really importantly, you need to figure out well, what are the data standards, where is it going to go, the reporting. And there's also -- you want to make sure that you address ownership of the data because there have been concerns expressed to myself through consultations and working with different groups, like First Nations, on sensitivity around TEK, as well as stream-keepers on, say, the misuse of data that has been generated by them in the past. So you need to work out these details in generating your monitoring framework.

Q Okay. Thank you. Moving on to Action Step 2.4, were there any other initiatives piloted to serve -- or were there any pilots initiated to serve Action Step 2.4?

MS. STALBERG: Yes. So again, Mark Saunders last week mentioned the Living Rivers Program where there was provincial funding generated to support salmon, protect salmon resources within the Fraser basin. So way back in July '06 Dr. Hyatt had set up a workshop in Washington with a number of U.S. scientists on ecological indicators and different programs and one of the participants was a gentleman called Steve Katz of NOAA, so the National Oceanographic and Atmospheric Agency, and he was, if not leading, coordinating a program called the Pacific Northwest Aquatic Monitoring Program.

And I followed up with him because he was a wealth of information on doing really what Strategy 4 is requesting, which is how do you bring together a diverse group, diverse parties, that are involved in salmon monitoring and try and make that information accessible, more readily accessible, so that you can more quickly generate things like habitat status information and build efficiencies into your program. So that was pulling together tribes and state employees, state

information and other parties.
So I followed up with him and gained some lessons learned, as well as going through their -- their portal and website and seeing how they depicted information. So I generated a proposal on how to do something similar and met with Coral DeShields, who was the -- one of the Fraser Basin Council coordinators that was part of this Living Rivers Program and she thought this was a good idea, so she took this on and put it forward as a -- again, a pilot really, but this is a very large pilot for the whole Fraser Basin to try and start -- how would we, as Action Step 2.4 calls for, starting to integrate the different monitoring programs that are going on out there and where could that information be made best available.

Q Okay.

MS. STALBERG: So I worked with Coral DeShields on that and over time that program evolved into what was called the Aquatic Information Partnership and I don't know where the status of that pilot is at this time.

Q Okay. Thank you.

MS. STALBERG: I would -- sorry, I should have added though by testing it out in a watershed size like the Fraser, lessons learned could be then applied to -- the Skeena watershed basin or the Columbia.

Q Right.

MS. STALBERG: The big systems, and it may be able to evolve further.

Q Ms. Stalberg, can you comment on a presentation that you made to -- with respect to habitat and the connection between monitoring under the WSP and the National Habitat Management Program?

MR. TIMBERG: Perhaps, Mr. Registrar, we could have Exhibit 204 brought up.

Q And, Ms. Stalberg, do you recognize this document?

MS. STALBERG: Yes, I do.

Q And could you explain this presentation?

MS. STALBERG: Yes.

Q That's Slide 5 I think is of assistance.

MS. STALBERG: Thank you.

Q First of all, who did you make the presentation to?

MS. STALBERG: This was to Ian Matheson.

Q And who is he?

MS. STALBERG: He was at that time the -- started as

the DG of habitat within Ottawa.
Q Okay.
MS. STALBERG: And he came to the Pacific Region to learn more about our business.
Q Okay.
MS. STALBERG: And I was asked to provide information on the Wild Salmon Policy.
Q So can you explain how you see the Wild Salmon Policy interacting with the National Habitat programs and policies?
MS. STALBERG: Yes. So this -- this was a -- sort of a pitch on the benefits of the Wild Salmon Policy and the linkages, the connections and disconnects between the Habitat Management Program and we talked last week about the disconnect, but I refer here to the connections between the two. So the Wild Salmon Policy, it calls for under Action Step 2.1 this characterization of habitat - identify the highly-productive and limiting habitats.
Well, most likely in an upcoming session that you're going to have with the Habitat Management Program, a panel there, they'll be talking about what's called the risk management framework.
Q Okay.
MS. STALBERG: That they now screen project proposals through under what's called the Environmental Process Modernization Plan. And this fits in -- it's quite relevant because risk, one of the considerations in the risk management framework is the sensitivity of the habitat, so by identifying these under the Wild Salmon Policy it makes this assessment much more readily done.
Q Okay.
MS. STALBERG: And then, as well, highly-productive and limiting habitat information, it can be used to prioritize the restoration and conservation efforts, as per one of the outcomes to --
Q So you're drawing the similarities here between the WSP and the EPMP?
MS. STALBERG: That's correct.
Q Okay.
MS. STALBERG: Or how -- really how the WSP can also serve the Habitat Management Program.
Q Okay.
MS. STALBERG: And so one of the tenets of EPMP is to streamline the regulatory reviews, make them quicker, and by having the information on where is

the highly-productive habitat, what is it, more readily available, it helps to streamline regulatory reviews. It again can help industry avoid certain areas and/or develop appropriate compensation. And then the habitat status information that's made transparent for proponents through the posting that's -- that makes a more predictable regulatory environment.

Q Okay.

MS. STALBERG: And then, as well, we talk about partners perhaps delivering on the environmental monitoring, there could be partners in industry that also may be delivering.

Q All right. Well, thank you for sharing that. I'd like to move on to the consultations you've done with implementing Strategy 2 outside of DFO with the various stakeholders. Can you -- can you describe that work that you've been doing?

MS. STALBERG: Yes. Perhaps we could refer back to that ops deck just as a reminder for me, please.

Q Okay.

MS. STALBERG: That's a September 23rd, '08 operations deck?

Q Right. That was at -- it's at 148 Exhibit 148, please, and to Slide 9.

MS. STALBERG: Thank you.

Q And so does this document set out the external consultations that you've done?

MS. STALBERG: Much of it.

Q Okay.

MS. STALBERG: It's not all, and I can speak to --

Q Okay.

MS. STALBERG: -- some of the aspects of it.

Q All right. So perhaps you could just clarify what's not listed there.

MS. STALBERG: So what's not listed here would be the consultations that I had with the Washington State --

Q Right.

MS. STALBERG: -- folks on costing and framework generation.

Q Right.

MS. STALBERG: Would you like me to provide a bit more information on any of these components?

Q I think we're okay with the document. I'm just trying to keep moving through this. With respect to moving on then to implementation planning, new

subject, what efforts were made to integrate -- actually, I'd like to just move to -- sorry, my question is this. It's sort of a conclusion to Strategy 2 is what are some of your ideas, what could be done to advance the implementation of Strategy 2?

MS. STALBERG: To answer that, I'm going to go back to the almost-asked question --

Q Okay.

MS. STALBERG: -- you were going to ask --

Q Certainly.

MS. STALBERG: -- to put into a bit of context.

Q Okay.

MS. STALBERG: Okay. So during -- if you recall last week, there was a discussion with the operations committee about where to take Strategy 2 and it was well, within the last year of my tenure, let's take a strategic work approach and work on operationalizing what you can of some of the approaches and processes that have been generated to date for Strategy 2. So over the course of that time, I worked extensively with the OHEB managers on laying out pretty high-resolution work plan that was here's what's needed to be done in Strategy 2. So for each Action Step, what needs to be done? And then worked with the OHEB managers, said okay, now I'm going to look at all of our government documents that relate to the Wild Salmon Policy, everything from program activity architecture, which is a very high-level document within the government that guides actual departmental activities down to the Pacific Region Implementation Plan, the five-year plan for the whole region, looking at risk management assessments that were done per department within branch, so looking at all of these various kinds of documents and saying well, where does it say that we're going to be doing Wild Salmon Policy work or monitoring work --

Q Right. So what are your thoughts?

MS. STALBERG: Well, so pulling that information together, then I continued with working with the managers and we set up a number of criteria to evaluate each of the steps that were needed to be undertaken to complete Strategy 2 or to implement Strategy 2. And through that process, the outcomes were through a workshop, well, through a

number of meetings and then a workshop with all the OHEB managers, they ranked these different work plan elements and they pretty much -- the majority came out really high and without very much spread or difference between the ranking. So it showed an intellectual commitment to the program, but it didn't help with so much the okay, well what's going to be done?

Q So -- so I'm just trying to get -- for the assistance of the commissioner, can you share with us what your thoughts are to advance the implementation of Strategy 2?

MS. STALBERG: Okay. So I'm getting there. So then I -- I was asked well, what are your suggestions, Heather, for the -- based on the amount of time that they had available - and they gave that to me on what could be delivered around WSP, what are sort of the essential elements and so I provided some recommendations around that and that was supporting the web-mapping application, generating the habitat status reports, like identifying the highly-productive and the restoration priorities, so at least there would be some work continuing and continued guidance for -- within the department. It did not contain actually undertaking going out and undertaking the monitoring of the indicators.

So now, sorry, but to answer your question, then what would my recommendations be? As far as I know there has not been a change in the delivery of the WSP where there has been a change from delivery within existing resources. So my -- I think of continuing the implementation of Strategy 2 in terms of a change agenda and a sustain agenda, meaning what needs to be done to continue to change the DFO program and then what needs to be done to sustain that change? And again, in existing resources, I'm not sure what can change.

Q So you're saying that funding is an issue; is that --

MS. STALBERG: Well, it's -- as Dr. Irvine mentioned last week, there's -- it's not just so much money, as capacity to deliver as well.

Q Right.

MS. STALBERG: And how many bodies are within the department to deliver, so certainly funding can support more.

Q Right.
MS. STALBERG: But I would say that there's -- and, as well, someone that is on the program after my tenure and may be able to provide perspective on my answer to you on this.
Q And who would that be?
MS. STALBERG: So there's Lisa Wilson, who is the overall coordinator of the WSP.
Q Mm-hmm.
MS. STALBERG: And I don't believe that's a full-time job.
Q Mm-hmm.
MS. STALBERG: And, as well, Melody Farrell, part of her job, she is the habitat management coordinator. She has within her work description responsibility for the Strategy 2.
Q Okay.
MS. STALBERG: And working on the implementation team. But for the change, I do think you need a WSP champion.
Q Okay.
MS. STALBERG: And Mr. Saunders has talked about this I believe in the development panel, that it would be, say, at the RDG level.
Q Okay.
MS. STALBERG: But I think you can have a champion that's sort of lower down in the organizational structure, someone that has sort of more time to go out and they -- they need to do works externally and internally. So externally it's -- if partners are going to be monitoring, then how are they inspired to do that kind of work and how do we bring them together? So there is external work that needs to be done, internally as well, linking the strategies together, linking the pilots so that we continue to build on the pilots and have a better idea of the strengths and weaknesses of different approaches for the WSP. I think that continued in this -- and this champion would need to have a broad understanding of the departmental program because WSP affects them all, right? So someone that can be -- is inspirational, is an advocate and has a broad understanding of the program.
And then as we talked about, to integrate Strategies 2 and 3, we'll need to have the Strategy 3 indicators undertaken and then we can

look to generating a framework. And that needs to be done in consultation with others. That's not just an internal exercise. And there's still work to be done on some of these -- some of the Strategy 2 work, as I mentioned, you know, where are we at with science.

Q Right.

MS. STALBERG: So then in the sustain agenda, I mentioned last week the disconnect with the Habitat Management Program, that environmental monitoring isn't on -- within the fish habitat management policy. Now that policy is under review currently, so it is -- it could be helpful if within these broad national guidance documents, these policies, that there is embedded within there sort of reference to or opportunities to support environmental monitoring. Not necessarily committing the department to deliver it all, but how can it be factored in? Because again, we're talking -- we've been talking about the pace of implementation --

Q Right.

MS. STALBERG: -- but it's based on current resourcing. If more dollars are going to be gained, probably the most likely place is nationally and it needs to fit within a national agenda. And I don't -- I think it's -- you would need to ask the question about, you know, prioritizing programs to someone more senior than myself. It's -- I don't think it would be appropriate for me to say apply "X" dollars or shift resources from that program to this --

Q Right.

MS. STALBERG: -- program because say an RD, a regional director of OHEB --

Q Okay.

MS. STALBERG: -- or an RDG would have a better perspective --

Q All right.

MS. STALBERG: -- on the programs delivered.

Q Thank you very much. Those are all your recommendations, Ms. Stalberg?

MS. STALBERG: Yes.

Q Thank you. I'd like to turn to Strategy 3 and Dr. Hyatt, you've discussed in your will-say some of the external forces that led to the inclusion of ecosystem values in Wild Salmon Policy. And this

is on -- first of all, I guess, Dr. Hyatt, were you involved in the development of the Wild Salmon Policy?

DR. HYATT: I was involved in reviewing some of the drafts and providing commentary on some of the elements under the various strategies.

Q Okay. And so then my question is you've discussed in your will-say some of the external forces that led to the inclusion of ecosystem values in the WSP. Were there any forces internal to DFO?

DR. HYATT: Oh, I think that in earlier testimony, panels have identified the development of the WSP, but it -- it didn't spring sort of *de novo* out of, you know, a context that had no history or other activity to it. There are external forces certainly where groups were looking for the development of a Wild Salmon Policy, but there were lots of internal developments that Fisheries and Oceans Canada was involved with, as well. For example, the Slaney et al paper which was one of the, you know, significant systematic assessments of the status of anadromous salmon and trout in B.C. and the Yukon, that wasn't just an externally developed enterprise. That was an enterprise that I actually led as a DFO representative and as a member of the American Fishery Society. So we actually joined causes to do that major stock assessment and to look at the status of anadromous salmon and trout in B.C. and the Yukon which had not been systematically examined for something on the order of about 40 years. And you have to go back to the late '50s or early '60s for such an assessment.

Q For the assistance of the record, that's entered as Exhibit 188, that paper.

DR. HYATT: So that assessment really provided impetus not only externally but also internally in the department, to begin to look at how we might do business in a new way, what our essential units for conservation would be. And the Wild Salmon Policy has been characterized as a new way of doing business and it certainly is. In the -- I was the second author on the Slaney et al paper and in that paper, there were over 9600 local salmon populations of five species distributed across no less than 2500 rivers, streams and lake locations in British Columbia and the Yukon. And

each of those at that point was subject to a separate assessment and a consideration of what it said about the status of wild salmon or trout.

By contrast, under the Wild Salmon Policy you now have something on the order of four hundred and -- 400-plus conservation units that have a much more coherent foundation in terms of both genetics and ecotypology under a standardized method to characterize what they are. When Tim Slaney and I were wrestling with these 9600 populations, the question was well how many of them are just strays or kind of ephemeral observations where the fish don't really have any biological identity that Fisheries and Oceans Canada should be especially concerned about. And the Wild Salmon Policy and the development of the conservation unit definition and methodology has clarified this greatly and has also put us on a trail to reorganize all of our regional data about wild salmon around this conservation unit entity. So we're no longer characterizing 9600 separate entities in 2500 streams. We're now trying to look at this in a more representative fashion in order to cover these conservation units that have real biological and evolutionary meaning because of the way in which the methodology has been handled.

Q Okay. That's helpful, Dr. Hyatt.

DR. HYATT: Now, the second element, and that was moving towards Wild Salmon Policy and the definition of conservation units, but the second element of this pertains to the development of ecosystem-based values and indicators and objectives. In 2000 Brian Riddell and I co-authored a paper and this paper's thesis was that definitions are essential. Clarity of definition is a requirement for the department to move forward and make headway on any major new initiative. And that particular paper took issue with the separate definitions that were out that the department wrestled with with respect to what the definition of conservation was. And what we pointed out in that paper is that you could be in a meeting with commercial fishermen and with ENGO's who were environmentally inclined and both would agree that the number one priority for the department was conservation. And everyone would

go away happy, thinking that they had met common ground.

But in fact, the devil's in the details and so if you drilled down to find out what each had as their definition of conservation, one would find that these were disparate definitions. On the one had, you could have conservation of the biomass of production of salmon which is what is required to sustain the commercial fishery in the short run, but that doesn't necessarily in the short run have to include the conservation of biodiversity. That is a different definition.

And so unless you make these definitions perfectly clear, you can end up with enormous confusion and working at cross-purposes. And so under -- within the Wild Salmon Policy, one of the tasks in terms of moving from development to implementation, and one of the tasks that fell to me, was to ensure that the phrases ecosystem values and ecosystem indicators or ecosystem objectives and ecosystem-based management of wild salmon, to make it clear what that actually entailed.

MR. TIMBERG: That's helpful. So perhaps, Mr. Registrar, we could bring up Exhibit 8, the Wild Salmon Policy, and go to page 23 and look at the language of Strategy 3.

Q And Dr. Hyatt, I'll ask you to comment on the language of Strategy 3 and how that operates.

DR. HYATT: Well, the first thing that one has to appreciate about Strategy 3 is that the full exposition of definitions was not provided within the policy. I mean, some definitions were provided, but they were very generic. So, for example, and ecosystem, if one looks at the definition that had been provided in the glossary, and I'll just refer to it quickly. I don't think we need to necessarily go there in the document. But it says:

> An ecosystem is a community of organisms and their physical environment acting as an ecological unit.

Well, that's well and good, but it still leaves open a huge range of combinations for what that actually involves. It provides no real substance

in terms of the detail for something that can be clearly identified and then implemented. What actions would one do with the myriad of combinations of ecological, you know, physical and biological entities that operate as a unit? There are literally thousands or hundreds of thousands of combinations of such entities.

So that lacks the kind of clarity that is required in order to move ahead with implementation of something like Strategy 3.

Q So what work have you done with -- to deal with that?

DR. HYATT: Well, what I did with it was to go back to first principles and say that in order to deal with Strategy 3, we were given a number of directives by the Wild Salmon Policy. One of them is to integrate Strategies 1 and Strategy 2, so we have to integrate what's being brought forward by way of definitions, objectives and indicators in those two strategies, bring it forward to Strategy 3 and then Strategy 3 also had to define some new concepts and provide some new definitions in order to make practical headway.

And so in the October 8th, 2009 concept framework that I developed for the operations committee, that was the first time a more or less complete framework with definitions and with the key elements that it would take to move forward on Strategy 3, that was the first time such a construct had been presented.

MR. TIMBERG: Okay. Perhaps, Mr. Registrar, we could have Exhibit 186?

Q And Dr. Hyatt, if you could take us through perhaps starting at Slide 5 and if you could clarify the work done on ecosystem objectives and indicators?

DR. HYATT: So starting from the directions that the Wild Salmon Policy provides in general, because in order to look for guidance from the Wild Salmon Policy, it's necessary to go through virtually the entire document. What you will find is that there are numerous references at various places under Strategies 1 and Strategy 2 to ecosystem values and objectives or indicators. And so it's necessary to kind of go through the entire policy and then begin to boil it down to create some clarity.

Now, ecosystem based management under the Wild Salmon Policy acknowledges that ecosystems influence salmon and we've known that for a long time. The department's business in terms of looking at habitat has been largely conditioned upon that view of the world. But the second is more novel. And that is there's a body of science that had been generated over the last ten to 15 years that was understood qualitatively decades ago but nonetheless it had progressed up to the point where it was worth considering that salmon actually also influence ecosystems.

So we manage salmon, I mean, one of the key models we use to manage salmon by is Bill Ricker's, Dr. Bill Ricker's famous stock recruit model. Now, one of the interesting things about that model is that it does not acknowledge that there is any connection between the parents of salmon and their offspring other than the generation of offspring by parents. It says there's no other connections that are of any real importance.

Now, Dr. Ricker understood that this wasn't true, that this was an over-simplification. In fact, if you read many of his works, you'll find it -- some rather interesting documentation of other views of this. But that model has been the prevalent model by which we manage salmon populations. And what it failed to acknowledge is that there are connections between the current generation and the next generation, not only in terms of that next generation originating from the parent generation, but also in terms of nutrients and energy that the parent generation brings back into watersheds and thereby influences the productive capacity of habitats.

So in a sense, the productive capacity of the habitats is conditioned by the death of the parental generation and whether this matters greatly or only in minor ways depends very much on the space and time variability of how ecosystem productivity, particularly in fresh water, is controlled in the landscape. There are locations where nutrient limitations are acute and were clearly the parental generation contributions to this matter greatly to ecosystem function and to the next generation. There are other places where

they're much less acute and so it will matter less.

So Wild Salmon Policy requires that we begin to provide the science basis not only for -- on an ongoing basis how ecosystems influence salmon, but also for where and when salmon influence the ecosystems themselves. And finally, the third element of this is that DFO's sectoral activities, and by sectoral activities I mean those activities over which we have some authority and control and responsibility, activities such as salmon harvest, aquaculture, salmon enhancement, habitat protection, those are sectoral activities which have specific events associated with them and that these activities influence both salmon and the ecosystems on which they depend. And so one of the obligations that DFO has as an organization with the emergence of Wild Salmon Policy is to examine those sectoral activities over which we have authority and responsibility and determine when, where and how they influence salmon and their ecosystems such that we can manage those activities. We don't manage fish or manage ecosystems, we manage human activities and DFO has a limited range of responsibilities here and society has a much broader range of responsibilities in which we hope they will join with us, such that we actually manage salmon, wild salmon populations for future generations in a sustainable way.

Q So, Dr. Hyatt, could you, using this document, can you explain what the ecosystem objectives and indicators are under Action Step 3.1?

DR. HYATT: Well, if we could just scroll along here, I think the next slide is Slide 7 that I could refer to. Yes. Now, the approach to developing ecosystem objectives and indicators -- first there's a step that's missing from this slide. The first thing one has to do is define under the Wild Salmon Policy what a salmon or a salmonid ecosystem is, because you can read through the document and you will not find such a definition. You will find reference to the fact that salmon depend on fresh water and marine habitats but you will not find any bounded definition of what a salmon ecosystem is. And so it's essential to start with that definition for clarity.

Next, because I am a -- I'm an applied scientist and I'm always looking for the art of the soluble, the art of the possible, not what is impossible, but what we can do effectively. And so it's important to define then operational ecosystem units, things that fisheries managers and habitat managers will be able to relate to, understand and move in a way that they can take action.

Next, you need to have a system of reference states. If you're going to define operational ecosystem units, ultimately you're going to have to say something about the reference state, because if the general objective is to maintain ecosystem integrity, one needs to know exactly what that means and how you would identify whether you were moving towards it, away from it or were at it.

The third is it's important to identify, as I've already mentioned, sector-specific ecosystem based management objectives and this isn't just restricted to DFO. It ultimately applies, and the policy projects that it will apply to First Nations and to stakeholders in the resource.

Once you've done those steps, you then can begin to focus on developing indicators and once you have the set of indicators that will inform these previous steps, you can develop a monitoring plan.

I think the next slide may be Slide 9.

THE COMMISSIONER: Mr. Timberg, I'm sorry to interrupt your examination.

MR. TIMBERG: Yes.

THE COMMISSIONER: You were to finish by 12:30. I have no idea sitting here whether you're within a minute of that or ten minutes of that, and we're coming up to the lunch break. But it's important for you to complete your -- or conclude your examination so the other participants will have an opportunity to ask questions of these witnesses while they're available.

MR. TIMBERG: Commissioner, I'm not -- is it possible to ask for an extension of that 15 minutes after two o'clock? I'm not -- I'm not at this stage going to be finished my examination at 12:30.

THE COMMISSIONER: Well, you're saying you need another 15 minutes? Is that what you're...

MR. TIMBERG: Yes.
THE COMMISSIONER: All right. Well, then we'll adjourn now and if you could perhaps review your notes and see if you can't wind it up in 15 minutes after two o'clock.
MR. TIMBERG: Thank you.
THE COMMISSIONER: Thank you.
THE REGISTRAR: Hearing will now adjourn until 2:00 p.m.

(PROCEEDINGS ADJOURNED FOR NOON RECESS)
(PROCEEDINGS RECONVENED)

MR. TIMBERG: Mr. Timberg and Geneva Grande-McNeill for Canada. Mr. Commissioner, I have one set of questions for Mr. Hyatt and I have one general question for the panel.

CROSS-EXAMINATION BY MR. TIMBERG, continuing:

Q Dr. Hyatt, if we could turn to Exhibit 186 page 8 and can you assist us as to how this illustration helps with the definition of ecosystems?
DR. HYATT: Yes, I can. Thank you, Mr. Timberg. Mr. Commissioner, the clarity of definitions is important to the pursuit of the various strategies under Wild Salmon Policy and the glossary definition says ecosystems are groups of organisms and their environment that interact as a unit, so a salmonid ecosystem under the Wild Salmon Policy consists of first a salmon conservation unit, so those have been defined.

Secondly, the associated habitat elements and habitat elements have been defined under Strategy 2 and habitat elements as defined under Strategy 2 are largely restricted to physical and chemical traits of the environment, not biota, and so when you invoke ecosystem, it brings in this third element, that is other species that salmon interact with. So that's a salmonid ecosystem, one which includes all three components - habitat elements, a salmon conservation unit, and then other species that are strongly interacting with salmon and so that's an important criterion to establish just what ecosystem it is we're trying to maintain the integrity of.

So there's one more slide, and if you would

move to the next one, I think this was up previously. So -- could you enlarge that, Mr. Registrar, please?

MR. LUNN: Just the diagram? Exhibit 186?

DR. HYATT: Yes, please. So this general definition of ecosystem, there are at least when I prepared the slide there were 457 conservation units from Strategy 1, four to eight habitat types from Strategy 2, which create at least 3244 conservation unit operational ecosystem units, which is a very large number and obviously we're not going to independently assess the integrity of every one of those, but we need to put them into an operational frame and so the familiar operational frame we put them into is by life history stage where one life history stage of a conservation unit associated with its highly productive or critical habitat such as either a creek spawning environment or a lake rearing environment, a river migratory corridor, an estuary staging area, out onto the continental shelf, two-way migratory and rearing area and then to the offshore waters where there are summer rearing and winter over-wintering areas on the high seas.

And the point of this slide is that each salmonid CU lives its full life history within a nested set of ecosystems, so when we are asked to address the issue of how to maintain ecosystem integrity, there isn't a single ecosystem in operational terms. There's a cluster of ecosystems. Now, this makes -- this is an important point in terms of DFO's ability to go forward because in some areas such as in the -- in a terminal fishing zone, an area in a terminal inlet where we execute a fishery, we have full authority to execute that fishery and to assess the characteristics of the environment that that life history stage is involved with.

But on the high seas, we don't -- we have shared authority, so we have, for example, these letters NPAFC, which stands for the North Pacific Anadromous Fish Commission, where in international waters we share authority with other jurisdictions and so to assess integrity there implies a partnership at an international level.

Within trans-boundary waters that involve

Canada and the U.S., we have the Pacific Salmon Treaty, which again says that we must engage in a partnership arrangement to sort out ecosystem integrity in geographic areas that -- where authority is shared by our two countries. When we get into the domestic area, DFO has some areas where it has full authority, but then as you move up into watersheds, the Province of British Columbia and the federal government have shared authority and shared responsibilities over each of these operational ecosystem units.

So what this emphasizes is that in order to implement Strategy 3, we have some elements that DFO is fully responsible for and has the authority to pursue on its own, but we have many elements under Strategy 3 where we will have to engage in partnerships with the province, partnerships with the United States or alternately once we get into international waters, partnerships with other nation states.

So we will be able to make headway on identifying objectives within each of these zones and in association with that indicators of ecosystem integrity within each of these zones, but it will require joint action in many of these zones and independent action by us in fewer of them than the full set.

Q Thank you very much, Dr. Hyatt. I'd like to now pose a question to -- first to Dr. Irvine and then to the panel, and the question is as follows. If the Wild Salmon Policy had been fully implemented in 2009, would this have prevented the extremely low returns of Fraser sockeye salmon that year or would it have improved advice to management?

DR. IRVINE: Yes. Thank you, Mr. Timberg. Yeah, I'd like to -- I guess the answer to that is no and yes, so the answer to the first question would be no and the answer to the second question would be yes, but let me elaborate. So the Wild Salmon Policy is -- it's a complex policy, but in essence it's about protecting diversity. So both Objective 2 in the policy and Strategy 2 are both about the conservation of habitat diversity. They both include components of that.

And so when we protect habitat diversity, which is what Heather Stalberg was talking about earlier, it's important to recognize that we're

not -- we're trying to protect a range of different habitat types, so it's not only -- you don't want to just protect the good habitat. You also want to protect the marginal habitat, the habitat that is of use at the current time. It may not be -- sorry. Am I coming through?

UNIDENTIFIED VOICE: Yes.

UNIDENTIFIED VOICE: Yes.

DR. IRVINE: Yes. Okay. So anyway, we're talking about the protection of habitat diversity. Now, the reason we want to do that is that it's -- by having diverse habitat, that allows for the development of adaptations for the different habitats. So this is not only by salmon, but it's basically by all of the critters in the ecosystem.

So when you protect habitat diversity, then what you're doing is you're creating or protecting biodiversity. So that includes the diversity of salmon, but also the diversity of other species, other ecosystems. And the reason we do that is to act as an insurance policy. So by having salmon that are adapted for variable environments, this essentially creates kind of an insurance that the salmon are likely to be able to survive during periods of climate change or some other change.

Now, so that's kind of the basis of the Wild Salmon Policy. Now, where that relates to what's going on with Fraser sockeye, I think, Mr. Commissioner, you were exposed or you were presented with some information probably during the first week talking about Fraser sockeye and the fact that, you know, the smolt adult survivals of Fraser sockeye have been declining for about two decades. The 2009 returns were anomalously low, but it was -- it was along this trajectory, but it was below the kind of forecast.

So would the Wild Salmon Policy, if it was implemented, have resulted in more salmon returning in 2009? Well, no. You know, the policy wouldn't do that. What the policy is about is protecting diversity so that the salmon are more likely to be able to survive during periods of climate change, but it won't result in huge returns when you have a one-off event, as may have occurred in 2009.

Now, I guess the way to think of it is if the conditions in 2009 that generated the low

survivals were to continue for many years, if we have diverse populations of salmon, that we are more likely to maintain those populations. Similarly, if the pattern -- the reasons for the declining survival over the previous couple of decades were to continue, we are more likely to maintain salmon populations.

Now, it's kind of -- an interesting example is actually Bristol Bay sockeye. So there was a paper published by Ray Hilborn, who is a university professor in Seattle and what they looked at in Bristol Bay -- so Bristol Bay is a very lucrative sockeye fishery area and they essentially looked at the stock composition, the stocks that are contributing to the fisheries in the late 1990s and then by looking at DNA samples through time, they went back and sort of reconstructed what the stocks were that contributed to this fishery in the early 1900s and they found that it's really quite different. So that the stocks that are contributing to the fisheries right now are -- were not necessarily the important stocks in the early 1900s.

So there's a really important lesson here, that populations that may be favoured under certain environmental conditions are not necessarily the populations that will be important in the future. So -- so the Wild Salmon Policy isn't about sort of solving the problems of a year, an individual year. It's really about maintaining the diversity so that longer-term changes can be -- at least the populations are more likely to be able to survive when you have long-term patterns.

Then your second question, I think was about whether if the Wild Salmon Policy was fully implemented would we have provided improved information to fishery managers, something like that, and that in part is related to some of the stuff that Dr. Hyatt was talking about, but in particular, Strategy 3.2, at least I'll sort of give my bias here. And, I mean, I firmly believe that we need to do a better job of incorporating information from the marine environment in improving our ability to understand salmon survivals and predictions of unusual events as occurred with Fraser sockeye in both 2009 and

2010.

When Dr. Hyatt talked earlier about Ricker's stock-recruit curve, that's basically the number of adults related to the number of recruits to the next generation and, as he mentioned, there never used to be a means by which one could include environmental information in adjusting that relationship. So this is an area of active research. We are not all the way there. But I know that we are improving our understanding and so I like to think that we will be able to predict unusual events like what occurred in 2009 and 2010 more effectively in the future.

We can do it retrospectively. I can give you lots of ideas on why the numbers were low or high in those two years. But the ability to do it, of course, is to do it in advance, to document your predictions, publish it and then show that it stands the proof of time.

Q And just -- I'm cognizant of the time. It's 2:15, so your answer to the second part of the question as to whether the full implementation of the Wild Salmon Policy in 2009, would it have improved advice to management? What's your answer to that?

DR. IRVING: Well, the answer to that is yes, but I think it's really about our improved understanding of the processes controlling survival for Pacific salmon. And then Action Step 3.2 is where we're trying to do a better job of including information on marine linkages to salmon survival into the annual salmon fishery management cycle, and so that's one of the -- that's where we're going right now.

MR. TIMBERG: Thank you. Mr. Commissioner, that's all my questions.

THE COMMISSIONER: Thank you, Mr. Timberg.

MR. WALLACE: I have next in cross-examining, Mr. Leadem for the Conservation Coalition, please.

MR. LEADEM: For the record, Leadem, initial T., appearing for the Conservation Coalition.

CROSS-EXAMINATION BY MR. LEADEM:

Q Dr. Holt, I will be exclusively referring you to your paper which has been marked as Exhibit 184 that you co-authored with Sue Grant entitled "Fraser Sockeye, Wild Salmon Policy Evaluation of

Stock Status: State and Rate".

I note that of the 26 accessible CU's that seven of them consistently were found to be in the red status zone on most of the metrics; is that correct?

DR. HOLT: On some of the metrics, yes.

Q Yes. In your paper -- and I can take you there. In the interest of time, I'm going to read it and ask you if you agree with it.

> Of seven CU's that were consistently in the status red zone across most, if not all, metrics.

Is the way the paper reads at page 89.

DR. HOLT: So this was a draft version of the paper, and on -- based on those preliminary analyses, that was the conclusion.

Q Yes.

DR. HOLT: However, after review with the Salmon Sub-committee, we're reconsidering some of those metrics, so -- because it became apparent that we weren't -- that we were making inappropriate assumptions for some of those analyses and that they may be biasing the analyses. So I wouldn't -- it's not clear to me that those assessments would stay the same through all those revisions.

Q I understand that.

DR. HOLT: So I can't agree to that statement now.

Q All right. In terms of the bias that you spoke to, would the bias concern those seven specific CU's, or were they other CU's?

DR. HOLT: I'd have to go through the paper and identify them specifically. One of the major revisions that pertains to my contribution to the paper had to do with addressing time-bearing productivities. So considering the fact that productivity has declined over time and revising one of the models that estimated benchmarks on abundances.

So without doing that analysis, I don't know how those benchmarks would be changed. I haven't had a chance to do that re-analysis yet.

Q I understand that. I think for the benefit of our understanding of where these -- the seven CU's that were identified in the paper, at any rate, within the red zone, status red zone, I was

wondering if we could take a look at the map that's on page 6 of that document that shows the actual -- some of the significant conservation units. I was wondering if we could start with the seven that are delineated, within the confines of the paper at any rate, and if we start at the north, if we can highlight Takla-Trembleur, that was one of the CU's that was identified in the paper as within the status red zone, was it not?

DR. HOLT: I'd have to look at the list.

Q All right. If you want to take a look at the list, it's at page 89. Do you have a hard copy in front of you, 'cause that would save us some time. I can show you my hard copy.

DR. HOLT: I just want to clarify one point here, that I was the primary author on part of the methodology and not on the overall assessments. That was really Sue Grant's work.

Q I understand that. I understand that.

DR. HOLT: I can provide as much as I can on specific questions about the assessment, but really my contribution to this was on the methodology for accounting for time-bearing productivities.

Q No, I appreciate that. But in lieu of Sue Grant, you're a co-author, and so you're here and available.

DR. HOLT: Yes.

Q So you're the only one I can ask questions of concerning this paper at this time.

DR. HOLT: And I'll do my best to answer.

MR. LEADEM: Thank you, Ms. Gaertner.

Q So at page 89, the first full paragraph on the page is -- delineates the seven CU's that were consistently in the status red zone across "most, if not all, metrics." And I'm just simply going to read the list and then get you to confirm the location on the map that we now show depicted. This is at page 6. This is in the conclusions portion of your paper.

DR. HOLT: Takla-Trembleur, Bowron, Nahatlach.

Q Nahatlach.

DR. HOLT: Taseko, Cultus, Widgeon and Kamloops.

Q All right. So I wanted to now draw your attention to the map and our technician has highlighted Takla-Trembleur at the north, and that's part of the Early Stuart management group, is it not?

DR. HOLT: Yes.

Q And then Bowron -- moving our way down south, Bowron is part of the early summer management group, correct?
DR. HOLT: Yes.
Q Nahatlach, moving further south along the Fraser, is part of the early summer group as well?
DR. HOLT: Yes.
Q If we go back over to the west slightly to Taseko, that's part of the early summer management group and also one of the seven; is that correct?
DR. HOLT: Yes.
Q Cultus, which we've heard a lot about before, is actually fairly close to the U.S. border and very close to Vancouver, that's one of the seven as well, correct?
DR. HOLT: Yes.
Q That's also one that is currently listed by COSEWIC as endangered, is it not?
DR. HOLT: Yes.
Q And then Kamloops Lake, going away over to the east now, that's also one of the seven, and that's part of the Late Summer group, is it not?
DR. HOLT: Yes.
Q And then Widgeon, it's not shown on the map, but that would be close to the Pitt group. My understanding is that Widgeon River type is a very unique species with respect to the conservation unit and that it actually spawns in a slough, Widgeon Slough, that connects with Pitt Lake and that, at some times, it will spawn in the lake at low tides and it will come back and spawn in Widgeon Slough at high tides. Is that correct, to your knowledge?
DR. HOLT: I don't know the details about Widgeon.
Q It's in the paper at any rate. That's -- I'm simply getting the information that I've just given to you from your paper.
So at this state of our knowledge, would you agree with me that subject to whatever may happen with the CSAP process as it unfolds, that the best science that we have presently have these seven groups potentially being in the red zone; is that right?
DR. HOLT: They're potentially in the red zone, but there is -- there was no consensus among the group that they should all be in the red zone.
Q Right.

DR. HOLT: There was uncertainty about how to combine information across metrics. Ms. Grant made some assumptions about how to combine that information that was not shared amongst all members of the Salmon Subcommittee. It was unclear how they would -- assessment would come out after the re-analysis, and so the intention was to finish the re-analysis in the next 60 -- I think it was 60 or 90 days -- and then subsequently do a formal review of -- a CSAP review of these 26 CU's with the correct information so that we could then, once we had the correct status on all of those metrics, then look at them and provide an overall assessment across them.

Q Yes. And I thank you for that. Presumably sometime, then, within the next 60 days, we can expect that we might see a revision of this paper, and we might then have an opportunity to either --

DR. HOLT: Yes.

Q -- discuss this with you or Ms. Grant. Is that fair?

DR. HOLT: Yes. Yes.

Q I think you would feel a lot more comfortable with that approach.

DR. HOLT: Yes.

Q Would you? You mentioned that there's some degree of uncertainty due to the potential for bias and due to the potential for having to revisit some of the datasets and taking a look at the metrics. Given that there's some uncertainty, but still given that we have some indication that we have these seven groups that potentially could be in the red zone, does not the precautionary approach dictate to you, as a conservation scientist, that you should take some steps to protect these endangered -- potentially endangered conservation units?

DR. HOLT: That's certainly the case, but within 60 days I think it's fair to say that we can do the re-analysis, come up with a more accurate list, and then proceed from that point.

Q Yes, and I fully appreciate that. I'm not asking you to opine on what management decisions should be done, but I'm simply asking for your opinion as a scientist --

DR. HOLT: Yes.

Q -- faced with the necessity of applying

precautionary principles. In this context, would it not mean that rather than just simply awaiting the potential result of 60 days or the final science which could actually cast something in stone, that you would take a precautionary approach and actually do something about these seven potentially endangered CU's right now, and at least convey that to the management people that are going to be making those decisions within your Ministry.

DR. HOLT: It's just not clear to me that -- I understand the precautionary approach to not provide uncertainty -- or give uncertainty as a reason for inaction.

Q Yes.

DR. HOLT: Here we have a situation where we have different metrics telling us different stories about what their status is, different -- if we make different assumptions in the model, one of the major ones that we dealt with this meeting was accounting for the cyclic dynamics of the stocks and identity-dependant and directions between cycle lines so that is we see these large cyclic dynamics and it may be because of interactions, competitive interactions between those cycle lines. If we account for that, we can get a very different status.

So if we -- and most scientists on Fraser River, biologists, would say that those cyclic interactions are biologically sound. If we -- and if we follow that through and assess that as based on that assumption, then a lot of these are actually in the green zone. So then there's a question -- we haven't come up with a consensus on how to deal with the green zone when we account for this biologically plausible hypothesis, and a red zone on another status.

Q Yes. Yes, I understand that the science is in a bit of a quandary as to where --

DR. HOLT: Yes.

Q -- to actually apportion these.

DR. HOLT: And so our hope is to provide assessments on all four or five of these metrics and assumptions, provide information for all, so you can get the whole story and then provide that so that managers can then decide how they want to prioritize amongst those CU's so they can look at ones that

have more reds, for example, to put most of their emphasis versus providing -- giving a list of all seven. All seven of those might have a red status in them.

Q But I come back now to this point, and I won't belabour it. I'll ask it to you one more time, and I'll put it this way to you: That if we're in an era of uncertainty with respect to which of these conservation units are in red zones and which are not, which are green and which are yellow, but that the preliminary evidence seems to suggest that these seven, in particular, show that they're potentially - especially with the smaller CU's that are within this seven - are in danger of being extirpated, wouldn't you take some concrete positive steps as a scientist to identify that fact to your Minister to allow your Minister to make a determination on what conservation measures ought to be employed today, rather than simply waiting until the science is clear.

That, as we know, may not be within the next 60 days. It may be months or years hence.

DR. HOLT: I understand that it's important to be -- to take steps despite the fact that we have uncertainty. However, I also don't see it worthwhile to take steps when we know that there might be biases in these -- in the analyses.

Q All right.

DR. HOLT: You know, I understand that -- it's out of my purview what the management actions will be.

Q Yes, I understand that.

DR. HOLT: I provide the scientific assessments behind that.

Q Right.

DR. HOLT: Perhaps there's someone else who could better answer that question.

MR. LEADEM: Okay. I thank you for your answers.

MR. WALLACE: Thank you, Mr. Leadem. Mr. Commissioner, I may not have made this clear, but over the lunch hour we discussed directing questions at Dr. Holt first, and so, Mr. Leadem, I think will be back once we've completed this round, probably tomorrow.

Which brings us to Mr. Rosenbloom.

CROSS-EXAMINATION BY MR. ROSENBLOOM:

Q Yes, Dr. Holt. My name is Don Rosenbloom and I appear on behalf of Area D Gillnet and Area B Seiner. My questions at this moment in time are exclusively directed to you in light of the circumstances that you won't be here tomorrow.

Can I assume, Dr. Holt, from my review of the agenda for this inquiry into the future that, at this point in time, you do not -- you are not invited back to this inquiry? In other words, this will be your only appearance?

DR. HOLT: That is true.

Q All right. And that being the case, I do have a number of questions for you, and a few of them that I ask of you, if you feel that there is somebody more appropriate to answer these questions, either on this panel or indeed someone that you know will be testifying at this proceeding, I take no offence at you deflecting the question to the person most able to answer those questions.

Now, my first question to you relates to the whole substance of the Wild Salmon Policy and, in particular, the assertion that maintenance of high biodiversity, all CU's, in other words, above their lower benchmarks is necessary to maintain a fully sustainable fishery for the Fraser sockeye? And I assume you generally subscribe to that approach, do you not?

DR. HOLT: Yes.

Q That being the case, my question to you is this, isn't that fishery largely dependent on a relatively small number of large stocks? Let me start with that question. Do you agree?

DR. HOLT: That is true for the current period. As Dr. Irvine mentioned a few minutes ago, it is possible that the stock ratios may change over time so the ones that are dominant now may be small in the future, but other ones that are small now may become dominant in the future

Q Right.

DR. HOLT: -- so maintaining that diversity is important for the long run.

Q So you speak of -- I'm sorry, yes, so you speak of Dr. Irvine's comments a few minutes ago about Bristol Bay, do you not?

DR. HOLT: Yes, that was one example that he gave.
Q Yes, one example. Isn't it true that some of the small stocks that are the main concerns for sockeye biodiversity loss in the Fraser River, in the Fraser, rear in smaller lakes like Cultus that have no potential for ever replacing losses if something bad should happen to the larger stocks? And I assume -- maybe I shouldn't assume your answer. What is your answer to that question?
DR. HOLT: I wouldn't necessarily say that. I think, in the past, Cultus returns have been much, much higher than they were now and could be relatively commercially important, but there will be others who would be more knowledgeable from the Stock Assessment Section.
Q And who would that -- who would we be looking to for that kind of answer?
DR. HOLT: Well, Arlene Tompkins is the head of the Stock Assessment Section so she might know, or Mike -- Mark Saunders -- Mr. Saunders might provide other names.
Q All right. So I will direct that question to Mr. Saunders to at least deflect it and inform us as to who should be answering that question in future. Following up on the same line of questioning, isn't it true that if something really bad does happen, for example, because of climate change, that the smaller and less productive stocks are likely to be the first to go?
DR. HOLT: No, it's not. CU's were established to maintain diversity so each CU will -- may have a slightly different genetic, morphological, or life history characteristic. Those CU's that are of relatively small abundance right now may -- may be specially adapted to increase their productivity under different scenarios that may happen with product -- with climate change, whereas other ones may decline. So it's uncertain right now which of those CU's might survive through climate variability, climate change. It's not necessarily the case that it's the dominant ones that will -- that have those specific characteristics that are adaptive to climate change conditions.
Q I appreciate that's your evidence. I am very intentionally putting these questions to you, as these matters will come up later in the inquiry

with other witnesses and I wanted to hear your answer, especially in light of the fact you're not back here.

Another question on the same theme, if the Wild Salmon Policy is not a policy to protect biodiversity at all costs, but a practical policy to ensure biodiversity, then why does the Science backup for it not include explicit analysis of the trade-off relationships between use rate, in other words, harvest, and expected biodiversity loss, instead of just specifying a set of benchmarks or targets for conservation units?

DR. HOLT: That's an interesting question and it's one that we've come up with, or across during implementation. Not part of the initial policy development, and I'm not the person to talk -- to ask about why that wasn't part of it, but it has come up in implementation.

Q And who do you suggest best can answer that question?

DR. HOLT: Probably, other panel members.

Q All right. So I will float that question when the other panel members are under cross-examination on that question, which allows me to move to the next question for you. I assume you're familiar with the term, "sustainability over-fished" -- "sustainably over-fished," I should say, that term?

DR. HOLT: Mm-hmm.

Q And that term, as I understand it, please correct me if I misstate, is where a stock can easily be stable under a given exploitation regime, but at a stock size far below the one that would produce maximum average yield. Is that a fair definition?

DR. HOLT: True.

Q All right. So my question to you is many Fraser sockeye stock have been in that status for much of the 20th Century; would you agree with that?

DR. HOLT: Yes.

Q All right. Do you see anything wrong, Dr. Holt, from a biological perspective from allowing such a condition to persist if the stock does not have high harvest value?

DR. HOLT: From a population -- from a short-term population perspective, there probably isn't any short-term population concern, however, there may be other ecosystem concerns, longer-term ecosystem

concerns where depleting, consistently depleting populations, although they may be at sustainable levels, may result in a lack of ecosystem inputs from, for example, marine-derived nutrients from salmon returns.

Q And would I be right in saying that is venturing a little bit out of your expertise?

DR. HOLT: Exactly. So that would be Strategy 3.

Q Right, and I would put that to other panel members --

DR. HOLT: Yeah. Yes.

Q -- wouldn't I? Thank you very much. But in the context of your expertise, would you agree with me?

DR. HOLT: So for the population dynamics, in the short term -- sorry, I can't remember the specific wording of the question. It -- can you remind me?

Q Yes. Could I remind you? I'll ask the question again, that context. In the -- obviously, focussed on the issue of sustainably over-fished, my question is do you see anything wrong, from a biological perspective, from allowing such a condition to persist if the stock does not have high harvest value?

DR. HOLT: So I'm not sure what's the high harvest value part/portion of your question, but when you ask whether there's a -- any biological problems with that, so biologically, I wouldn't consider those ecosystem components so there would be biological problems with that from an ecosystem perspective.

Q Yes.

DR. HOLT: Yes. From a population perspective, no.

Q Thank you. Why has your reporting of CU status focussed only on stock size metrics, meaning spawning stock relative to the stock that would produce highest yield, and on trend metrics, rather than also reporting exploitation rates status relative to your estimates of the optimum exploitation rate for the CU's?

DR. HOLT: And so you might be speaking in particular about the Fraser River example?

Q Most definitely.

DR. HOLT: We chose not to -- our initial intention was to use that metric on fishing mortality when information on abundances was not available. Fishing mortality relative to productivity can

give a bit of a one-sided assessment. For example, if fishing mortality is in the green zone, that is our fishing mortality is relatively low compared to the productivity, so our fishing, that doesn't necessarily mean that a CU is a healthy CU, it may actually be an unhealthy CU. And so it doesn't give a really full picture. Our intention was to use that, especially in cases where their abundances were low.

Secondly, the benchmarks on fishing mortality have been under discussion, which of the specific lower benchmarks to use and so because of the debate over those lower benchmarks, we decided -- that's another reason why we decided to keep it out of that analysis.

Q Doesn't reporting only stock size and trend metrics tends to promote fixed escapement policy, thinking and policy choice?

DR. HOLT: It's possible to identify a fishing mortality that will result in a lower benchmark, or a higher benchmark and so it's possible to do that conversion. It doesn't limit us to using the lower -- using an escapement policy. For example, in the Fraser River, there is a FRSSI process, which is the Fraser River Sockeye Spawning Initiative that develops harvest control rules. They use harvest control rules despite the fact that they also understand lower and upper benchmarks, which, as far as I understand, they've incorporated into their analyses, but they -- they're not using escapement policies there, they're evaluating harvest control rules. So I don't necessarily think that it -- using those benchmarks limits us to an escapement policy.

Q But it does promote a fixed escapement policy, doesn't it?

DR. HOLT: I wouldn't say that. I've had discussions with area managers who are considering benchmarks on spawner abundances, but also looking at what the fishing mortality that would be required in order to meet that upper and lower benchmark on spawner abundances, because we can convert between a fishing mortality and spawner abundances. There is a certain fishing mortality that we can apply to assist them, under average conditions, that will result in a level of spawners.

Q Mm-hmm. I come to the issue of density

dependence, and it will be pretty obvious as I deliver these questions to you, that I don't have a scientific background, but in my reading to date, there are obviously issues of density dependence, both in terms of freshwater and ocean water. In fact, one of your mentors at Simon Fraser University, Dr. Peterman, recently published a paper that you're probably familiar with regarding --

MR. WALLACE: Mr. Commissioner, I don't see this as a Wild Salmon Policy issue. Dr. -- this matter will be discussed in detail in harvest management.

MR. ROSENBLOOM: Well, I actually did relate this to Wild Salmon Policy. Let me deliver the question to you, and then if it's objectionable, believe me, I will be told.

Q When the -- when a stock is found to be within the red zone, and where, from a biological standpoint, you, as a scientist, believes there should be a management decision in respect to that stock, my question is how is density dependence playing into this whole equation? Are the managers who are making decisions on harvest management based upon a stock ending up in the red zone factoring in analysis and scientific investigation of density dependence?

DR. HOLT: So there is lots of different types of density dependence, and they would -- they'd all factor in different ways. We can think about density-dependent mortality at lower spawner abundances, where we have -- when we have really low abundances, the productivity tends to be lower than you'd expect. You get -- just because of, for example, an abundance of predators that could exert a stronger mortality at very lower abundances. So that's one type of density dependence. Another, I think, that you were inferring from the work with Randall Peterman, Dr. Peterman, is density dependence on the ocean when there are large abundances of fish in the ocean that compete for a common pool of preresources. That may result in reduced body size and perhaps increased mortality.

Q You see, where I go with this, and, again, doing this without a scientific mind is can I assume that as there is implementation of this Salmon Policy, that you could imagine a situation where a

stock was found to be in the red zone --
DR. HOLT: Mm-hmm?
Q -- and where the remedial step that managers might take would be to limit the escapement as opposed to increasing the escapement because of the issue of density dependence?
DR. HOLT: They -- repeat that again, they might want to limit --
Q That in the circumstance where a stock was found to be in the red zone, can you imagine a management decision that lessened the escapement, as opposed to increasing the escapement.
MR. ROSENBLOOM: My learned friend wants to interject.
MR. WALLACE: Mr. Commissioner, as I hear the question, it's about what steps would be taken in the event of the metrics being applied and determinations being made with respect to -- on the assessment of the -- of the particular CU. This panel is dealing with the implementation of the policy, which is the up to but not including the part about integrating the scientific information determined under steps 1, 2 and 3, with the management decisions, which is, I think, the proper place for Mr. Rosenbloom's question.
THE COMMISSIONER: I think, Mr. Wallace, what I would like to know is whether someone with Dr. Holt's expertise and her background and involvement with the Wild Salmon Policy, whether she would have any involvement or influence or contribution to the management decision; in other words, that her research and her work would somehow have found its way into the -- the implementation of the policy would have found its way into answering Mr. Rosenbloom's question. If she doesn't have any role to play in that regard then I understand your objection. But if she has some role to play or has some contribution to make or has some information to provide the Commission, I think it would be appropriate to hear if she does have an answer to that question.
MR. WALLACE: Well, certainly the results of the scientific determinations made under steps 1, 2 and 3 are what inform the management decisions under 4. Whether Dr. Holt has any role in that is perhaps an appropriate question. But getting into the substance of those management decisions, which is where I hear Mr. Rosenbloom going, seems to me

is better addressed to a later panel. And we can certainly take those questions under consideration and make sure that there will be an ability to answer that sort of question --

THE COMMISSIONER: Right. My comment was just in the context of knowing that Dr. Holt was not coming back as part of the harvest management, I want to make sure that if she has something to contribute that this would be her opportunity to do so.

MR. WALLACE: Indeed. And I'm sensitive to that and the line -- I think the way you framed the point is a valid one, Mr. Commissioner, in that what is the role of the scientist in how the decisions are made under Strategy 4, as opposed to the judgments that are made under that.

THE COMMISSIONER: No, I understand that. She's not exercising the judgment. Mr. Rosenbloom?

MR. ROSENBLOOM: I just want my question answered. I don't care who answers it in the sense that there's no property in Dr. Holt answering it so long as at the conclusion of this inquiry, this question is answered by somebody in a position to be able to answer.

THE COMMISSIONER: And that's why I made the comment to Mr. Wallace. I want to make sure that your question is addressed but I don't know yet whether Dr. Holt is the correct person to do it or not. So I want to give --

MR. ROSENBLOOM: Yes.

THE COMMISSIONER: -- her an opportunity to tell you that.

MR. ROSENBLOOM: Thank you.

Q Dr. Holt?

DR. HOLT: I can -- I can address the scientific underpinnings of that question and not the management response.

Q Yes.

DR. HOLT: I think what you're getting at is density dependence at larger abundances where -- when we have high abundances, this may result in reduced returns or recruitment because of compensatory effects if what the scientific term is.

Q Yes.

DR. HOLT: And -- however, your question was framed in terms of status in the red zone. And so those types of effects would -- are unlikely to happen in the red zone where we're dealing with lower

abundances where that type of overescapement - another term they use - would likely not be a consideration. In terms of the management implications or applications, that would be the harvest management panel.

Q But there could be an overabundance on a certain year of the cycle and then in latter years -- subsequent years, a diminished return that could be attributed to density-dependent issues, could it not?

DR. HOLT: That could be the case but -- and then questions of how you distribute the harvest mortality amongst those four -- amongst cycle lines. And now we're talking about density-dependence among cycle lines. That's perhaps a question for management.

Q Yes. Well, in fact, to give us an example, this past year, if next year or the year following, we have very, very low enumeration -- low stock return, this could be an issue for investigation, could it not?

DR. HOLT: Perhaps.

Q Yes, thank you. Now, I want to move into another area and trying to move as quickly as I can. In listening to your testimony, I get the impression -- and again, I'm looking at this from 30,000 feet up, as opposed to from the minutiae. You, as a scientist, are missing a lot of data that you would expect to have to pursue the kind of mandate that you're being asked by DFO, for example, with the production of the paper, the Grant-Holt paper and things of that sort. You have testified, have you not, that there is a deficiency in material?

DR. HOLT: True.

Q True. And that deficiency in material has, for want of a better term, really prejudiced the quality of the work you're being mandated to produce for your department. Let's be frank. Isn't that correct?

DR. HOLT: True. We have -- we've identified four classes of indicators to assess status and -- for many CU's. We do not have the information to provide assessments on those. And I've talked about that before.

Q And you did indeed and you're on record as saying that. And then that has to lead to a series of questions about why is that the situation and how

do we rectify it? And I think you would agree with me that the reason that you are short the kind of database, if I can describe it that way, that you feel is really necessary, is because of the lack of resources within DFO.

DR. HOLT: Lack of resources and for some of the metrics, for example, those around distribution, this hasn't historically been part of our mandate to assess that and so we don't have a historical time period. So even if we had resources right now and started right now, it would take ten, 15 years to establish a baseline and -- and a time trend in order to properly assess that.

Q What kind of timeframe would it take to bring the department up to standard in respect of the areas that weren't up until now their responsibility?

DR. HOLT: I am not clear how long it would take to -- I can talk about what length of time series we would -- we should need. I'd say ten to 15 years once we have a monitoring framework that we are clear can -- is useful for the metrics that we want to identify. But I'm not clear how long it would take to develop and implement that monitoring framework.

Q But all this is costly, isn't it?

DR. HOLT: Yes.

Q Very costly, isn't it?

DR. HOLT: Yes. I -- it would be costly to implement a brand new monitoring framework that -- that addressed all of those metrics. However, it is possible to use information from other sources that we haven't tapped into rigorously in the past so that we may be able to address some of these metrics without having to start from scratch? For example, from community groups, Mr. Saunders spoke about the Stream Keepers or other groups that might be able to provide information to address some of those gaps.

Q So you say you can maybe mitigate some of the expenses by drawing on source information that is not currently within DFO's database?

DR. HOLT: True.

Q But still you would agree with me that what you are venturing into, you, as the department, is venturing into in the implementations program is going to cost a great deal of money. Do you not agree?

DR. HOLT: That's -- that's likely the case. However, I would say that it may be possible to adjust -- to assess status using, for example, Dr. Holtby's synoptic survey where we can rapidly assess status for all CU's using a subset of what he terms "conservation indicators" so that we can identify those priority CU's where we might have higher concern and then focus our efforts on those so that -- which may reduce at least some of the initial costs for status assessment province or region-wide. But in the long-term, I do see a long-term extensive monitoring process program as being valuable.

Q As not only being valuable but, in fact, as being necessary for an effective implementation of this program.

DR. HOLT: Mm-hmm.

Q Do you not agree?

DR. HOLT: True.

Q True. All right. Now, to that end, and forgive me for this question, might any member of DFO have advised you either in writing or orally that, as employees of the federal civil service of the DFO, you were to come before this panel and not call for significant increased funding for the implementation of DF -- of the Wild Salmon Policy?

DR. HOLT: No one said that to me.

Q Nobody said that to you?

DR. HOLT: No.

Q Thank you. Some of your colleagues have given will says that will be spoken to tomorrow when they're cross-examined about the lack of leadership or -- that's actually a strong term -- leadership issues within DFO, as explaining possibly why we are where we're at today, the predicament we're in today, as opposed to full implementation. I didn't see in your will say anything on that question. But from your perspective where you stand as a scientist playing a major role in this, do you believe there is a shortcoming in leadership?

DR. HOLT: I would say shortcoming in leadership to the extent that we're assigning personnel and resources towards assessments. You know, I've been dealing with the Strategy 1 assessments. One of the challenges in implementing that is lack in -- a lack of people who have time to -- to

implement that work and to work through all of the data issues and do those assessments. And so perhaps under different types of leadership, our personnel and/or resources would have been more strongly allocated to that to get that work done?

Q And with a different leadership, there might be a stronger initiative by that leadership to ensure that the estimates of DFO through Treasury Board provided ample financing so that this Wild Salmon Policy could be implemented. Do you not agree?

DR. HOLT: That leadership may have provided more resources to implement it. Is that --

Q That that leadership at a very high level --

DR. HOLT: Mm-hmm.

Q -- may not have carried out an initiative with Treasury Board to ensure that this policy was amply financed and implemented.

DR. HOLT: I don't think I can speak about -- to the leadership at that high level in regards to Treasury Board questions.

Q All right. We learned from the deputy minister, Claire Dansereau, who testified in these proceedings sometime ago, and we also learned from documents that are going to go into evidence tomorrow, although I'm happy to put them before you today, that there's going to be a reduction in budget of DFO up in the upcoming fiscal year starting April 1st of -- her testimony was 5 percent, approximately.

I read in some documents that are going in tomorrow that this is obviously a matter of discussion within DFO in terms of the implementation of the Wild Salmon Policy. Can you tell the Commissioner, from your perspective, again, on the front line, as a biologist carrying out a high responsibility for this program, what is the implication of a budget for -- for DFO that is heading in a diminished *quantum*, as opposed to increased *quantum* for funding of this program?

DR. HOLT: You know, it may result in delay in implementation if funding is not directed towards assessment -- assessment processes for implementing the Strategy 1. You know, funds are -- well, people -- personnel time is required to make those assessments happen and so there -- so there may be a link between what the funding is -- what funding is available and the personnel time.

Especially, a lot of -- some of those assessments require or benefit from additional funds for contractors to help through some of the data analysis.

MR. TIMBERG: Mr. Commissioner, if I may interrupt. It was my understanding of Claire Dansereau's evidence that DFO was presently going through a strategic review of 5 percent and that at the conclusion of that strategic review, the monies will be reallocated with a new focus on where DFO spends its money. So it's my understanding she did not say it was a 5 percent cut across the board but instead it was a 5 percent cut to enable a strategic review to happen with -- with those monies.

MR. ROSENBLOOM: Well, the record will speak for itself. I actually have it here somewhere in the printed-up transcript. But in any event, it will speak for itself.

Q Dr. Holt, in any event, clearly you'll agree with me what we all see is a direction towards diminished funding generally for DFO, as opposed to the opposite, fair to say?

DR. HOLT: The question is, do I see that DFO that is receiving less funds in the future?

Q Is that not the scuttlebutt within DFO?

DR. HOLT: That's information that you have just told me so I can't --

Q Okay.

DR. HOLT: I don't have any...

Q That's -- that's fair enough. My last question for you is a question that I will be asking to each of the panel members, but you separately. This Commissioner is mandated to advise the Government of Canada regarding the complex issues, obviously, of salmon and the critical years of '07 to '09. My question to you is this. The advice that the Commissioner gives to the Government of Canada may well be influential in Cabinet of the federal government obviously taking a sober look at where things stand with this Wild Salmon Policy and where it might go.

Assuming for a moment, and I don't pretend to have the slightest knowledge of where the Commissioner's state of mind is, but assuming for a moment that the Commissioner believes that this Wild Salmon Policy is in the public interest, and

assuming for a moment that this Commissioner would like to see implementation of the Wild Salmon Policy within, let's say, a two to three-year period, what advice would you be giving to the Commissioner in terms of what you believe he should be advising Ottawa to ensure that WSP is indeed implemented more or less within two or three years?

DR. HOLT: I'll speak to Strategy 1, how Strategy 1 could be implemented. So I would suggest that it requires stronger collaborations between -- for assessing status of CU's, stronger collaborations between DFO and other organizations that have information -- like more extensive information. So that -- that's just a step that needs to -- needs to happen.

Q May we stop there for a moment before you move on?

DR. HOLT: Yeah.

Q This is all very important evidence. What is this collaboration you speak of? Why has it not gelled up to this point in time?

DR. HOLT: Because the data has been provided by external groups. It has been inconsistently collected and using a variety of techniques that aren't well-documented. So it's very difficult to combine that information with what -- what we have.

Q Who's at fault for that?

DR. HOLT: No one's at fault. It's just the way it is.

Q Okay.

DR. HOLT: It's collected by different people. It's not under DFO's mandate but there are opportunities there. What we need is some time and resources to be able to look through that data comprehensively to see how we can use it in an effective way. So we need -- I would encourage those types of collaborations, as well as resources and person -- not just short-term resources but a longer-term commitment to having people available to -- to do those assessments over, say, a five, ten-year period, not just short-term money in this fiscal year but from the long-term commitments to resources to doing those assessments.

Q Well, when you spoke of needing time, no one is denying you the time, are they?

DR. HOLT: Yeah.

Q Pardon me?
DR. HOLT: No one is denying me the time.
Q Well, you said --
DR. HOLT: Yeah.
Q -- "We need that time." It isn't as if someone is dictating that you're not going to be afforded that time.
DR. HOLT: No, but there's pressure to implement this quickly.
Q Yes.
DR. HOLT: My intention was to say there was that -- it would be advantageous to have resources to build capacity at DFO over the long-term, as opposed to just short-term money for an individual project here or there to do more of a quick-fix but something more strategic and long-term.
Q Which, surely, Dr. Holt, speaks to the expense of implementing this program, does it not?
DR. HOLT: True.
Q And the need for added resources, including financial?
DR. HOLT: I can't argue, no.
MR. ROSENBLOOM: I have no further questions. Thank you.
MR. WALLACE: Mr. Commissioner, it's 3:10 almost and perhaps this would be a convenient time.
THE COMMISSIONER: Sure. In view of time, we'll take a short, ten-minute break.

(PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)
(PROCEEDINGS RECONVENED)

MR. WALLACE: Mr. Butcher?

CROSS-EXAMINATION BY MR. BUTCHER:

Q Dr. Hyatt, I have a question to Dr. Holt. Because mention has been made a number of times without reference to the Slaney paper. You were a co-author of this paper?
DR. HYATT: Yes, I was the second author of the paper and I actually led the project that produced it.
Q And I think you've told us that this paper was the first significant stock assessment done in 40 years?
DR. HYATT: It wasn't -- no, it wasn't the first significant stock assessment done in 40 years.

There were many stock assessment papers done. This was the first systematic stock assessment paper that looked at all of the anadromous salmon and trout populations within B.C. and the Yukon that -- that had data records associated with them. There -- there had been a previous quite detailed assessment of just the five anadromous salmon species by the International Pacific Fisheries Commission back in the late '50s and early '60s.

Q So what you're saying is this was the first broad scope report since that IPFSC report in the 1950's?

DR. HYATT: It's the first of its kind that I'm aware of certainly.

Q And Dr. Riddell earlier in his evidence made reference to this. And I just wanted to identify the -- sorry -- I can't read it on the screen. He made reference in his presentation to some sockeye extinctions that had occurred and made reference to the fact that there were -- they were mainly dam-related.

DR. HYATT: That's right. The majority of the sockeye extinctions had occurred in the Columbia River System in association with hydroelectric dam development there, as well as in the Lower Mainland area of B.C. in places like Alouette and, oh -- and Coquitlam, yes, thank you, Jim.

Q And those -- there were also apparently, according to the -- the right-hand column, first full paragraph, also five stocks that became extinct as a result of the Hell's Gate slide and subsequent overfishing?

DR. HYATT: It's been sometime since I looked at this paper but if that's -- if that's the --

Q I think you can see it there now.

DR. HYATT: -- what the text says then we were quite careful about -- yes, we were quite careful about -- this was attributed to various sources of information, both expert interviews, as well as great literature that we systematically went through at the time.

Q So if I've got this right, the date of this paper is 1993?

DR. HYATT: The paper was published in '96.

Q Okay.

DR. HYATT: The initiative and the -- the data covered

up to 1993.
Q So the -- by that point, there had been large scale fishing for a hundred years?
DR. HYATT: There had been --
Q On Fraser -- on Fraser sockeye?
DR. HYATT: Yes, there had been an industrial fishery for approximately a hundred years. Although one might add there was a developmental period that predated power blocks and internal combustion engines. And so it wasn't until the -- roughly the 1930s that a -- that a major industrial fishery really took hold.
Q And the only extinctions during that century that you know of are related to dams or the Hell's Gate slide on the Fraser sockeye?
DR. HYATT: The only extinctions on the Fraser that I know of -- there are others that I know of that were not related to dams or to slides outside of the Fraser.
MR. BUTCHER: That's the end of the background questions, Mr. Wallace.
DR. HYATT: Thank you, Mr. Commissioner.
MR. BUTCHER:
Q Now, Dr. Holt, the first question that I have relates to the number of conservation units that you've identified. It's around 40 because, as I understand it, there's some give-and-take.
DR. HOLT: Yes. Yes.
Q Now, Dr. Riddell had given evidence earlier that he was of the view that there might be 230 lake-based CU's and 34 river-based CU's. The question I have for you is, can you explain why the number is so reduced?
DR. HOLT: Was he perhaps speaking about the entire Pacific region and I'm speaking about Fraser River Watershed? So there are approximately 40 in the Fraser River Watershed.
Q I see others nodding their head. Dr. Irvine, is that the explanation that you think we have?
DR. IRVINE: Well, yeah, I think that's what Dr. Riddell was talking about, the sockeye CU's in the Pacific region.
Q The -- when were you commissioned, Dr. Holt, to begin work on the paper that has become Exhibit 184?
DR. HOLT: I'm assuming that's the Holt *et al* 2009 CSAS paper? If so, then beginning of 2008.

Q Was that immediately upon your employment with the department?
DR. HOLT: Or are you speaking about Grant *et al*?
Q Yes. No, I'm speaking about Grant *et al*.
DR. HOLT: Oh, okay. So I started work -- let's see, we had the review --
Q And maybe I've asked that question ineloquently because I'm not so concerned about when you started work on it but when was work started on it? Do you know?
DR. HOLT: It was after Ms. Grant completed a forecasting paper in the spring. So when she finished that and finished all the reviews, then she started on this one. So that would have been in the summer --
Q Of which year?
DR. HOLT: -- at some point. Of 2010.
Q Okay.
DR. IRVINE: I can shed some light. I can't give the exact answer but it would have been -- I thought it was entered into evidence, the request for scientific information related to that paper. I could be wrong. But it would be around this time of year when the annual request for scientific advice get developed within the department requests person.
DR. HOLT: It perhaps might be listed at the very end of this document.
Q Okay. So every year, requests are made in the budgeting process for particular scientific work?
DR. IRVINE: That's correct. I don't know that I would call it -- yeah, I guess you could call it part of the budgeting process, yes.
Q Was it before or after this Commission had been called?
DR. HOLT: We started work on this after.
Q Is this the most significant piece of work that's been undertaken with respect to the implementation of Strategy 1?
DR. HOLT: Well, I'd say that the document by Holtby and Ciruna would be the most significant identification of the CU's. In terms of Strategy 1.2, the assessment, this is the most significant work that's been peer-reviewed. I'd say a large body of work has been done on Barclay Sound but that has not been peer-reviewed.
Q And it doesn't relate to the Fraser. Is this the

most significant work on the Fraser that has been done under Strategy 1.2?

DR. HOLT: 1.2, yes.

Q And that was only commissioned after this Commission was ordered?

DR. HOLT: Yes, this work started after this Commission started.

Q The document has "draft" written all over it and you have told us that there are some concerns about the accuracy of the data in there because of biases that exist within the scientific data. Can you tell us where this paper is at in terms of its production schedule? Is this draft one? Draft five? And are we expecting draft 20 or 25? And when will we see the final version? That's a lot of questions. I'm sorry for that.

DR. HOLT: So this was the draft submitted for review. The -- we need to have a final completed version I think it's within 60 -- either 60 or 90 days of the -- of the review date, which was in November. So 60 or 90 days would be in the middle of February or end of February that a final one will be submitted. And that -- that will be submitted to the chair of the salmon subcommittee who will then -- I'm not sure what the process is, if they review it or approve it or how it works. Can -- Dr. Hyatt can speak to that.

DR. HYATT: I can add to that. The salmon subcommittee will examine this set of revisions having given specific directions to the authors on what the revisions -- the criterion they must satisfy. And as long as the subcommittee group who look at this is satisfied those criterion have been met, that the directions have been followed, then the paper will be accepted and it will be final and published and then posted for -- to be publicly available.

Q Dr. Holt, are you expecting there to be some significant changes to some of the commentary -- some of the findings and some of the commentary in here?

DR. HOLT: I'm not sure how the -- the red, amber, green splits are going to end up with the final version. Our intention from the methodology perspective, which is what I've been involved with, is to provide a more transparent way of showing the impacts of different assumptions about

the biological underpinnings so under different assumptions about density, dependence or different assumptions about time-bearing productivity show -- our intention is to show the status associated with each of those different assumptions. That's the major -- that's one of the major revisions -- the major revisions that I am most involved with.

Q All right.

DR. HOLT: And so -- and I can't speak to what the impacts will be on the red, amber, green split amongst the CU's.

Q And what about the -- some of the findings in the text? Are you expecting those to change as well?

DR. HOLT: I -- I'm not -- I can't speak to that. They could change. Yes, they could change.

Q Now --

DR. HOLT: And part of the -- one of the -- the comments from the salmon subcommittee was that given that we need to change these analyses, that they could not approve the -- they cannot review and improve the assessments that we provided. And so they provided advice for changing the methodology, which we do, and then have a subsequent review of those assessments once it was clear what the red, amber, green splits would be amongst CU's and amongst assumptions and metrics. We could have a review of that assessment in a subsequent process.

Q Okay. So it's very much a work in progress. Is that -- would that be a way to summarize it?

DR. HOLT: Well, this -- this paper will be revised by the middle of February, a 90-day limit.

Q Okay. Now --

DR. HOLT: And so that's -- like that's a -- that's a firm deadline.

Q Now, what I understand you did was look up four sets of data for each of the conservation units and run computer simulation programs for each of those metrics or sets of data.

A No.

Q Okay. Well, maybe you should assume for the moment that I'm a very dim undergraduate in a first-year course and just tell me in one paragraph what you did to -- or two paragraphs, tell me what you did when you were looking at each of the conservation units.

DR. HOLT: So we looked at metrics on abundances and

trends and abundance over time, which I think is clear --
Q Yes.
DR. HOLT: -- those two dimensions, right. On trends and abundance over time we looked at two -- two specific metrics. One was short-term reduction so over the last three generations what the reductions have been over time for the short-term. And another one was -- have long-term changes. So what's the current status versus long-term mean? So that was getting at two time scales of change over time.
Q And what are those time scales?
DR. HOLT: So --
Q Did they vary from CU to CU?
DR. HOLT: The short time -- the metric on short time scale did not vary year-to-year -- CU-to-CU. That was three generations. So it's approximately 12 years for sockeye salmon.
Q Okay. And on the long term, it depended on the availability of the data?
DR. HOLT: Yes.
Q And I presume you used as much data as there was available?
DR. HOLT: Yes.
Q And what sort of ranges were there for the data that you had?
DR. HOLT: Between -- I think it's 15 or 20 at the shortest to 55 or 60 at the longest.
Q And I take it from something you said just before the break that one of your concerns is about the consistency --
DR. HOLT: Mm-hmm.
Q -- and quality of the data.
DR. HOLT: Mm-hmm.
Q Is that fair?
DR. HOLT: Mm-hmm.
Q That there are some rivers and streams that we have very good long-term histories for, correct?
DR. HOLT: Yes.
Q And some that we have either very short periods or periods of broken data or periods of poor data?
DR. HOLT: Yes.
Q And all of that affects the quality of the computer simulation runs, I presume?
DR. HOLT: Yes, but in this assessment there were no simulation runs. That was from the 2009 paper

where I evaluated benchmark. This was just purely an assessment --
Q Okay.
DR. HOLT: -- so no simulations here.
Q So it affects the quality of your assessments?
DR. HOLT: Yes.
Q Are there particular conservation units that you can tell us about that you're really concerned about the quality of data?
DR. HOLT: So there were the 26 CU's that we evaluated with -- on both abundance and trends and abundance over time and then there was those additional ten CU's, which we did not evaluate because of the poor quality data. So it's those ten CU's where I would have special concern over data quality issues.
Q Any in the 26 that you have real concerns over data quality?
DR. HOLT: There are some where we had to use shorter time series because of inconsistencies of how the data had been treated over the longer time series. For example, some of the CU's maybe have been influenced by enhancement practices. So it wasn't fair to compare enhanced and non-enhanced sections of the time series. So we've had to reduce those. And so for -- for those cases, we do have less -- poorer quality information because the data set is shorter.
Q And I take it that from going forward you as a scientist may be looking for the work for your -- the person who replaces you in 25 or 30 years, you would want that data from this point on to be consistently and properly collected?
DR. HOLT: True. But techniques are constantly changing so the key component here is when they do change to have a systematic way of comparing methodologies.
Q So you can always compare apples with apples?
DR. HOLT: Right.
Q And that just is something -- or that is something that simply hasn't been done historically?
DR. HOLT: That's true.
Q I just have a couple of questions about some particular parts of your report. Page 11, please. And if you can blow up, Mr. Lund, the second paragraph? Here, the report in the second paragraph identifies two different periods of

decrease in productivity, one in the '60s and '70s and one in the '80s and '90s. Do you see that?
DR. HOLT: Mm-hmm, yes.
Q Have you got any explanation for those two different productivity decreases?
DR. HOLT: That would be better answered by a biologist in the area or perhaps someone from the panel --
Q Well, we want to get you --
DR. HOLT: -- but Ms. Grant --
Q -- finished today. But your --
DR. HOLT: Yeah.
Q That's --
DR. HOLT: No.
Q -- outside your area of expertise --
DR. HOLT: That's outside my purview, yes.
Q -- to explain --
DR. HOLT: yeah.
Q -- that. If we could please go to pages 92 and 93? I looked in your report for something that might summarize your findings in something that we can understand, red, amber and green. Do these two pages summarize what you and your co-authors have found?
DR. HOLT: It's a summary of part of the analysis.
Q Particularly, it's identifying which of these CU's are in the different colour categories.
DR. HOLT: Yes, for individual metrics and for different assumptions about the analyses.
Q The -- your evidence now is that these colour-codings may well change?
DR. HOLT: Mm-hmm. Yes, and we will be adding more columns especially to the last group, abundance metric one, that last group of columns -- or we'll be adding more columns there to address different -- additional assumptions.
Q Again, looking at the dimwitted first-year undergraduate, can you tell us the difference between Ricker, Kalman and Larkin?
DR. HOLT: Sure. So Ricker, Dr. Hyatt already spoke about this, is a traditional analysis model for relating the number of spawners to the subsequent number of recruits for the next generation.
The Larkin model is an adaptation of that, a revision of that that accounts for the cyclic dynamics and the interactions among cycle lines, that the abundance of fish that -- that come back depend not only on their parents but also the year

before their parents or year after and because of density-dependent interactions between cycle lines. So cycle lines are not independent. And so that Larkin model accounts for that -- that cyclic pattern in the interactions.

Now, the Kalman -- Kalman model is another revision of the -- of the Ricker model. That's the standard one -- standard model. But it accounts for time-varying productivity. So it accounts for the fact that we've seen declines in productivity over time.

What we haven't included in this -- and this -- in those three models is a Larkin version of the model that also considers the time-varying productivity. So that's one -- one assumption that we didn't address that it's missing from here.

Q Are they all equally valid or is one --

DR. HOLT: Yeah.

Q -- a better model or test than the other?

DR. HOLT: That was -- a large time was spent discussing that point at the workshop -- at, sorry, the CSAS review in November. How do you weight those? And the overall consensus was that we can't provide more weight to one or the other right now, that we can present them all to show the spread of the status assessment across those different assumptions.

Q I don't know if you're able to answer this question but it would appear that the early Stuart and early summers are the runs that generally showed some decline in the '60s and '70s. And the summers, in particular, were the ones that showed the declines in the '80s and '90s. Are you able to say that -- to confirm that or is that -- I'm not going to ask you to go and check that.

DR. HOLT: Yeah, I -- I would defer to Ms. Grant for that question.

Q And just an obvious point, I think, looking at page 93 is that the trends for the late summer stocks are all very positive with one exception; is that fair?

DR. HOLT: Could we scroll down, please?

Q Page 93.

DR. HOLT: With the exception of Cultus --

Q One -- one exception, Cultus Lake. Is that fair?

DR. HOLT: And perhaps Seton at least for the recent

trends in Seton and in Harrison.
Q Yes.
DR. HOLT: And perhaps Kamloops.
Q And that -- you're aware and maybe you aren't but I'm going to -- are you aware that it is -- that the late summer runs have been closed to fishing for many years to protect that Cultus Lake stock?
DR. HOLT: Mm-hmm.
Q Is that -- you're aware of that?
DR. HOLT: Yes.
Q And most of those other runs in that time are quite healthy?
DR. HOLT: More than half, say, if that means -- if that's most.
Q Now, there --
DR. HOLT: On the -- on those metrics.
Q There is -- if we can have page 89, please? Second full paragraph. This paragraph makes a report that this -- I'm reading from the second sentence:

> There are seven CU's that were consistently in the status red zone across most, if not all, metrics.

Is that the kind of comment that might get changed in the next draft?
DR. HOLT: Yes, there was some discussion about that because there's disagreement by Ms. Grant's understanding of "most". I'd have to go through and compare what -- which metrics were read and -- but -- and -- and it may also change based on our assumptions on the abundance metrics. So I can't guarantee that it will stay the same. That's what I'm -- that's what I want to say.
Q And then later on in that paragraph, there's a rather gloomy statement that suggests:

> For the smaller CU's, given their low abundances and decreasing trends, they are at a high risk of extirpation.

Is that also a comment that is likely to change or may change?
DR. HOLT: You know what? After -- when we're reading this, I'm not sure what the context of the word "smaller" is. Let me -- I have to think -- I have

to read the entire paragraph to -- is that smaller in abundance? Oh, okay, so historically. So that might not change. I can't guarantee that it won't change but my thinking is that it might not change.

Q We just have to wait, I presume.

DR. HOLT: Yeah, and I'm also not the first author on this.

MR. BUTCHER: Thank you. Those are my questions.

MR. WALLACE: Thank you, Mr. Butcher. Ms. Gaertner?

MS. GAERTNER: Mr. Commissioner, Brenda Gaertner, and with me, Leah Pence for the First Nations Coalition. I have to ask a few preliminary questions of Dr. Irvine before I turn to Dr. Holt. And I'd like to have called up Exhibit -- where's my notes -- oh, it's not yet marked as an exhibit. It's document number 28 on the Commission counsel's potential list of exhibits, Canada 168237. These are minutes of the meeting that was held shortly after the Wild Salmon Policy was passed. It's a meeting that was held at the Musqueam Hall. Chris Corrigan was the facilitator. And by my read of this, Dr. Irvine and Mr. Saunders were both present.

CROSS-EXAMINATION BY MS. GAERTNER:

Q Would you agree with me on that? Do you recall that meeting?

DR. IRVINE: Yes, I think so.

Q And Dr. Irvine, if I could get you to go to page 4 to begin with, or if you could direct his attention to page 4 and 5, I think that'll help to refresh your memory. You were there, as I understand it, in a number of capacities but you were talking about Strategy 1 at this stage in the discussion. That's found at the bottom of --

DR. IRVINE: What was the --

Q Sorry. At the bottom of page 3, you see --

DR. IRVINE: Okay.

Q -- "Strategy 1: Jim Irvine" --

DR. IRVINE: Yeah. And just refresh me, this was December...?

Q December 2005 at the Musqueam Hall.

DR. IRVINE: Okay.

Q Okay?

DR. IRVINE: Okay.

Q And your presentation begins at the -- at the page 4 -- at the top of page 4. And I wonder if you could take a moment and review page 4 and let us know when you need to go over to page 5?
MS. GAERTNER: And in between that, I wonder if you could mark this as an exhibit? Or if this could be marked as an exhibit?
THE REGISTRAR: Exhibit Number 213.
MS. GAERTNER: Thank you.

EXHIBIT 213: Canada 168237 - Minutes of Meeting held at Musqueam Hall in December 2005

DR. IRVINE: Yes, okay.
MS. GAERTNER:
Q All right. Now, I wonder if you'll agree with me that there seems to be a couple of themes in your presentation. One is -- and I see it a number of times and I even see it in capitals, which often suggests that you were stressing it, that you were stressing that CU's are not management units and that was likely in result to concerns that First Nations were raising around how they would experience the implementation of CU's in their territories; is that correct?
DR. IRVINE: Well, no, not exactly. I mean a lot of people are confused with CU's and they think that their areas of the province so what I would -- the point I was trying to make here is that CU's are groups of salmon, they're not geographic units and they're not -- they're not management units; they're actually groups of fish.
Q And so First Nations -- well, I'm going to do it. Do you agree with me that historically DFO and still today make management decisions based on aggregates of sockeye, including things like determining total allowable catch and the effects of which fisheries? You'd agree with me on that?
DR. IRVINE: Yeah, I mean historically Fraser sockeye have been managed largely based on the three major run timing groups.
Q Exactly. And that's -- similarly, the international obligations that Canada has is linked to those management groupings, also; is that correct?
DR. IRVINE: You know, to be honest, I've had very

little to do with the Pacific Salmon Treaty so I don't want to --

Q All right.

DR. IRVINE: -- get into that.

Q At page 5 of your minutes, you're confirming to the First Nations that are in attendance at this meeting that in DFO's definition of the conservations they're looking for -- for input; is that correct?

DR. IRVINE: Yes, we were trying to figure out ways that we could try to incorporate ATK or TEK.

Q And you'll agree with me that your statement reads:

> Infringement of rights will happen during the decision-making process - First Nations need to be engaged in every step of the way. CU is NOT a management unit.

Is that correct?

DR. IRVINE: I just -- I'm just going to try and find that.

Q Page 5.

DR. IRVINE: I haven't looked at this for over I guess about five years, if I ever looked at it. Yeah, so somebody asked me about whether CU's would infringe on Aboriginal rights and economic opportunities and my answer seems to be that DFO would consult with First Nations and others on the preliminary list of CU's and they were seeking input over the next year.

Q In the middle of the page on page 5, answer:

> Definition of CU's - looking for input. Infringement of rights will happen during the decision-making process - First Nations need to be engaged every step of the way. CU is NOT a management unit.

That's your answer to a question that occurred at that meeting?

DR. IRVINE: All right. Just maybe could you highlight the bullet? I'm having trouble sort of figuring out which one you're talking about. Okay. Here we are.

Q Halfway through the page.

DR. IRVINE: All right. So the question was:

CU's will push Aboriginal people out of the fishing industry.

Infringement of rights will happen during decision-making process.

That doesn't sound like something I would say. I would -- I would agree with, "First Nations need to be engaged," and "CU is not a management unit," but I don't -- I certainly don't think I would have said, "Infringement of rights will happen during the decision-making process." I can't -- I can't imagine --

Q Mr. Saunders, I wonder if you could help in this matter?

MR. SAUNDERS: Yes, I'm -- in addition, my recollection, Mr. Commissioner, isn't that clear on I -- I remember the meeting very clearly, the answers I don't. I think Mr. Corrigan may have been including in the answers some of the dialogue that happened that were raised in the -- at the same time as the answers so I'm not convinced the answers -- and when I was looking at mine as well -- looked like they were a combination of things I said and threads within the -- a dialogue that was happening over the issue.

Q Okay. So the dialogue that was happening over the issues was, as we moved into the implementation of the Wild Salmon Policy, one of the first steps that people were looking forward to was the definitions of the conservation units. You'll agree with me on that? And that there was --

DR. IRVINE: Yes.

Q -- and that there was a need to perhaps educate, understand on all parts as to how those conservation units might be moved into management decisions or otherwise and how conservation units were going to be established. You'll agree with me on that?

DR. IRVINE: Yes.

Q And you'll agree with me that it was pretty clear at that meeting, and you can take a look at other pages, that First Nations input into the establishment of the conservation units was something not only sought but encouraged by DFO; is that correct?

DR. IRVINE: Yes, and I would say that we undertook --

we did that during 2006. There was a series --
Q Those are the sticky-note meetings? Is that what you're referring to?
DR. IRVINE: That's right.
Q I wonder if you could make a distinction between seeking engagement at public meetings versus a consultative process with First Nations. So the sticky note meetings you might agree with me that those were meetings in which members of the public and others could come. There were sensitivities. And you asked people to put sticky notes that gave DFO some input. That might be an engagement process; is that correct?
DR. IRVINE: Well, I mean some of the meetings -- quite a few of the meetings were specifically with First Nations. It was more than just sticking sticky notes on maps. I mean that was part of it. But my recollection is that we also invited input through -- by telephone and by letters and by email. So it was -- it was more than just stick notes.
Q Right. I also want to just point out at the minutes and see whether or not you can confirm whether these were your statements or whether you recall them being made. But I think it's important that at the meeting -- and you'll see at page 6 at the top, third paragraph:

> Benchmarks are measures of status - rather than decision-making points. Two most important things you have to know how many there are (abundance) and how they are distributed.

You will agree with me on that?
DR. IRVINE: Yeah, I wouldn't have said that -- well, I would have said something like, "Benchmarks would delineate status zones and that they're not decision-making points." And in the policy we talked that the two main sources of information would be abundance and distribution. That's correct.
Q All right. I understand I have to move to Dr. Holt right now. I did want to establish a few more foundational things because Ms. -- Dr. Holt began her work and so I'll try to do that without taking you to documents and then I'll take you

back to the documents tomorrow when I have a bit more time. After the meetings in the communities and the input and getting some of the concerns -- I'm going to call them the sticky note meetings just so you can bear with me for a moment. Then there's another meeting in March of 2008.

And Dr. Holt, I believe you were present at that March 2008 meeting and, similarly, also, I believe Dr. Hyatt and Mr. Saunders was also there. And I want to take you to Exhibit 193, if I may? So we've done a bit of a fast-forward. We've gone a couple years forward. There's been a couple of forums, as best I recall. And this -- this is the second of the large forums on conservation units. And I want to take you to page 4 and 5. And just to confirm that you were there and that there was a presentation on Strategy 1 and some of the work that was being done on the CU's and the CU methods. You see that?

And then I want to take you to Appendix 4 at page -- at page 16 and 17. Sorry. Actually, could you help me and confirm when you agree with to say actually yes. There was a couple nods and I just keep going but I understand that won't be that useful in the transcripts.

DR. HOLT: Yes, I was there.

Q Thank you.

DR. HYATT: As was I.

DR. IRVINE: As was I.

MR. SAUNDERS: As was I.

MS. STALBERG: As was I.

Q Oh, great, it was a good party. All right. Now, we'll go to Appendix 4 and this is the matter of import to the questions I'd like to ask Dr. Holt. You'll see at page 16 and 17, there's some summaries and, in particular, First Nations are making it clear they want smaller venues to discuss CU's and the information regarding how CU designations will affect them and they're asking for clearer information. Will you agree with me on that?

MR. LUND: I'm sorry?

MS. GAERTNER: Sorry. I'm at Appendix 4 at page 16 or 17 of that document.

MR. LUND: So page 16 is Appendix 2 and Appendix 4 is at page 31. I just want to be sure.

MS. GAERTNER: Sorry. Okay. Appendix 2.

MR. LUND: Okay.
MS. GAERTNER: Sorry. Page 16. I had half of it correct.
Q And at number one -- after the -- there's was two points made by the -- under the Skeena Fisheries Commission and then there's the next full paragraph. If you could just review that and see whether you'll confirm that concerns were raised and the request for smaller venues. And I think when they say "CU's" they are in the full thing. That took me a while but I think that is actually conservation units as opposed -- as distinct from anything else there. The proofing of minutes is not always on the highest priority. And then you'll go on to see that they're asking for technical support and they're suggesting some partnerships might be useful for the development of benchmarks and monitoring. Will you agree with me that those were discussed at that meeting and that the minutes reflect that?
DR. HOLT: Yes.
Q And then you'll go on to see that they're asking for technical support and they're suggesting some partnerships might be useful for the development of benchmarks and monitoring. Will you agree with me that those were discussed at that meeting and that the minutes reflect that?
DR. HOLT: Yes.
MR. SAUNDERS: I can add. It may be a small point but I'm -- there were breakout sessions, I believe, at this so I don't know necessarily this was plenary. I don't have enough context to know if it's plenary or something that came up in a breakout session.
DR. HOLT: My memory is that these were written on pieces of paper.
DR. IRVINE: Sticky notes?
DR. HOLT: No. No, correct me if I'm wrong here but I think individual participants wrote these on pieces of paper and they may or may not have been voiced out loud.
DR. HYATT: My recollection is that is the case, that there were -- there was an opportunity -- in some of these forums, particularly with First Nations people, there's a reticence to -- among many to stand and speak. And so the opportunity was provided to just write a written -- you know, on a

-- on a small piece of paper to submit a written commentary so there are collections of commentaries that the facilitator would have incorporated into the record. And if some of these statements appear perhaps somewhat novel to us it may be because we've only either -- this might have been the first time we've seen some of them, or, alternately, because the point wasn't made in sort of the plenary part of the discussion it isn't as firmly imbedded in our minds as it might be.

Q Okay. I'm going to need to ask a few questions of Mr. Saunders then. Mr. Saunders, you will agree with me that First Nations were -- were quite interested in ensuring in the establishment of a conservation units the distribution was something that they would be interested in and would want involvement in; is that correct?

MR. SAUNDERS: I think that's true, yes.

Q And that partly is because the -- how a CU is assessed, as it relates to distribution and what import that has and what decisions may actually eventually once management decisions are made on it could, from their perspective, they raise that with you, affect their abilities to fish in their communities; is that correct?

MR. SAUNDERS: I think the -- when -- Dr. Irvine spoke to this earlier. I think there was a lot of -- a strong concern among First Nations that we were going to manage to conservation units would not be putting any emphasis in our management plans on the component populations within a CU. And that was a pause for concern of real import for First Nations.

Q Thank you, Mr. Saunders. All right. Let's see if I can now try to direct the questions specifically. I think, Dr. Irvine, I think you'll be part of some of the questions that I have of Dr. Holt and so, as between the two of you, please just decide who is best to answer them. It's my knowledge that there has actually been no feed -- no direct consultation with First Nations regarding the setting of the actual list of CU's; is that correct? That that was a peer review of the methodology but the setting of the original CU's for Fraser River sockeye was not brought back into the tribes or the communities for

consultation; is that correct?
DR. IRVINE: Well, at the sticky-note meetings, there were lists of CU's, including Fraser sockeye, preliminary lists that were presented to the participants so that there was some opportunity at those meetings to have input.
Q Yeah, so before the list was obtained, you obtained -- before the list was completed, you got some feedback at some communities but the actual determination of the methodology and the list itself once it moved into final form has not been discussed or -- there has not been a consultative process regarding that; is that correct?
DR. IRVINE: Well, as you know better than -- than we do, consultative process -- I mean consultation means -- it has a significant meaning in First Nations but there certainly wasn't I think what you would call Nation-to-Nation dialogue about these -- about these issues.
Q And Dr. Holt, you haven't been involved in a consultative process with First Nations regarding their final list of CU's that was developed, have you?
DR. HOLT: No, I haven't.
Q And to my understanding, there's been no consultations to date with First Nations regarding the benchmarks and the preliminary benchmarks that would be used including the decision to move from just the four potential benchmarks or the three potential benchmarks to the two, including, particularly, the decision not to use distribution as a benchmark. Would you agree with me in that?
DR. HOLT: True. There was no formal -- formal process there. There was -- we invited input from First Nations groups in the development of the benchmarks, that CSAP paper, as well as a recent workshop. But it wasn't a formal process that I think that you're asking about.
Q Thank you. Dr. Holt, I understand this morning that you mentioned there was consultation on the benchmark methodology and, in particular, in January of '09 in the CSAS process and that First Nations participated in that. I'd like you -- I wonder if you could go to Exhibit 160. I'm sorry. It wasn't on my earlier list but it's now an exhibit so I think it should be not too bad. If you could go to Appendix 2 at page 17 and -- oh,

page 20 of the pdf. And you'll see the list of attendees there. I only see one person there that might -- looks like Michelle Wash was there -- Walsh was there from the Shuswap First Nation.

DR. HOLT: So my recollection was that there was over a hundred people there, which does not match with this, I don't think, unless there's another -- is -- oh, it continues on -- so that doesn't match my recollection. But I also --

Q Dr. Irvine...?

DR. HOLT: Dr. Irvine might be able to better --

DR. IRVINE: Well, no, I'm just wondering if we have the right report. If you go up to the top, is this the meeting that you were talking about?

Q This is the January 2009 meeting in which the methodology --

DR. IRVINE: Okay.

Q -- of the benchmarks was discussed.

DR. HOLT: Yes, that's the correct meeting.

Q And there are --

DR. HOLT: But --

Q -- lists of attendees?

DR. HOLT: Yeah, you know, to be honest, my recollection was it was in that massive hall at -- down at SFU Harbour Centre. It was a double room. I do remember there being over a hundred people but -- so but that does not mesh with what this attendee list said.

Q And so that would have been the only consultation. When you mentioned this morning in your evidence that there was consultations, including First Nations participating at it, it's this meeting that you're talking about?

DR. HOLT: Exactly. It's this -- this meeting, right.

Q And it's a large meeting with a whole bunch of people, including a lot of technical information from scientists; is that correct?

DR. HOLT: Yes, this was meant to be a technical meeting on the scientific underpinnings of the benchmark developments.

Q All right. Again, Dr. Holt, you mentioned this morning in your evidence that consultations occurred in June of this year, June 2010, at a workshop on identifying benchmarks and assessing the status of the conservation units. I wonder if you could pull Exhibit 166? And if you could go to page 8. Again, this is a list of participants

and it appears that Mike Staley was present. I should mention I think Mike Staley was also present at that earlier meeting, although it's not clear if he's representing anyone. He's there clearly participating in the dialogue for sure. And there's a person from NTC Fisheries and there's a person from Skeena. Is there anybody else that you can identify as First Nations off that list that you know of that would have participated in that dialogue that day?

DR. HOLT: No, and I have to mention that this was -- meeting was intended to be a workshop for discussing the challenges -- the general challenges for -- for applying Strategy 1.2 or implementing Strategy 1.2 and wasn't specifically focused at First Nations involvement --

Q Thank you.

DR. HOLT: -- as I think you're getting at.

Q Thank you. And so if -- if I got it right, given where we are right now, we moved from meetings in which there was input into the preliminary list of the possible conservation units and those were regional in nature. And there hasn't been any further regional meetings in nature at all and we are now setting conservation units and their benchmarks without such good dialogue; is that correct?

DR. HOLT: Yes.

Q Mr. Saunders, is that -- does that surprise you given the effort that was made at the time in which the Wild Salmon Policy was passed and the discussions that occurred later?

MR. SAUNDERS: I don't know if -- I think there's a -- I'm not clear on the sort of -- I'm feeling uncomfortable having been away -- back in the last year-and-a-half but having been -- been away. I -- I would feel a little more comfortable if I saw a timeline of various meetings. And I think --

Q Mr. Saunders, why don't you wait till tomorrow then because I was going to do that but since I had to focus only on the issues around Strategy 1, I've just done that.

MR. SAUNDERS: Okay.

Q So I'll ask you that question tomorrow, in all fairness. Dr. Holt, you mentioned earlier today and I took great interest in one of the recommendations that you thought would be useful,

which is partnerships in the assessment and the application of the conservation units. And in particular, I'm wondering if one of the things you're including in that discussion is whether or not partnerships with First Nations who have, I would -- I would suggest, useful information on the ground regarding ecosystems. Is that something you're considering when looking at the assessments of conservation units?

DR. HOLT: You mentioned ecosystems in your question there and so I would defer the ecosystem level assessments to Strategy 3 and Kim -- Dr. Hyatt.

Q Let's leave it to conservation units.

DR. HOLT: But for -- to the extent that First Nations have information on assessments of population status of conservation units then, yes, I would see that as -- as valuable.

Q And would you agree with me that the diversity of the stocks and the diversity of the First Nations on the -- within the Fraser River Watershed is perhaps one of the reasons why that hasn't been done?

DR. HOLT: No, I'm not quite sure where that question is -- I don't think that diversity is a limiting factor in bringing in that level of input. Perhaps you can explain that a bit further.

Q I'm actually -- sure. I'm making the suggestion and I just wonder if you'll agree with me, that if you have to engage and consult with 20 or 30 or 40 tribes or -- depending on how large a migratory route you're going to talk about, including many, many smaller communities that might have specific issues around distribution, that that might be a little bit more challenging than the Barclay pilot; is that correct?

DR. HOLT: True. I understand what you're saying now. The diversity of the First Nations groups within the Fraser River Watershed because what we need and we don't have is someone to spearhead that -- that process.

Q And so I'm very concerned that this paper was presented in -- just last month and you're -- now got 60 or 90 days to complete it and the benchmarks will be set, is that correct, as a result of that?

DR. HOLT: No, I wouldn't say that's fair. I think there's a misconception that benchmarks are

decided once and -- and then they're set in stone. Benchmarks will change annually, as new information becomes available. In terms of -- there are specific values on specific metric and then as more information becomes available on other metrics, as we, for example, gather information from groups, for example, from First Nations on distribution, then we will incorporate that information to develop new benchmarks on those metrics. So there -- I -- there is no final benchmarks that are set with this paper. They will evolve.

Q All right. I'm just wondering if -- were you familiar with the process that was used in the Skeena, as it relates to the setting of the benchmarks? It was my understanding there was ground-truthing with First Nations that occurred before the benchmarks were finalized. Are you aware of that?

DR. HOLT: No, and I'm unfamiliar with the benchmarks that have been finalized in the Skeena as well.

Q Well, maybe I should -- I wonder if anybody else -- Dr. Hyatt might be able -- any of the other panel might be able to correct. No? All right. Let's leave it.

MR. SAUNDERS: I wasn't aware of that.

Q My understanding was that Blair Holtby actually did the work with the tribes in the Skeena to do some ground-truthing before the -- maybe it was before the conservation units were set, as distinct from before the -- but you're not aware of that and we can leave it.

MR. SAUNDERS: I'm not aware of that work, no.

Q Okay. Dr. Holt, we're going to develop this a little bit tomorrow but perhaps I think what I'll benefit from your insight about what the challenges are associated when you take a scientific method, which you'd -- I'm going to be very careful -- and I mean by no insult to this panel -- you dissect and ecosystem into individual parts and you get it right down to a conservation unit and the challenge of moving that to a world view of a First Nations where the ecosystem is felt and experienced as a whole and that dissecting is often felt dangerous. And in particular, that lots of their information, sometimes called traditional ecological knowledge,

is -- is what I see in your written materials often considered anecdotal. And so I would like to know what your suggestions are or your ideas are -- and I will explore this with the panel more tomorrow -- on some of the challenges and some of the ways forward in trying to integrate the science of these two different world views in a way that I think could be very useful and, to use a word of the panel members earlier, elegant. And so I'd like to know what your suggestions or ideas on that are.

DR. HOLT: One of the challenges with the Strategy 1 is combining information from multiple metrics that come up with a single story on the assessment, red, amber, green. We found that that's difficult because we lose information. We have a lot of information on different metrics and different indicators, and we feel that that broad information may be relevant for the overall story of a CU. So there may be information -- broader information from First Nations, traditional ecological knowledge, that could contribute to that story. That's -- and that's part of the resistance among some scientists to creating that overall assessment because we lose that information that is sometimes less quantifiable. That -- but it's part of that more holistic view of the entire system. So I could see information from traditional ecological knowledge contributing to that overall story, if not to individual technical metrics. And I think that's one advantage to not reducing our information across all these different metrics and assumptions into a single red, amber, green but -- but providing that entire story.

Q And have you given some thought as to the types of processes that would be useful to implement that as you consider implementing Strategy 1?

DR. HOLT: I haven't myself thought about that. I do see that as important but that just hasn't been on my workload myself so someone else might be able to speak to that.

Q We'll get into traditional ecological knowledge tomorrow. I was just curious given the import of your work in this area, whether or not you've begun to think about it and how you'd like to encourage it. Particularly, I'm concerned -- I

have concerns and my clients have raised concerns about how scientific data and the use of technical data seems to override traditional ecological knowledge and occasions and that there is an emphasis on that.

And with all due respect, I think the process that you've now recently been put through to get to these benchmarks is going to cause concerns. And so I'm wondering what care could you take and how you think you could take more care in trying to ensure traditional ecological knowledge and First Nations concerns are brought closer into the scientific processes that you're relying upon.

DR. HOLT: So that could involve a more concrete consultative process following some of the recommendations that were in the workshop notes here. Perhaps others on the panel would like to speak to this.

Q Mark, do you want to...?

MR. SAUNDERS: Well, I -- Mr. Commissioner, I think you were interested in Carries' sort of thinking on this. I don't know if we're going to get it in -- into it tomorrow but my -- I've been involved with, as you know, the development of the policy for -- since 2003. And I feel very strongly that one of the most important linkages is to bring western science and the traditional -- Aboriginal traditional knowledge together. I don't pretend to understand, after having talked to a lot of First Nations people, and I find it very difficult as a western scientist to be able to understand exactly what ATK is. I think too many of us have a feeling it's simply an observation that we can very easily incorporate and add it into our scientific evidence and carry on in a traditional hypothesis testing reductionist approach. And so the approach I took five years ago when I was on the implementation team, I was approaching First Nations Aboriginal Fisheries Commission -- or the people within that group -- policy group that had experience with ATK and -- or in the process of it and I said -- and we agreed at that time in our informal discussions that it should come from First Nations and we were working on potentially guidelines to DFO on -- from First Nations to us on how to incorporate ATK into our assessments, into our science. And for various reasons, that

didn't come -- that work, as to my knowledge, it didn't come to pass. But I still would hold that that's a type of a dialogue that we would have to establish a process.

Q Okay. We will get into that a little bit more.

MR. SAUNDERS: Okay.

MS. GAERTNER: And I'm going to make sure that Mr. Wallace has time to finish. Those are all my questions of this panel. I'm grateful for your -- of Dr. Holt actually. I'll have more questions for the rest of you tomorrow.

MR. WALLACE: Thank you.

MS. GAERTNER: Thank you.

MR. WALLACE: Mr. Commissioner, I have one clarifying question and so I'd like to put it to Dr. Holt.

RE-EXAMINATION BY MR. WALLACE:

Q Dr. Holt, you were asked -- or in an answer to a question from Canada's counsel, you observed that priority CU's -- you spoke of priority CU's for the determination of benchmarks. Now, priority CU's has a meaning and in Strategy 4 of the Wild Salmon Policy. And I just wanted to clarify that when you were speaking of priority CU's for the determination of benchmarks that wasn't the -- you weren't speaking of the priority CU's identified under the Wild Salmon Policy, which come in for special treatment on an interim basis but rather, as I understand it, these were just -- these were the CU's that you established benchmarks for first.

DR. HOLT: That's true. Those were CU's identified by the Wild Salmon Policy Strategy 1 oversight group to implement Strategy 1.

Q And that was simply because there had been a pilot project for one and so on. Was another reason that those were selected because those were the CU's that had been prioritized for action under the Marine Stewardship Council Action Plan?

DR. HOLT: It's not clear to me that that was the case and Neil Schubert, Mr. Schubert, was chairing that meeting and would have a better understanding of that unless someone else on the panel --

Q They are the same CU's. Do you know that?

DR. HOLT: Okay.

Q Okay.

DR. HOLT: Yes.
Q Okay.
DR. HOLT: Yes.
Q You don't have that, thank you.
MR. WALLACE: Mr. Commissioner, I have no further questions. And Mr. Timberg, I understand, had none as well. And Dr. Holt, thank you.
THE COMMISSIONER: Yes, thank you, Mr. Wallace. And I am grateful to participant's counsel who cooperated with Commission counsel on ensuring that your questions of Dr. Holt could be answered today, as she is not available tomorrow. We have tomorrow for the rest of the panel and I would again hope that all of you will do as you've been doing along and I'm grateful for that, cooperating with Commission counsel to work out your time allotments so that we can get through the panel tomorrow. And I think we're sitting until 4:30 again tomorrow to try and accomplish that.
MR. WALLACE: Yes, indeed. We are -- I fully expect to get into the RDG panel tomorrow at noon or thereabouts.
THE COMMISSIONER: All right. Well, Ms. Gaertner is shaking her head. But in any event -- but then again, she's frequently shaking her head so it could just mean it's the end of the day. Thank you all very much.
THE REGISTRAR: Hearing is now adjourned for the day.

(PROCEEDINGS ADJOURNED TO DECEMBER 8, 2010 AT 10:00 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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Karen Hefferland

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

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Diane Rochfort

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Karen Acaster