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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Federal Courthouse
701 West Georgia Street
Vancouver, B.C.

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Salle 801
Cour fédérale
701, rue West Georgia
Vancouver (C.-B.)

le mercredi 2 fevrier 2011

APPEARANCES / COMPARUTIONS

Wendy Baker, Q.C. Maia Tsurumi	Associate Commission Counsel Junior Commission Counsel
Hugh MacAulay Jonah Spiegelman	Government of Canada
No appearance	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")
No appearance	B.C. Salmon Farmers Association ("BCSFA")
No appearance	Seafood Producers Association of B.C. ("SPABC")
No appearance	Aquaculture Coalition: Alexandra Morton; Raincoast Research Society; Pacific Coast Wild Salmon Society ("AQUA")
Tim Leadem, Q.C.	Conservation Coalition: Coastal Alliance for Aquaculture Reform Fraser Riverkeeper Society; Georgia Strait Alliance; Raincoast Conservation Foundation; Watershed Watch Salmon Society; Mr. Otto Langer; David Suzuki Foundation ("CONSERV")
Don Rosenbloom	Area D Salmon Gillnet Association; Area B Harvest Committee (Seine) ("GILLFSC")

APPEARANCES / COMPARUTIONS, cont'd.

No appearance	Southern Area E Gillnetters Assn. B.C. Fisheries Survival Coalition ("SGAHC")
No appearance	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)
No appearance	Adams Lake Indian Band
No appearance	Carrier Sekani Tribal Council ("FNC")
No appearance	Council of Haida Nation

APPEARANCES / COMPARUTIONS, cont'd.

No appearance	Métis Nation British Columbia ("MNBC")
Tim Dickson	Sto:lo Tribal Council Cheam Indian Band ("STCCIB")
No appearance	Laich-kwil-tach Treaty Society Chief Harold Sewid Aboriginal Aquaculture Association ("LJHAH")
No appearance	Musgamagw Tsawataineuk Tribal Council ("MTTC")
No appearance	Heiltsuk Tribal Council ("HTC") Articled Student

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THE REGISTRAR: The hearing is now resumed.
MS. BAKER: Mr. Commissioner, today we are going to be addressing the topic of stock assessment, and we have two witnesses, one of whom you've met before, one who is new to you. We have Timber Whitehouse and Brian Riddell. So maybe you could go ahead and swear these witnesses.

TIMBER WHITEHOUSE, affirmed.

BRIAN RIDDELL, recalled.

THE REGISTRAR: Could you state your full name, please?
MR. WHITEHOUSE: My name is Timber Reginald Whitehouse.
THE REGISTRAR: Thank you. Counsel?
MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER:

Q Dr. Riddell, you've already testified in these proceedings and we've reviewed your qualifications on other days. I just want to highlight a couple of things to do with stock assessment in particular.

From 1979 to 2001, you were a research scientist at the Department of Fisheries and Oceans, and you were the program manager for various programs and sections related to Pacific salmon stock assessment; is that right?

DR. RIDDELL: Yes, it is.
Q Including population genetics research and international fisheries issues relating to Pacific salmon stock assessment?
DR. RIDDELL: Yes.
Q And then sometime in 2001 and through to part of 2004, you were the science advisor for the Pacific Fisheries Resource Conservation Council? It was a secondment from the Department of Fisheries and Oceans?
DR. RIDDELL: That's correct. Specifically, I was away from the Department from September 2001 through March 2004.

Q And then you returned to the Department in March '04 and became the advisor on Pacific salmonids at the office of the Director, Science Branch?
DR. RIDDELL: Yes.
Q And from 2005 to 2009, you were the division head, Salmon and Freshwater Ecosystems, Science Branch, DFO?
DR. RIDDELL: That's correct.
Q And as the division head, the acronym -- we have a lot of acronyms in this world it seems -- so the acronym for Salmon and Freshwater Ecosystems is SAFE, and as a division head of SAFE, you were in charge of salmon stock assessment, including Fraser River salmon stock assessment?
DR. RIDDELL: Yes.
Q And currently, as I think we've identified previously, you're the CEO and president of the Pacific Salmon Foundation?
DR. RIDDELL: That's correct.
Q Okay. Thank you.
And, Mr. Whitehouse, you're c.v. is attached in the binder before you in Tab 11, and it's CAN 285162 and it's on the screen in front of you. You have a Bachelor of Zoology from UBC?
MR. WHITEHOUSE: That's correct.
Q You were a fisheries technician at the International Pacific Salmon Commission from '82 to '83?
MR. WHITEHOUSE: Correct.
Q And you've been with the Department since 1984?
MR. WHITEHOUSE: That is correct.
Q You've been a research technician in various capacities and have been within the Stock Assessment Division up to the present?
MR. WHITEHOUSE: Correct.
Q And from 2005 to the present, you have been the Area Chief of Fraser River Salmon Stock Assessment Program?
MR. WHITEHOUSE: Correct.
Q And as Area Chief for the Fraser River Salmon Stock Assessment Program, you're responsible for enumeration of sockeye spawning escapements in the Fraser River?
MR. WHITEHOUSE: That's correct.
Q And the Fraser River Salmon Stock Assessment Program provides science support for stock assessment including determining production and

processes affecting production of salmon in the Fraser River watershed?

MR. WHITEHOUSE: That is correct.

Q And I take it that the Stock Assessment Division deals with other salmon stocks in the Fraser River watershed, not just sockeye.

MR. WHITEHOUSE: That's correct. We're responsible for assessment of all five species that are under federal jurisdiction.

Q And your work is exclusively in the freshwater environment?

MR. WHITEHOUSE: Yes, we work exclusively within the freshwater environment.

Q Thank you. I haven't spent a lot of time looking at your c.v., but I would like it marked to go into the record as an outline of your history with the stock assessment portfolio.

MS. BAKER: Could that be marked as the next exhibit?

THE REGISTRAR: Exhibit number 379.

EXHIBIT 379: *Curriculum vitae* of Timber Whitehouse

MS. BAKER:

Q I'm going to begin my questions by going through some of the current programs for Fraser River sockeye stock assessment, and the questions are primarily directed to Mr. Whitehouse, to begin with. So I would like -- if you could please just go through with me, in an overview, what are the Fraser River stock assessment programs that are currently being used by the Department?

MR. WHITEHOUSE: Yes, certainly. I highlight that we are a science-based program working on all species as we mentioned earlier. We work on Fraser River sockeye assessment. That includes the terminal area escapement estimation, estimation of juvenile life history stage, abundances within the watershed, number of locations. We also work on the evaluation and assessment of the data collected within those programs, and in the capacity of forecasting the program abundances associated with annual sockeye forecasting for production purposes.

We also work on chinook and coho stocks, so we have a program organized on the chinook and coho. It contributes to exactly the same

elements, the assessment of adult escapement within the watershed. We also evaluate juvenile abundance and life history characteristics and have a component that is involved in the production, forecasting and technical evaluation of data collected in association with the management programs that we operate there.

We also have a program that focuses on chum and pink salmon within the watershed, collecting the same types of information on a limited basis with those two species.

That, in a nutshell, wraps up the major focus with respect to the work that we do.

Q Okay. I'm going to go, then, to a little bit more detail on some of those. We'll just identify - I think we'll come back to this in more detail - but just to identify now, there are -- and I think you've confirmed that you do escapement enumeration on spawning grounds?

MR. WHITEHOUSE: That's correct. Escapement enumeration involving the assessment of adult spawning stocks of salmon as they return to their spawning grounds including the detailed assessment and calculation of abundance. They also work on programs that help characterize biological attributes or traits of the populations that we've assessed on the spawning grounds.

Q Okay. And then just to kind of go through some of these other programs, because we'll spend a bit more time on the adult programs, do you do fry assessments?

MR. WHITEHOUSE: We do do fry assessments. There are a number of fry assessments that occur within the watershed: assessments of fry production out of incubation habitat, that is, newly-emergent fry, spring programs. Those are directly operated within the mandate of my program.

We also undertake, in conjunction with the habitat assessment science component at Cultus Lake's labs, assessments of summer/fall fry abundances in sockeye nursery lakes throughout the watershed, and in conjunction with that, there are frequently follow-up assessments of fall fry abundances within nursery lakes in the watershed.

Q And are those assessments done on all systems within the Fraser watershed?

MR. WHITEHOUSE: No, they're not done on all systems.

They're done on a select few throughout the watershed, largely strategically focused based on information requirement needs.

Q Where are they done?

MR. WHITEHOUSE: When we talk about spring projects, those have been done recently out of artificial spawning channels throughout the watershed, so that would at Nadina, at Gates Creek, and from the Horsefly spawning channel as well as Weaver spawning channel. Fall -- or summer fry assessments for sockeye abundance in nursery lakes have been largely restricted to, in recent years, the Shuswap system and the Quesnel system. As well, we've done -- there has been some recent work done at Chilko Lake.

Q And are those assessments done on a yearly basis in the sites you identified?

MR. WHITEHOUSE: They're done as required, and largely associated with information needs. There's not necessarily a need to do assessments every year annually. If you think about the information need, it largely relates to fry recruiting from large spawning abundances, so it occurs in the year following large escapements to systems.

Q And just to make sure we all know what you're talking about, when you talk about a fry assessment year, what are you counting on a fry assessment? You're counting how many fish in a system, and how do you do that?

MR. WHITEHOUSE: Different techniques depending upon the life history stages that we're attempting to evaluate in the context of fall fry -- or spring fry programs. We're looking at marker capture programs, using capture techniques as fry migrate from their spawning gravel downstream into the nursery lakes. So we use largely marker captures there, or out of the spawning channels they use what are called proportional fraction samplers.

If we're talking about the assessment of summer or fall fry in nursery lakes, we're dealing with a different technique altogether there. We use in-lake hydroacoustic techniques to evaluate total populations. In both cases, back to your original question to frame (sic), we are attempting to estimate total sockeye fry abundance at the particular life history stage.

So spring programs, that would be in relation

to fry migrating from the gravel into the nursery lake. In the case of a summer fry estimate, we're talking about estimating fry abundance in the June timeline within the nursery lake using hydroacoustics. Then in the fall, again, hydroacoustics-based estimate, total abundance of fry based on distribution of the surveys throughout the lake.

Q And were those types of fry surveys done under the old International Pacific Salmon Commission?

MR. WHITEHOUSE: Yes, there's been -- an estimation of fry abundance has been a component of the data, information collected on a regular basis for Fraser River sockeye assessment back to the IPSFC days.

Q Once that information has been collected by your group, how is that information used in Fraser River sockeye management?

MR. WHITEHOUSE: It informs a number of pieces of process. First of all, I think most importantly, you have to look at what the information may provide in terms of understanding potential production bottlenecks. With respect to fry data, we're looking to understand whether or not there are limitations associated with incubation habitat quality. Are the number of spawners present on the spawning grounds sufficient to demonstrate a reduced fry production in relation to the numbers of fry present -- or spawners present, excuse me.

In the case of the in-lake nursery assessments, the summer and fall assessments, we're looking to get an understanding of the impact of various levels of fry entering the lake on that lake's ability to produce sockeye - a concept called carrying capacity - from a biological perspective, and an understanding of whether or not the fry entering the lake may have their survival affected by the numbers that recruit into the lake.

These have the potential to feed into production forecasting if the data are collected in a consistent manner. They also have the benefit, in terms of strategic program implementation, that they may tell you that there are issues in terms of potential fry output for a given year in a given stock.

Q So can you explain what that means?

MR. WHITEHOUSE: I think the key concept would be if we're seeing situations where we've got high abundance recruiting into a sockeye nursery lake, if in undertaking summer or fry fall estimates, for example, would tell us whether or not the expected abundance produced the subsequent spring would be average, greater than average or less than average.

Q Okay. And the next area I wanted to cover is nursery lake productivity assessments, and I think this is something different from what you've just been talking about; is that right?

MR. WHITEHOUSE: That is correct. They are linked. We're are talking about habitat assessments of nursery lakes. We're dealing with a discipline called limnology. The purpose of the assessment in these cases is to determine ecosystem-type impact that -- or the linkages between Fraser River sockeye and the lake that they're rearing in.

Nursery lake productivity assessments involve detailed assessment of algae communities, zooplankton communities, which are the food basis which sockeye feed on, as well as the chemical and physical properties of the lake nutrients present in the system that support the sockeye food webs.

I mentioned earlier the concept of carrying capacity, the ability of a lake to support sockeye, juvenile sockeye. Nursery lake productivity assessments are used to give us a handle on what the capacity, based on the linkage between the juvenile assessment and the limnological parameters are.

Q And where does this -- what's the breadth of this limnology program? How many lakes are examined in your program?

MR. WHITEHOUSE: Well, over the years, most of the major nursery lakes within the Fraser drainage have been assessed. The key focus in recent years has been on the Shuswap Lake system, Quesnel Lake and Chilko Lake.

Q And so how often is work done to review or assess the limnology, if that's the way to phrase it, in these lakes?

MR. WHITEHOUSE: The strategic approach that is taken, in terms of assessing, is a follow-up normally associated with years of large abundance, spawning

abundance, so that it would occur in the year following a large spawning abundance. Very predictable in the context of the Shuswap system, and that's a system which is dominant and sub-dominant on the 2002, 2006, 2010 cycle for dominant, and 2003, '07 and '11 on the sub-dominant. So important to be conducting the limnology assessments on those years. Similarly, at Quesnel, it follows on the year that juveniles are rearing from large spawning escapements.

Q So it's done simply on certain cycle lines for those lakes that you've described?

MR. WHITEHOUSE: Those are the important or critical pieces of information that need to be collected, yes.

Q And so would it be just one year out of four, or would it be two years out of four, or how would it be done?

MR. WHITEHOUSE: It could be one or two years out of four depending upon escapement abundances.

Q Okay. I'm sure I'm not using this terminology properly, but have those limnological assessments been done to a greater degree in the past or what's the status if you were to compare to the past type of work done and today? Is it more or less today or the same?

MR. WHITEHOUSE: There has been a period associated with the old IPSFC, the International Pacific Salmon Commission period, prior to 1985, when there was a structured program that evaluated nursery lake capacity on a regular basis. It would have been structured very much in the way I'm identifying here, although they would have wanted to collect baseline information to understand what a lake looks like under a low abundance versus a high abundance situation in terms of fry recruiting into the system.

Once you get that baseline information out of the limnological surveys, then it becomes more important to do follow-up in terms of these dominant abundance years to look at the impact of sockeye fry as they graze on the food source in the lake, to see the impacts that they're having upon the nursery and its capacity.

One of the outputs in the linkage back to the fry programs we talk about is a lake that is not being heavily grazed produces big fry. A lake

that is being grazed heavily, such that there may be competition for the food resources, produces smaller fry 'cause the densities of fry get higher in the lake due to large spawning escapements. You'll see a signal from the fish population that their fry size decreases in either the summer or fall surveys.

Q Dr. Riddell, you had something to add?

DR. RIDDELL: Maybe just to emphasize a couple of points that Timber is talking about here. But when we do the fry assessments, you should really think of that as probably the sort of first level assessment of the management objectives. These objectives tend to be set on a spawner to fish recruiting to fishery, and then the subsequent spawner, so adult to adult.

But one of the ways that we track whether or not these are in the appropriate range, are they too high or are they too low, well, then we do the ecological assessments on whether you're getting good production and survival of the fry.

So Timber talked about the early assessment of fry in the gravel and we use that to look at habitat capacity of spawning areas. You can estimate management objectives simply based on available spawning space. There are estimates of those.

When you start talking about the nursery lake productivities, I simply wanted to bring out that there's actually been two major thrusts. There has been the work done by the old IPSFC and evolved into the current program. There was a serious effort through the mid-'70s and through the '80s in Science Branch. At that time, it was the Fisheries Research Board. Dr. John Stockner did extensive work on the limnology, productivity and fish communities of the Fraser Lake systems so you could look at what are the appropriate carrying capacities of those lakes and what are production potentials. Where would you choose to invest money in spawning channels or lake enrichment as an enhancement program, for example?

So Science Branch was looking, at that time, at opportunities for development. And where there have been dams built, for example, we have spawning channels. What is the effect of the fry production out of those? So those problems come

in.

I also wanted to bring up in the limnological work, there is extensive work done on trawling. The reason for that is that the fish community of the lake also determines what the sockeye productivity can be. There are of course sockeye-like fish called kokanee which are resident in the lake. They are also counted on the hydroacoustics. So the Department developed this trawl system so they do the hydroacoustics, but it has to be matched with an extensive program of trawling so you can get the species identification.

Mr. Commissioner, it's very, very similar to the idea of the hydroacoustics discussion last week and you have to associate that with a test fishery in some way to identify the targets. It's the exact same idea.

Q So the trawling allows you to do the species composition to go with the hydroacoustic count?

DR. RIDDELL: That's right, and it's not just salmon in the lakes. One of the biggest competitors are things like sticklebacks that can be in very, very large abundances. They can be very productive and actually become a food sink 'cause the food that you're trying to enhance through, like in Richmond, under the Salmon Enhancement Program, if you don't have the right zooplankton community or fish community, you can't get the food to the sockeye. We've definitely found many examples where we've tried fertilization in stock because you're not able to get it to sockeye.

Q You're just feeding the other --

DR. RIDDELL: You're feeding the other animals in the system, yeah.

Q The baseline analysis that was done by the old Commission, has that been reassessed in recent years, or is that work still -- do you still rely on the baseline work that was done 20 years ago, 20-plus years ago.

MR. WHITEHOUSE: There was an add-on associated with the fertilization program that Brian talked about. That did a fairly extensive broad survey of nursery lakes within the Fraser in the '80s and '90s. But since that time, there has been little -- we call that synoptic work, looking at the production capacities across a broad range of

lakes to determine whether there'd been changes relative to earlier assessments. That work has not really had much follow-up since the mid-1990s in the Fraser system.

Q And is that work that needs to be done?

MR. WHITEHOUSE: I think periodically, there's a considerable value.

DR. RIDDELL: Well, I think periodically is the right term because the determining factors in productivity can be the lake morphology, which is not going to change very quickly except if you have differences of the river inputs and so the nutrients; the rate of turnover of the water mass itself, and that's actually highly predictable if you know the flows from the rivers and the morphology; and the clarity of the water. Those sort of three key parameters determine how frequently you really need to go back.

Now, if the development around the lake substantially changes, then, yes, you would have a different nutrient input. Even that doesn't change very quickly, and so you really don't need to be there always, but you do need to be vigilant and sort of tracking what's the status of development around the lake and what's the flows to the lake and so on.

Q And is there a program within Science, then, to do that kind of qualitative assessment as to whether or not you need to go back and do more detailed baseline analysis?

DR. RIDDELL: I'll probably have to leave that to Timber locally. I think that there's no question that we were trying to maintain a regular monitoring, like periodical, as Timber referred to. Whether we're doing the shoreline monitoring, I'm less certain of that.

MR. WHITEHOUSE: I'll actually add one more condition that does warrant a follow-up, an addition to the development issues that Brian spoke about. That is any particular major shifts associated with sockeye abundance, sockeye carcasses themselves represent a potential source of nutrients coming into a system. Where there's a likelihood that large numbers of sockeye could actually boost nutrients in the system, I think there is a pretty strong rationale to include those types of events as ones that would warrant a follow-up. Sockeye

can have an effect on subsequent sockeye production by delivering nutrients from the marine environment into nursery lakes.

So clarification, just a bit of additional information to what Brian said regarding an ongoing program to assess these aspects, there is a program. We have been successful to this point in continuing to keep it running. It operates out of the Cultus Lake lab as I mentioned earlier. The opportunity to assess the key systems that I mentioned earlier, Shuswap, Quesnel and the Chilko, has been maintained but we haven't been able to look at many systems in the Fraser beyond those in recent times.

Q And when it was under the old Salmon Commission, was that assessment done on a greater number of lakes than the three you identified that are currently being done?

MR. WHITEHOUSE: Not only the IPFSC. DFO in the '80s and '90s as I mentioned earlier had a more structured approach to delivering these assessments, such that we visited most of the major nursery lakes as a follow-up to work done by the IPSFC in the '70s, so in the '80s and '90s, there were periodic follow-ups to look at baseline levels of production within lakes as well as investigating these events associated with large escapement.

Q All right. And I'm still not sure, is there right now a program within DFO where you are able to go and do that qualitative assessment on the different lakes beyond the three you identified to see if it's time to update that baseline information? For example, if there's large carcass inloads into the lakes.

MR. WHITEHOUSE: Yeah, it's quantitative, not qualitative work, just to clarify there.

Q Sorry, I thought that the point was that you only need to do it when there's certain changes done and I was assuming that was sort of a qualitative assessment, but maybe I was wrong on that.

DR. RIDDELL: Well, I think Timber's point is that the work, by its very nature, is quantitative, so you have a comparison with the past.

Q Yeah, no, I understood. As to when it's time to redo that baseline, perhaps that's also a quantitative assessment. I had understood it

otherwise.
MR. WHITEHOUSE: The capacity exists. We have a group within the Department that focus on limnology and lake acoustics and trawl surveys. So, yes, we still have an existing program.
DR. RIDDELL: Maybe as an example the one system that we have not been able to maintain as regular a system on was monitoring of the Stuart/Takla system. That was done under IPSFC. It's actually a challenging system because the abundances are relatively low and there was always one that was really difficult to actually address. I think that there's some work going on with First Nations up there, but I do not believe it's presently funded under the core programs.
MR. WHITEHOUSE: No, you're correct, Brian. And a number, Francois Lake, Fraser Lake.
DR. RIDDELL: Francois Lake.
MR. WHITEHOUSE: The big group of Early Stuart system lakes. There's also systems like Harrison Lake and the Pitt Lakes which, in the context of overall nursery capacity within the system, warrant a review on a periodic basis.
Q And those lakes you've just identified haven't been reviewed since the '90s?
MR. WHITEHOUSE: That's correct.
Q Another area I wanted to go over with you were smolt assessments, so that's different from what we've talked about with respect to fry assessments. Could you just review what those are and how often they're done, et cetera?
MR. WHITEHOUSE: Yeah, I'll just step back 'cause I think Brian made a good point when he was talking about the life history stages.

Smolts are, just to clarify what we're talking about, smolts are sockeye just as they leave the nursery lake on the journey towards the ocean to spend another two-and-a-half years in the ocean before they return as adults. So they've reared in the lake for a full year, and they're leaving the nursery to make an oceanward migration.

We have two systems within the Fraser where we have been able to regularly monitor smolt output. These are direct counts of smolts, so we're talking about making estimates of total smolt output on a year-by-year basis.

The most important system that we monitor is Chilko Lake. In that system, we generate an annual estimate of total smolt abundance out of the system based upon a sub-sampling technique where we put a fence in the river, direct all smolts within the -- that are leaving the system through that fence and generate photograph estimates of their total abundance on the way out.

This gives us a couple of pieces of information that are quite important to understanding life history of Fraser sockeye. First is the relative production of smolts from a given brood year that leave a lake. That tells us the production between egg deposition, which is the number of eggs that females lay in the gravel in their spawning year, to the subsequent survival to the smolt stage. We can then break the life history, at least survival of sockeye, into two discrete components because we'll have information from eggs to smolts, and because we enumerate adults as well, we'll have information from smolts to returning adults. So there's two survival stanzas that you can get out of that.

We also do smolt enumeration at Cultus Lake. Cultus is a smaller system in the Lower Fraser, also has a fence. In the case of Cultus, we do complete -- because it's a much smaller system, we can count every smolt out of the system, so they move through a fence into a trap box and are counted out on a daily basis.

DR. RIDDELL: Can I just add?

Q Yes.

DR. RIDDELL: Cultus has not been consistent to the degree that Chilko was. Cultus has a very long history where we actually did some of the original studies of sockeye biology in the '20s and the '30s in Cultus Lake, and one of the earliest hatchery programs, but Chilko is, without question, the best set of sockeye data in British Columbia, because we have a sockeye-counting fence at Chilko since 1948, and that's been done every single year. I believe that's true.

MR. WHITEHOUSE: That's correct.

DR. RIDDELL: So we get smolt size and number, length and weight, scale samples. So it's by far -- it's quite different than really talking -- shouldn't make a direct comparison, I guess what we're

saying, in terms of consistency to Cultus Lake.
Q Right.
DR. RIDDELL: It's been done when the stock was subsequently quite depressed and we're looking at recovery now.
Q And I know that you weren't working on this in 1948, I don't think, but do you know why Chilko was chosen as a smolt-counting environment?
DR. RIDDELL: You know, I've looked for that myself, to be honest, and I think Mr. Roos's book is the only place I've ever really seen a discussion of that. I think it really comes down to sort of a unique environmental situation. It's a very, very wide laminar flow. You can put a fence in there. There's a lot of flow of water going by, but there's a very wide area, so the pressure front can be -- you know, you can hold a fence in there.

If you went to the outlet of Quesnel Lake, well, you're going through a canyon, and so you have a very difficult time working that environment. I think something was asked of me like this previously. You might do something like this at the outlet of Shuswap Lake, because you have a very wide system there. But you have a much higher flow going through there and it's much more difficult. I think it really is a rather unique environment.

People talk about doing it at the outlet of Stuart Lake, for example, but it's very wide and it would be a much, much bigger fence. So it's probably just a choice of a number of trade-offs they had to make at the time.

Q And just - it's probably obvious - but just to confirm, this is a continuation of a program that was in place under the IPSFC.
DR. RIDDELL: Yeah, definitely.
MR. WHITEHOUSE: That's correct.
Q And I take it, it's been upgraded as new equipment has become available, but it's essentially the same program with newer and better ways to count; is that right?
MR. WHITEHOUSE: The methodology has been very consistent through time. You're right, there have been modifications, updates to the fence, to the trap boxes, et cetera, that make it more efficient to operate. But the principle behind the enumeration program has been consistent and

maintained in that manner through time.
Q Okay.
MR. WHITEHOUSE: I'll add one more thing. I think there's a very -- Brian is correct in his characterization of why Chilko was selected. In addition to the very wide nature, it's shallow. This is one of the key issues. It is actually workable through the range of water levels that you get during smolt out-migration, so the water levels -- it's a high alpine lake and, as such, it experiences a very late spring in terms of water run-off, so the flows and water levels are low and stable through the period of smolt emigration, making it actually doable.

Many of the other systems, the water comes up so much during the period of smolt out-migration that it's just not tractable to put a fence in for the purposes of enumerating.

Q And just to close off on Cultus, the Cultus system is somewhat different from other systems in B.C. in that it is a hatchery system to a large extent, that what you're counting in the smolt fence are hatchery fish to a large extent; is that right?
MR. WHITEHOUSE: It's not specifically a hatchery system until very recently. So there's been a great deal of enhancement work that has gone on at Cultus associated with its endangered status. Cultus sockeye are listed as endangered. The Department has a recovery strategy and plan to support the recovery of that stock. One of those components relates to enhancement.

Recently, one of the important facets of the work at the fence at Cultus, in Sweltzer Creek, is evaluating the survival of the various hatchery strategies. There are a number of different strategies to release juveniles from the hatchery back into the wild, and we're looking at the fence to determine which strategies are effective. There are marks that are applied to the fish to be able to follow them as juveniles in the lake, smolts through the fence, and then actually marks that you can see on the adults as they return to get a feel for the efficacy of the various enhancement strategies. So that's where enhancement comes into play in hatchery fish at Cultus.

Q Okay. But because of that, the fish that you're

counting in Cultus are somewhat different in that they do have a mix of hatchery and wild fish that you don't have, for example, in Chilko or in some of the other systems.

MR. WHITEHOUSE: That's correct. In no other systems within the Fraser that we're enumerating juveniles are we dealing with hatchery-enhanced components.

Q Okay. The Chilko stock, you had said that the enumeration of smolt gives you two components of information. One, egg to smolt, and then one, smolt to returning adult. So kind of the freshwater lifetime and then the marine, if I can call it that, lifetime coming back.

Is the Chilko stock a valid indicator for other stock in the system for both of those timeframes, the freshwater environment and then the marine environment? Can you say that what you see with the Chilko stock can be extrapolated to the other systems for both of those life phases?

MR. WHITEHOUSE: First of all, I should identify what indicator means. It has a specific meaning in terms of the terminology we use. "Indicator" meaning representative of other stocks, groups or life history stages in -- throughout a broader range. You would, in developing an indicator stock, pick one group to be representative of a much -- one stock to be representative of a much larger group of stocks.

So your question was is it a valid indicator to represent life history, freshwater life history, egg to smolt production within the Fraser for all groups? That would be a significant stretch and I would say, no, it would not be. Chilko is quite a unique system. So as an indicator for freshwater productivity in the watershed, Chilko is unlikely to be an indicator.

Is it an indicator of the marine life history survival stage? I would say there's a qualified "yes" to that. The reason I say it's qualified is we don't fully understand what's going on from the time smolts leave their nursery lake till the time they hit the ocean, and there's a very broad range of migration distances within the Fraser such that some fish are moving 1500, 1200-1500 kilometres out of their nursery lakes on the very top end of the Fraser, whereas others are only migrating tens of kilometres out of the Lower Fraser before they

hit the marine environment. Potentially, subject to different survival effects along that migration corridor.

However, in terms of marine survival patterns, there is quite a synchrony associated with sockeye movement into the marine environment. Sockeye migration, smolt migration begins about April in the Lower Fraser. You'll start to see sockeye smolts occur. By the end of June, the main body of the total run has gone by. Those fish are then migrating within the marine environment largely en masse. So is it reasonable to assume it's a marine survival indicator? A qualified "yes".

Q Did you --

DR. RIDDELL: Well, if I could add, empirically, for marine survival, over time it actually has been a very good indicator actually. Mr. Al Cass, that you'll be interviewing next week, has, for a number of years, tracked what we call the co-variation. So what he looks at is adult-to-adult returns, and from that, you can imply marine productivity rates. You get productivity rates for over the whole life span.

Then he can plot with that the actual estimate of smolt-to-adult survival which is a true measure of what we can get from marine survival. The correlation is very high.

The lakes actually have a co-variance of about .7, so about half of the annual variation is accountable from lake to lake. So, as an indicator of marine survival, it's actually been quite good until recent years. In the most recent period where we're talking about the rate of rapid decline in productivities, Chilko survival seems to be tracking down a little worse than some of the other lakes. So it seems to have separated.

But up until certainly within the past decade, it's been a very good indicator of marine survival. And I would agree with Timber completely on the adult spawning to smolt. It's a very unique environment and it's not representative of the other productivities.

Q Okay. And for the period of decline that you just indicated, do we have any indicator stock that allows us to assess marine survival?

DR. RIDDELL: Well, I mean, you're still getting an

estimate of -- you're getting the only direct measure of marine survival in the Fraser is the Chilko Lake smolts. The fish coming out of Cultus, you can get another measure, but many of the tagged fish they've got the estimates for are hatchery-based juveniles. There's actually a wide variety of recovery plans being attempted in Cultus Lake so there's a few different life histories.

So there's no really direct measure of the marine survival change outside of Chilko Lake.

Q So you'd indicated, though, up until the past decade, there was very good -- it worked very well as an indicator of the other systems. What's been done in the past decade to account for changes in that system that it may not be such a good indicator anymore?

DR. RIDDELL: There has been no adjustment of the indicator 'cause there's no other opportunity. What we're comparing that against is the other systems that were -- is the sort of backdrop for comparing Chilko are the adult-to-adult return rates. If you plot those through time, you see this trend that really the Commission has really been asked to explain, the rate of decline of Fraser sockeye. That's really looking at adult returns to adult spawners.

So if you look at Chilko smolt-to-adult returns or the marine survival estimates, it's tracking a little below that as if there's a little bit poorer marine survival from that system than the others in the Fraser.

Now, keep in mind when you do a total for the Fraser, in total, in two out of four years, that will be heavily affected by the fall return, and particularly Shuswap Lake complex which has not shown the rate of decline that the other sockeye lakes have. So what you're getting is an averaging effect where the big returns in the fall runs are keeping that average up in two out of four years.

THE COMMISSIONER: Ms. Baker, can I just ask a couple of quick questions on this point that Mr. Whitehouse referred to.

If I understood it, you mentioned migration corridors within the Fraser for the out-migration. Is that -- are the corridors fairly well tracked

in terms of research or -- what did you mean by migration? I think I know what you mean, but I just want to make sure I'm not misunderstanding your point.

MR. WHITEHOUSE: Yeah, to clarify, all smolts within the Fraser obviously leave through the Fraser.

THE COMMISSIONER: Right.

MR. WHITEHOUSE: They share common areas. So up-river stocks, the stocks originating above the Nechako, for example, are in a common migration corridor from the Nechako/Fraser confluence through the remainder of their migration down to Steveston. Stocks that enter below that are obviously going to only share a portion of the total migration.

Your question is very much germane to the understanding of survival patterns within the watershed, because if there are different factors affecting survival during that period, between which they leave their lake and which they reach the marine environment, could be related to how far they're moving through the system.

THE COMMISSIONER: I see.

MR. WHITEHOUSE: So where they share common -- and my point with Chilko was is that until the Chilko smolts hit the main stem of the Fraser, they're in a unique migratory corridor on their own. It's quite a dynamic environment above there.

If there are survival effects that occur between the lake outlet and the confluence, that may not represent what's going on throughout the rest of the watershed.

Brian's work in conjunction with our program on the Chilko smolts is, last year, an acoustic tagging program to look at the in-river survival estimates of smolts is the first attempt that we've made, as this is brand-new technology, to actually understand what survival patterns for sockeye are during their migration between their nursery lake and entry into the marine environment. So we don't understand those dynamics well at all.

THE COMMISSIONER: Thank you.

MS. BAKER: Thank you.

Q And that actually is perfect lead-in because the last program I wanted to talk about here was the Chilko tagging program, and we touched on it just in a few words when you were here before, Dr.

Riddell, but perhaps now you could explain in more detail what that program is.

DR. RIDDELL: Well, the Chilko smolt tagging was really -- last year was our very first year. It was definitely a pilot study and it was applying sonic tags to naturally produced sockeye salmon smolts leaving Chilko Lake, and using the post-detection system that we brought up last week under hydroacoustics, so these are tags that are actively transmitting a unique signal. Every fish is therefore identifiable. We put receivers down the river and then there are an array of receivers in the Lower Fraser, and then there's lines of receivers in the Strait of Georgia up into Queen Charlotte Sound. Those lines are what people refer to as the POST arrays.

It was exactly as the Commissioner asked. When I was investigating the whole issue of what was contributing to the decline, and what we knew and we didn't know, I contacted what I call the "God of sockeye", Jim Woodey, and he said, "No, we've never actually been able to monitor that." The first real study effort was in the mid-'60s, and there's actually been no effort to study the survivorship of downstream within Fraser mortality of smolts.

So the tagging technologies that have been developed now for small salmon provides us the first opportunity to do it. I call it a pilot, because the tags are only so small. We were not able to put tags in any fish -- I don't think we put any tags in fish less than 12 centimetres.

So when people talk about one-year-old smolts for Fraser sockeye, it's not strictly true. You can have one and two-year-old smolts. Two-year-old smolts are about 50 percent bigger than one-year-old. So what we were tagging is natural fish, but we were tagging the upper maybe five to ten percent of the size distribution.

To be consistent, they did move downstream very, very quickly. The fish that we detected at the lower river were all through from the outlet of Chilko Lake to the detection arrays at the mouth of the Fraser in seven to ten days. But what was extremely surprising is the survivorship to the mouth of the Fraser was only 25 percent of the tagged smolts leaving the lake. That

surprised us a great deal.
Since it's a pilot study, though, I'd emphasize we are planning -- we're putting the money and the tags together right now to do it again this year, and we're going to take another step up and use the new generation of tags that will allow us to tag down to about ten-and-a-half centimetres. We still can't get down to the average size of the natural smolts, which is more about probably nine centimetres, nine or ten.

MR. WHITEHOUSE: Actually, closer to 80 -- eight centimetres.

DR. RIDDELL: Eight, yeah, so we're still in the upper third of the size distribution. There are other types of tags that could be used to cover the whole array, but you can't detect them as easily at all. It's a very, very difficult task.

MS. BAKER:

Q So when you --

THE COMMISSIONER: Do I understand, Dr. Riddell, that you don't use any kind of test fishery or hydroacoustic --

DR. RIDDELL: No, that's the beauty of this. You tag the fish -- you have to put the tag in surgically, so we maintain the fish in controlled conditions.

THE COMMISSIONER: I see.

DR. RIDDELL: We do it very early in the morning. We hold the fish in to late at night, and if they're fine, then we release them sort of -- I think they're releasing them like 3:00 or 4:00 in the morning.

THE COMMISSIONER: I see.

DR. RIDDELL: So it's still dark. So they're tagged and gone in a day, and there are detections just down from the release site, and if they're detected at that point, then they're counted as a viable tagged fish.

THE COMMISSIONER: I see.

DR. RIDDELL: And we monitor them passively down there. So we never handle them again.

THE COMMISSIONER: Right.

MS. BAKER:

Q And who's the "we" that you referred to? Is it a DFO program?

DR. RIDDELL: Well, it's a joint program of a number of groups. The Pacific Salmon Foundation put it together only because it was something that I was

interested in and found some donors to support. We did it with UBC when Dr. Scott Hinch -- because he has teams of people working on the POST arrays, Timber's people. DFO maintains the Chilko smolt fence, and so they were integral in all of this. Science Branch contributed some funds to buy some tags, and then Dr. David Welch with Kintama, who was presented to the Commission before, he contributed to it by detecting the fish. He had to upload the data from the arrays in the lower river.

Then even the POST program was involved because we got the detections in the Strait of Georgia. So this was really a very comprehensive sort of program to really conduct this thing.

Q And you said you are going to be doing it next year, or 2011 as well?

DR. RIDDELL: Yes. We've just put in the order for all the tags. This year, Dr. Scott Hinch has money from what's called the Ocean Telemetry Network for Canada. This is actually part of a worldwide network. And so Dr. Hinch is actually doubling our tags, so we're going to use the tags that I bought last year, which -- the particular size range, and the new version of the tag is being bought by UBC. So we'll actually, instead of having 200 tags last year, we'll have 400 this year.

Q Do you anticipate that this program could be used in the future in management of Fraser River sockeye?

DR. RIDDELL: Well, right now, the feedback I'm getting is people are concerned about how representative these tags are. I'm not actually prepared to really throw it out that quickly. If we're getting very poor survival on large fish, I don't know why anybody would assume that you get better survival from a small fish, except that there is obviously a reason why sockeye (indiscernible) is a relatively small fish.

So there is a bit of a trade-off right here in terms of how far we push this. The unfortunate part is the next step down to tag really representative-sized fish is extremely difficult to do. You have to sample the fish. Again, you'd have to do something like the Commissioner was asking for before. Now, I tag the fish and let

them go and we don't have to handle them again.
The next step, to get to very small fish, you put a passive tag in and then you have to have an activation system and detection. This exists in the Columbia Basin. But the thing that the Columbia has that the Fraser doesn't have are things called dams. All right? And so we don't have sampling sites downriver. What you could do is actually build -- they actually have huge trawl nets that they have in the river, and the end of the trawl is open. In there, there are large arrays of plate detectors, and so basically the water flows through this net and you can detect the fish doing that, but your detection efficiency is very low. So it's -- going down to a new type of tag other than the sonic is actually a major step down.
I don't know that we'll continue doing this. We'll see what happens this year. If we find that we get very, very good survival this year, then we've missed something in the two years and we'll have to do it again.

Q So it's still research only.

DR. RIDDELL: It is definitely research. This is not being -- I am catching people talking about the survival of smolts is only 25 percent, and I have to keep correcting them that this is one year only, very large fish, definitely a pilot. We should not be applying this generally. But I think the number of us that were involved are shocked that the number was so low. That's why we really want to sort out what's the cause of this.

Q Okay. Did you have something to add?

MR. WHITEHOUSE: I think I want to just provide a little bit more context, because I agree with the way Brian has framed the program. I think if we want to look at what potential it brings to management assuming it was going to be feasible, assuming that the tags can get to the size that they're detectable for small fish, there is a real positive benefit to understanding survival patterns for sockeye during that phase from which they've just migrated the lake to the time at which they leave the Strait of Georgia, because we understand nothing about that survival right now.
One of the complexities about forecasting is the sort of black box that the ocean represents,

and to be able to conceptually understand two years in advance of adult returns what survival impacts we are seeing for smolt stages would be a substantial improvement in not only the lead time on which we understand what type of factors and survival patterns we might be seeing for sockeye stocks, but it would add another piece into the production forecasting puzzle that may, if it has potential and can move beyond a research tool to a long-term monitoring project, would give us potentially substantially more confidence in forecasting, looking forward.

THE COMMISSIONER: Is Dr. Riddell's program the only realistic or viable program for out-migration that science has so far developed, the tagging system, or are you thinking as well that there might be other opportunities for gaining this information on survival in the out-migration process for sockeye.

DR. RIDDELL: Yeah, well, the sockeye qualification is the important one. I mean, it has been used on other species in the Fraser system, but always on larger smolts.

THE COMMISSIONER: Right.

DR. RIDDELL: Now, there is a company trying to build a very small tag that would have a very small battery and so would only function for maybe six weeks.

THE COMMISSIONER: Right.

DR. RIDDELL: And if you can do that, then the trade-off is it would be very good to get the downstream survival, but you're going to lose it very quickly in the ocean. The other is to get very small, you have to go to a very high frequency of transmission, and so you have to have much more expensive receiving arrays 'cause the range of detection goes down to about 100 metres.

THE COMMISSIONER: Right.

DR. RIDDELL: And it's very, very -- one thing that we didn't anticipate how hard it was to figure out is if we are going down the river at the speed of the Fraser, how frequently should you transmit a signal so that when you pass these one and two detectors, that you're actually in the receiving range. So we pushed it right down to once every 11 seconds, and it probably actually should be a little faster than that. So you're really pushing

the range of technology right now to get down there.

So we don't expect another big advance in the technology for a few years, so right now, I think we'll go down as small as we can. Even the microtags I've just referred to, you'd be very hard-pressed to get down to tagging the eight-centimetre fish that Timber's referred to.

THE COMMISSIONER: Thank you.

MS. BAKER: Mr. Commissioner, I'm going to move to a different area. Do you want to take the break now?

THE COMMISSIONER: Yes, thank you.

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

(PROCEEDINGS ADJOURNED FOR MORNING RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: Order. The hearing is now resumed.

MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER, continuing:

Q So now I'd like to cover some more sort of implications of stock assessment into the Fraser River Management Program. And before I do that, I'd like to just ask, Mr. Whitehouse, if you could explain some terms that we hear in stock assessment and those two terms are "precision" and "accuracy". Can you explain what those mean within the -- or how those terms are used in the context of stock assessment?

MR. WHITEHOUSE: Yes, thank you. Quite important concepts and they are technical in nature. I think probably the easiest way to summarize would be to say that when we're talking about precision, it is a statistical concept generally expressed as a confidence interval around an estimate. So if we say we've got a hundred thousand fish plus or minus 10 percent, the confidence interval expresses the precision of that estimate. Operationally, or from a fundamental perspective, it also tells us something about the degree of effort that went into the survey. Generally, high precision estimates meaning smaller confidence intervals. So plus or minus 5 percent, high

precision are surveys that have resulted in or been generated with high effort surveys. When you're talking about lower precision estimates, those are confidence bounds that are quite large, plus or minus 40 percent, for example. Generally, lower effort in terms of generating the estimate.

So you can have both high and low precision estimates. Those are expressed by confidence intervals. From a functional perspective, statistically they mean if you were to run the same survey repeated times. You've heard this, 19 times out of 20 you would expect the outcome to be within the 95 percent confidence intervals. It's a common way of expressing these things.

One of the keys, though, that we're trying to communicate when we're talking about precision and accuracy is confidence in the estimates. And this is where accuracy comes into play. Accuracy is how close we think our measurements are to the true measurement. And we're always at a disadvantage in that we never really know the true numbers or very rarely do we know the true number that we're shooting a target for. So accuracy really reflects what we consider to be bias in the estimation process when it comes to terminal area assessment data, for example.

Bias would mean, do we believe that there's, or are we aware of, processes associated with the survey types we implement that would result in estimates being constantly high or constantly low. Positive bias meaning the estimates tend to be greater than you would expect if you actually knew the result and negative bias meaning they would come inconsistently below that.

Key to the combination of the two is understanding when we talk about the precision gives you a gauge across time of the type of survey. So if you've got high precision estimates, you're putting high effort into generating the estimate. Doesn't tell you about the accuracy, though, because accuracy is related to the implementation of the program and whether you have the necessary program elements in place to identify whether you've got the potential for positive or negative bias.

When you -- when you're talking about high precision programs, high effort programs,

generally means that the full suite of bias testing evaluations, these are elements of the survey design, are in place and you're able to comment on the likelihood of bias within the estimate. So is it accurate, unbiased or is it likely to be biased but you can detect the direction? You can have estimates that have high accuracy, use the analogy of a dartboard and throwing darts, or if you're shooting for the bull's-eye, all the darts cluster tightly around the bull's-eye. That would be high accuracy because you're hitting the target with a very small spread around that. The analogy to a high accuracy but low precision would be a cluster that may have a four or five-inch group around that bull's-eye. The precision is lower but the central point is still the bull's-eye. If you move off of that, if there's a process that results in those estimates being consistently high or to the right, for example, you can still have a highly accurate but imprecise estimate. Pardon me. A highly inaccurate, it's off the mark but precise so you measure consistently again and again the same values so they may be 40 percent above target or, in this case, four inches above the bull's-eye, using the analogy.

You can also have an inaccurate and imprecise estimate where the spread around the central point is large. And those are things that we have to watch for when we're talking about comparability of estimates and the quality of the estimates or reliability of the estimates generated through time. So this becomes very important when you're comparing time series of estimates.

Q Okay.

MR. WHITEHOUSE: Understanding the precision, high precision equals high effort, and, generally, the ability to comment on bias. Low precision, lower effort and potentially sometimes less of an opportunity to comment on the bias within the estimate.

Q Okay. Thank you. I think those terms are going to come up as we go through some of these questions so I think that's helpful. In terms of how stock assessment data is used in Fraser River Sockeye management, I wonder if I could just run through some concepts and you can just let me know

if I'm covering the uses of stock assessment data. First of all, I understand it's used to understand population dynamics and the production of different stocks. Is that fair?

MR. WHITEHOUSE: Correct.

Q It's also used in the run-size forecasting process. That process uses enumeration in juvenile and smolt data for models?

MR. WHITEHOUSE: Yes, linking directly back to the production forecasting that you talked about earlier.

Q Okay. And enumeration also is used in developing post-season estimates of total return for looking at calculations of TAC and treaty obligations within the Salmon Treaty; is that right?

MR. WHITEHOUSE: Escapement estimates are foundational to that --

Q Okay.

MR. WHITEHOUSE: -- component, yes.

Q Okay. And if you don't have good stock assessment data, what is the impact on Fraser River Sockeye management? Like if we don't -- if the stock enumeration and escapement enumeration programs are not adequate, what would be the impact on Fraser River Sockeye management?

MR. WHITEHOUSE: I guess the way I would frame that is there are some fundamental underlying assumptions with respect to the types of information that you can collect to inform Fraser River Sockeye management. This includes the ability to reconstruct total abundance for stock groups within a year. If you can't collect critical pieces, the fundamental underlying assumption that you know total return is either much more uncertain or you may be able to have the inability to actually reconstruct that total abundance so a bit of a grade in terms of a response there.

Q Dr. Riddell, do you have anything to add on that?

DR. RIDDELL: Well, yeah, I mean I think the sequencing of your question is interesting because, as Timber said, the escapement information is fundamental to basically all of the stock assessment. But an application of that is developing management objectives. So on what basis do you manage your fisheries to try and achieve your management goals, which are normally described in some value of escapement of spawning fish. So in the absence

of that, you can have significant impacts on fisheries because you have high uncertainty about what are your goals, what is the return, how many fish should you put on the grounds.

I've always told people that you may not provide enough funds but you've got to keep in mind that just not spending the money here has other costs. And many times these costs are borne by other people. Now, they may be the fishers in the ocean, they may be First Nation fishers, but the absence of information does have a cost and it can be substantial and frequently, much more than the cost of acquiring the data. So I think it has numerous effects.

Q Thank you. Going back to the precision methods that you talked about earlier, Mr. Whitehouse, we have -- or you use -- in Fraser River Sockeye you use both high precision and low precision methods; is that right?

MR. WHITEHOUSE: That's correct.

Q And when do you use high precision methods? What would you consider a high precision method and when would it be used?

MR. WHITEHOUSE: High precision methods are employed primarily to enumerate large escapements and is linked to key drivers in terms of abundance. The major targets associated with fishing in a given year. Large escapements use high precision estimates. These are techniques like mark recapture surveys, fence counts. We have recently started using hydroacoustics, DIDSON, techniques to enumerate spawning ground methods and also calibrated, annually calibrated visual surveys, cyclical visual surveys. So that would be -- those would be high precision methods.

Q Okay. And is there a cut-off or is there some number that you use to determine when you're going to use a high precision method and when you're going to use a low precision method?

MR. WHITEHOUSE: Yeah, relates back to Brian's comment and mine earlier about the fundamental assumptions underlying management requirements. We use an abundance cut-off to make a determination of the type of survey to apply. It's currently set at 75,000 spawners. Above that, an estimated abundance of 75,000 spawners, we aim to deliver high precision estimates. So that would be mark

recaptures, fences, DIDSON counts or calibrated visual surveys. Below 75,000, we use a suite of low precision estimation techniques. These include visual counts that are not calibrated annually. Visual counts run a gamut so there's a degree of confidence associated with them from sequential visual surveys down to peak live counts. We also use in systems where you can't count fish visually effort-based surveys, which include recovery of carcasses as an index of fish present on the spawning grounds.

Q Okay. And are all Fraser River Sockeye populations enumerated every year?

MR. WHITEHOUSE: Our goal is -- and this is again consistent with the framework, the underlying requirement of management. Because Fraser sockeye are managed in total, as a return, we need a total understanding of escapement so our objective is, on an annual basis, to estimate all Fraser sockeye stocks on their spawning grounds.

Q And has that objective been met in every year?

MR. WHITEHOUSE: We have had three years in the past decade when we were unable to count all stocks on the spawning grounds. But aside from that, yes, we've been able to enumerate all expected spawning stocks within the Fraser annually.

Q Okay.

DR. RIDDELL: Could I just add -- I'm just thinking of the question previous to this where you were asked about every year. The only qualification here is keep in mind that every year is dependent on the Fraser sockeye sample. And so I believe when you say that there are 157 spawning sites in the Fraser River and therein various levels of populations, we don't survey every single population every single year because some years they have no fish. As long as there is fish in the returning cycle then they are enumerated.

Q Okay. With the exception of three years where you were unable to enumerate every population in those years?

MR. WHITEHOUSE: Yeah, correct.

THE COMMISSIONER: I know Ms. Baker won't be surprised when I ask this but you've been talking about stocks and not CUs. Has there been an adjustment or an alignment within this program for taking into account the CUs in the kind of research and

work you're doing to do the counting and so on?
MR. WHITEHOUSE: Thanks for the opportunity to clarify. I think it's an important one. CUs are a construct. They're a way of thinking about fish populations. So the way we enumerate fish has always addressed CU requirements. The resolution to which we count goes well below the CU level. I'll correct Brian. There's about 340 distinct spawning sites.
DR. RIDDELL: Spawning sites.
MR. WHITEHOUSE: Spawning sites within the Fraser. And he's absolutely correct; all of those sites are not used by sockeye every year. It relates to the population cycles in abundance. The way the sockeye are counted allows you to roll the escapement data up to the level of CU. So escapement enumeration programs can easily accommodate providing information at the CU level.
Q Okay. Just to return to the high precision/low precision methods, do you have confidence in the adequacy and appropriateness of these different methods for escapement enumeration for Fraser River Sockeye, Mr. Whitehouse?
MR. WHITEHOUSE: I have a high degree of confidence in terms of the adequacy. We have embarked on a process, particularly since about '92 with the first major review that I was involved in that continually evaluates the quality of the programs that we are able to deliver on Fraser sockeye and that has resulted in significant refinements through the past 18 to 20 years to ensure that we have a very solid and defensible set of estimates that we deliver on an annual basis. So they have -- the estimates will pass the test of a rigorous scientific evaluation in terms of issues like bias, which I've mentioned earlier, particularly for the high precision methods, which, on an annual basis, represent anywhere from 70 to 95 percent of the total escapement to the watershed. So we much -- very large fraction on an annual basis of the total escapement to the Fraser is enumerated with high precision methods. That can vary from -- depending upon the distribution of abundance of cross-populations from as low as 60 percent on some years to as high as 90, 95 percent on others.
Q The threshold that you identified for high

precision versus low precision is 75,000 spawners on the bed, there was a change, I take it, in recent years from 25,000 spawners, which used to be the cut-off for low precision and high precision, up to 75,000 spawners. Why did that happen?

MR. WHITEHOUSE: The change that was implemented was largely a response to the growing number of small/moderate-sized populations that were building within the Fraser. And it was a financial response with a larger number of populations building. There was a requirement for increased number of high precision estimates to meet the Fraser sockeye standard -- enumeration standard. And with these larger number of populations, it was stretching the ability of our current funding to be able to deliver high precision estimates for all populations above 25,000. So we, in consultation with the Fraser Panel, et cetera, moved the abundance threshold up to 75,000 to realize financial gain with minimal loss in terms of information quality to the overall management structure.

Q And what work was done to determine what the impact would be in changing that threshold from 25 to 75,000 spawners?

MR. WHITEHOUSE: There was a high-level overview looking at the distribution of population sizes within the Fraser to evaluate how many populations would really fall within the 25 to 75,000 range. Looking backwards, retrospectively, to get a feel for what portion of the run fell into this category, as well, forward-looking given an understanding of where abundance trends were heading, what sort of number of populations we expected to see, to maintain within that 25 to 75,000 range and how much of the total abundance returning on an annual basis would be impacted by a move from previous high precision to low precision. It's quite a small fraction. So less than -- in most cases, less than 10 percent of the total return and in most cases substantially less than that on an annual basis.

Q There was a recommendation made in the Wappel Report 2005 on this issue. And that's in Exhibit 14 before you, page 245, recommendation number 7. This was a report on the 2004 fishery. And the

recommendation at that time was that the Department of Fisheries and Oceans re-establish the threshold of 25,000 fish for the mark recapture method to be used for the estimation of spawning escapement. That recommendation hasn't been taken up. And can you explain why that is?

MR. WHITEHOUSE: My explanation would be related to the relative risk associated to the quality of the estimates. When looking at financial constraints there is a trade-off that you have to consider in terms of the overall survey design. And when we look at the risk associated with having more imprecise or lower precision estimates for a very small number of stocks on an annual basis, it far outweighs the risk associated with being unable to do enumeration at all on some components. So the financial constraints were quite severe such that we are looking at having to drop activities or maintain a lower set of precision objectives for a very small component of the total return. So that trade-off is the issue that was driving the decision to continue with the 75,000 threshold.

Q Dr. Riddell, do you have anything to add on that?

DR. RIDDELL: I just was going to emphasize that when we make these trade-offs, I think Timber referred to that there's a loss of precision. But what typically happens in mark recapture programs when you start to compromise the effort is that you put yourself at greater risk of the error or the bias.

MR. WHITEHOUSE: The bias.

DR. RIDDELL: Right. And we, at all costs, want to avoid the bias error. And so it was actually not much of a debate, to be perfectly honest, that the trade-off between very expensive studies for things that would be maybe in the 50,000 range, which actually in many other species the fishery officers and people trained in observation can get fairly good estimates versus risking the accuracy of the major assessment programs, it was far better to put the limited resources to get the best estimates for the most fish.

Q Are you concerned that there has been a negative impact to Fraser River Sockeye management as a result of this change in threshold from 25 to 75,000 spawners?

MR. WHITEHOUSE: I am not. I'd like to add one comment, too, because I think it's important from

a context perspective. When you look at the distribution of Fraser River Sockeye stocks in populations that might fall into the 25,000 to 75,000 bound, we do not run into many instances where the likelihood is that spawner abundance, looking forward in time, is going to stay within that range. The capacities within the system are generally that if a population breaks out of some low abundance threshold and begins to grow beyond the 25 -- into the range between 25 and 75, it is largely going to make a significant leap and be well above the 75,000 bound within a cycle or two. So we're talking about very small impacts to time series of probably one or two generations, at which point it's going to move into the high precision bounds anyway. It's going to get to escapement levels that are going to exceed 75,000 very quickly. And that is, in fact, the case that we've seen in a large number of stocks that were in the early 2000s within this bound. They have then moved on that we're in a position where we don't have the flexibility. There are now escapements in the 100 to 300,000 range, as opposed to maintaining a static 25 to 75,000 range.

Q Have any concerns been -- or have you had any concerns with the use of methodology for populations in that 25 to 75,000 range so that population range that used to be enumerated with high precision methods and has now moved to low precision methods, has there been any work done on those populations?

MR. WHITEHOUSE: One of the key aspects in making the move and in understanding how adequate the assessment tools that we're using are for estimating, and Brian mentioned it in terms of being able to satisfy bias issues in mark recapture programs, in making the move to a lower precision estimate for a slightly larger program -- for a slightly larger population, the issue really relates to, is do we understand how the survey techniques that we're going to use address the potential sources of bias such that we may see consistency in underestimation, et cetera, in the tools that we're using. Mark recapture gives us the ability to comment on that.

When we switch to a low precision estimate,

it's very important that you understand the interaction of the survey, the fish and environment, to understand how accurate and complete your assessment process is going to be. And one of the most important aspects of that is what we call calibrating the estimation techniques. And what this entails is running two parallel estimates simultaneously, a high precision, a fence count as an example, with the low precision estimate to generate a factor that allows you to correct for the potential of systematic bias. So this is an essential component that we require in order to make confident jumps between methodology types.

Q Have you been able to do that calibration work for that 25 to 75,000 population or numbers?

MR. WHITEHOUSE: Yeah, we are under -- that is work that is underway currently. So as opportunities arise and, of course, we're at the whim of population sizes on the spawning grounds, we can make our best estimates of what are going to be present. We couple high precision estimates with a calibration program. The simultaneous operation of two projects, one of high and one of low precision, to allow us to understand whether we're seeing consistency in the type of patterns between one survey type and another.

Q And I understand that we have an email, which outlines where things are with the calibration work and that's at Tab 10 of the binder in front of you. It's CAN170247 and I wonder if you could just identify that. I won't take you through it because of time but if that is an accurate status of where you are at -- where the department is with the calibration work you just described as of February 2010, which is the date of the email from you --

MR. WHITEHOUSE: Yes, that --

Q -- to Al Cass?

MR. WHITEHOUSE: Yes, that is correct. This is the status of progress on calibration work.

MS. BAKER: Right. And can I have that marked, please, as the next exhibit?

THE REGISTRAR: Exhibit 380.

EXHIBIT 380: Email dated February 3, 2010, from Timber Whitehouse to Alan Cass

MS. BAKER:
Q The calibration work that's been done, has that been funded by the department or has that been funded through some other program?
MR. WHITEHOUSE: Well, it's been funded by the department and jointly by other programs. We cannot undertake calibration without the two components. And the way we've been approaching calibration work is to look for support. It's an add-on to existing program suites. So what we would look -- the strategy involves looking for sources to implement high precision estimates on systems that may fall in the 25 to 75,000 range so that we can deliver a consistent visual site survey and then make that comparison that I talked about a minute ago.
Q All right. So DFO, in its ordinary course of business, would be funding the low precision work on those sites but you would be looking for additional funding to support the high precision method, as the comparator on those sites; is that fair?
MR. WHITEHOUSE: That is correct.
Q Okay.
MR. WHITEHOUSE: I'll add that in addition where opportunistically we may see a proposed high precision estimate delivered in-year, so a population we expect to come in at a hundred thousand actually comes in at 75,000, we will make sure that we take the opportunity to calibrate on that system so that -- these are limited-time opportunities, they're fleeting, you have to take advantage of them as they arise. So we would make sure that we add on the necessary visual surveys to pick up calibration opportunities.
Q Right. And again, any of that additional work is funded through programs, such as the Southern Endowment Fund of the Salmon Commission?
MR. WHITEHOUSE: The last part would be funded completely in-house through DFO. The calibration work specifically. We have looked to numerous partners, including the Southern Boundary Fund of the Pacific Salmon Treaty, the Salmon Watersheds Initiative and other sources that we've partnered with.
Q Okay. Thank you. I want to move to funding and assessment frameworks and priorities. There's a

group called the Stock Assessment Coordination Committee, or SACC, as it's referred to. This is responsible for regional coordination of priorities for stock assessment work in the Pacific region; is that right?

MR. WHITEHOUSE: That's correct.

Q Okay. And the members of SACC include the division head of SAFE, which was Dr. Riddell in the past, and that's now Mark Saunders; is that right?

MR. WHITEHOUSE: Correct.

Q Okay. Also includes the head of Salmon Stock Assessment, who at the present, is Arlene Tompkins?

MR. WHITEHOUSE: Yes.

Q Okay. Includes the area chiefs for stock assessment from the area offices, which would include you and your colleagues, is that right, Mr. Whitehouse?

MR. WHITEHOUSE: That's correct.

Q Thank you. And it has representatives from Ocean Habitat, Salmon Enhancement Program, Fisheries and Management, Jeff Grout. Those people are all on the SAC Committee?

MR. WHITEHOUSE: They participate variously, yes.

Q Okay. And the Salmon Treaty coordinator would be a part of that committee as well?

MR. WHITEHOUSE: He has been in the past, yes.

Q And sometimes area chiefs for resource management?

MR. WHITEHOUSE: Correct.

Q Okay. And I take it that this SAC Committee that is given a budget target and then a project profile is developed to meet that budget target? Is that how it works?

MR. WHITEHOUSE: Slightly out of sync. I think that the overall role of SACC, budgets come into play but the necessary assessment components to support management objectives largely drive the profile of the regional assessment program and then the adequacy of funding comes into play after that in terms of addressing which components are affordable.

Q Okay. All right.

DR. RIDDELL: I might add, the sequencing of the discussion, also, is one where the budget responsibility for regional stock assessment is through the science sector and so it would come to

the head of the salmon stock assessment division. And working with their area chief stock assessment and the core stock assessment program in science, we would typically start meeting actually typically about this time of year because there are spring stock assessment programs, as we've noted, and you would start then working towards your expected program needs for the coming year, which are going to be very similar to the past program four years ago. And you would start flushing out your budgets and looking at whether or not you had sufficient funds to meet the expected project needs before you would then go to SACC because otherwise you're not really going to identify what the issues are to really address with the SACC members.

Q Okay. In terms of the budget, we've heard about A-base and B-base funding in the hearings. Are both those types of funding part of the budget for stock assessment?

DR. RIDDELL: Definitely, yes.

Q Okay.

MR. WHITEHOUSE: Yes.

Q Mr. Whitehouse, can you explain what currently is covered by B-base funding in the stock assessment budget?

MR. WHITEHOUSE: To a large extent, when we're talking B-base within the SACC arena, we're talking about Pacific Salmon Treaty B-base funds, those cover both salary, wages and most of the operational costs for projects delivered focusing on all five species within the region.

Q Okay.

DR. RIDDELL: Maybe for clarity, though, we should identify A-base and B-base to beginning with, because A-base is what we would, within government, typically refer to as core annual funding. And that has changed three times significantly in my experience. When we sign the -- well, actually, when we formed the regional stock assessment program within science, there was a regional budget review that really had to separate all the existing budgets within DFO Pacific. They defined the existing A-base budget in about 1985.

In 1985, we signed the Pacific Salmon Treaty for the first time and the region received

approximately $32 million in salaries and programs, including some capital for equipment. It was a very large sum at the time because, of course, we accepted responsibility for the old IPSFC and brought those people in to the department. That money was for a very long time considered to be a special allocation by treasury board and was referred to as B-base because it wasn't part of the core annual budget. It was dedicated to the implementation of the Treaty and it was tracked that way financially from probably 1985 fiscal year through 1999.

In 1999, we signed a second-generation treaty with the United States. And I actually do not recall why but at that time, the original Pacific salmon funding that had been referred to as B-base and a dedicated fund was rolled into A-base, which is the ongoing core funding. That had an unfortunate effect in the long run because frequently when there are reductions in government spending, your core funding is the first place that funds are looked for and special allocations are frequently protected by treasury board agreements. The 1999 agreement had a second treasury board allocation of approximately $11 million. And that money was tracked and is still tracked as a separate, special allocation from treasury board. And of course, it's dedicated through DFO but it is still tracked separately.

The effect of the 1999 on the Fraser Sockeye is probably notable because the presentation to treasury board in 1999 was that we could only ask for additional funds under the new agreement for anything that was clearly new under the agreement of the new treaty. So given that most of the significant funds for 1985 was taking over the IPSFC, we were not allowed to request any additional funds at all for Fraser Sockeye in 1999. Am I emphasizing "all" too much? I don't think we did in the end.

MR. WHITEHOUSE: No, there was a small amount.

DR. RIDDELL: Small amount. Very small amount for Fraser Sockeye.

Q So in terms of cost increases for wages, cost of living, incremental costs, replacement of equipment, any of that kind of stuff, were you allowed to ask for new money for any of that?

DR. RIDDELL: No, but those are frequently considered to be annual operating costs and you are expected to budget for in your annual process. Salaries, our different salaries, are provided by treasury board, as new agreements are signed and you don't always get the full increment, regrettably. I'm not sure how that happens but we do typically have to find resources to meet the salary demands at times.

Q All right. And improvements that you may want to make to those existing programs, would they be considered new programs or would they be considered the old programs and you were unable to ask for new money for them?

DR. RIDDELL: Well, I'm trying to remember why Timber is saying "some" because I can't actually remember the exact example. What did we get money for in Fraser Sockeye?

MR. WHITEHOUSE: There was an increase of 330,000 O and M recognizing there was substantial growth in some stock so --

DR. RIDDELL: Oh, okay.

MR. WHITEHOUSE: -- there was new stocks emerging that would require high precision estimation. And there was one FT, one new staff member funded, recognizing there would be an increased workload associated with evaluating and assessing that information. So there was both salary and wages and O and M identified.

Q For the total 330,000?

DR. RIDDELL: Yeah. And that's out of 11 million. And the majority of the money was directed to new programs, which, at that time of the treaty agreement, the big debates in '99 were management regimes for Chinook and Coho salmon coast-wide. And then when they went to an abundance-based management regime in the ocean that I assure you, you don't want to talk about, then they went to indicator stock so you had better information to manage those fisheries on. But the Fraser Sockeye did not get a lot of resources other than Timber identified. The consequence of that is it then became part of core funding and open to subsequent reductions within the department.

Q So is it fair to say that the Fraser River stock assessment program is still mostly reliant then on funds allocated in 1985 in terms of a total number

when DFO took over the assessment from the IPSFC? And then there's also been -- not only is that sort of the baseline but there's been erosion of that money base because since 1999 these funds are now in A-base funding and are subject to further reductions?

DR. RIDDELL: Well, I think the simple answer is yes. But my qualification would be that much of the money that is directed to Fraser Sockeye now has had to come from the Pacific Salmon Treaty allocation. The department has always treated Fraser Sockeye as our first priority need to meet our Treaty obligations and we see it clearly as the sort of gold standard of how the department is evaluated. So the Fraser Sockeye program when you look at budget histories, they have suffered fewer cuts than many of the other programs only because of the very specific decision to fund them as a top priority.

Q Okay.

DR. RIDDELL: And so it's a little bit difficult to answer your question historically because if you had a 1985 dollar now and we have a dollar today, they're not made up out of the same pots that they used to be.

Q Okay. Coming back to the funding on an operational level, SACC, again, it apportions annual stock assessment funds; is that right?

MR. WHITEHOUSE: Yes.

Q And is there an agreed prioritization framework for how monies are spent within stock assessment?

MR. WHITEHOUSE: We follow a structured approach, yes.

Q All right. And if I can ask you to turn to Tab 7 of the binder in front of you? Is this document a document used in prioritizing stock assessment funds and needs? This is the Salmon Stock Assessment Plan 2004/2005.

MR. WHITEHOUSE: That's correct. This is a document that reflects business planning exercises in '04/'05. Represents I will call it an iterative process associated with three to four years of planning prior to that and aligns assessment objectives with management objectives.

Q Is it still foundational for assessment priorities? Is it still relevant today?

MR. WHITEHOUSE: I think it's important to stress that at a core or base level, the funding or the

assessment priorities haven't changed at all probably from a Fraser Sockeye perspective to times that pre-date the initial 1985 treaty. So the elements that require support are stable and would be similar to those that are -- well, equivalent to those that are described within the elements of this plan.

Q Okay.

DR. RIDDELL: Could I just add something?

Q Yes.

DR. RIDDELL: The business plan was developed. There was always a limited amount of money. And there are changing priorities over time. And so what the intention was, was to develop a business planning process that was structured and the people could have an accountability with and it's structured around the idea that there are ongoing objectives we have to meet such as conservation risks of particular populations, meeting Pacific Salmon Treaty obligations, First Nation agreements, which are developing and some may be new in some areas and so they could change their priority. We put a high priority on assessing stocks that are important for harvest management. What are important contributors to the fisheries? And then one that probably got less importance but is always in the back of our minds scientifically is the priority for long-term monitoring information.

And so we set up a structure for all of the salmon populations throughout B.C. and tried to evaluate them on a standard set of criteria. Now, the weighting of those can change over time because the conservation value, for example, could change with time. But this was a way to try and develop a structured approach to budgeting on an annual basis that was responsive to changes in the stock and meeting current priorities.

Q Thank you. And I don't know if you answered the question. Is this document still used today? Is it still a foundational document and used today?

MR. WHITEHOUSE: It largely describes the process used to allocate funds today.

MS. BAKER: All right. Thank you. Could I have that marked, please, as the next exhibit?

THE REGISTRAR: Exhibit 381.

EXHIBIT 381: Salmon Stock Assessment Plan 2004/05

MS. BAKER:
Q And are the assessment priorities revised every year as you look at the landscape before you?
MR. WHITEHOUSE: The assessment priorities, meaning project profile -- well, let me step back. Assessment priorities don't change unless there's a major change associated with management objectives. The exception would be if there was emerging conservation concerns whereby we knew we had to re-direct resources to address the ability to provide status comment for stocks that had reached very low levels, for example. But as I said earlier, the key drivers that underpin the management models don't change largely so assessment priorities, with the exception of maybe emerging conservation-related issues, are quite static as well.
Q All right.
DR. RIDDELL: Could I add that the assessment priorities do change annually. I mean the criteria we set; we try to maintain to be consistent through time. But example, a First Nation agreement. If there is a new agreement that comes into place with new deliverables and they require an allocation of funds that would have to be met. We've already identified in Fraser Sockeye that you have the cyclic variation in a number of populations. In some years, we would have had to allocate significant amounts of the budget to meet the demands in the Fraser Sockeye. On the low cycle years, we could have up to a million dollars that could be re-allocated to other programs to try and catch information up from other areas and other populations. So the budgeting process is actually different every year; the criteria don't change much.
Q Yeah, I guess that was the point. The criteria don't change but every year you're going to be applying the funds differently depending on --
DR. RIDDELL: Every year was a different argument.
Q All right. And when are your budgets typically finalized for stock assessment in the calendar year?
DR. RIDDELL: Which one? We have the preliminary. We

have our near final and our near-near final and then final.
Q Final.
DR. RIDDELL: Final typically is actually about mid-fall.
Q Okay.
DR. RIDDELL: Used to be. I shouldn't speak currently. Do you know that?
MR. WHITEHOUSE: It may be slightly better than that, Brian. Late August/September timeline. But you're right, it's well into the enumeration season.
Q All right. So you've actually been implementing programs before the budget is finalized in any given calendar year; is that right?
DR. RIDDELL: Every year.
Q Okay. Is there any impact from the late finalization of these budgets within the calendar year?
DR. RIDDELL: Well, you know, full credit to the area chief stock assessments because they were the ones typically -- we always knew where we could, if you want, to be most risky and what we could fund and not fund. And so we would always plan within plus or minus 10 percent when we're looking at final allocations and then really had to track them continuously through the year. Formally, the government has a six-month review, a nine-month and then a final. And at that six-month review, which six months into our year typically is September and currently now apparently have full budgets. We had years where you really didn't even know exactly what the target was at six months. But what you would start doing or what I did at the time, we would start looking at what the expenditures were in real dollars because most of the programs are now pretty much coming to an end except Fraser Sockeye assessment frequently into the fall.

Those are so well budgeted that very, very seldom did Timber ever have a problem in trying to recoup money for pre-planned programs. And so really we were getting away with just really good people managing these budgets and understanding what the budget pressures were going to be. The nine-month review frequently is when I would have to do a lot of looking across budgets to make sure

that I came out as close to a zero balance as I could in the end. Surprisingly, I think, in my four or five years, I think we only went over budget by very small amounts once out of four or five years. But it is fairly tense in the final three or four months of budgeting and what it leads you to.

Q And have there been instances where --

THE COMMISSIONER: Ms. Baker, I wonder if this would be a good place to take our break?

MS. BAKER: Oh, sorry, yes.

THE REGISTRAR: The hearing is now adjourned until 2:00 p.m.

(PROCEEDINGS ADJOURNED FOR NOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: The hearing is now resumed.

MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER, continuing:

Q When we left just before lunch we were talking about the SAC Committee and funding and budgets. Who is responsible for approving the final budget, Dr. Riddell.

DR. RIDDELL: Well, the final approval is at the Regional Executive Management Committee.

Q And is that based on recommendations from SACC as a whole?

DR. RIDDELL: Yes. Annually I would prepare a budget summary indicating what was covered, what the unfunded priorities might be, and basically send that up through the chain. That would be the signoff for the budget.

Q Right. And you have an example of that at Tab 8, which is CAN062201. This is, I take it, one of the notes that would find its way up to the Regional Management Committee for final decision?

DR. RIDDELL: Yes.

Q Okay. And just to identify some of the concerns that would be outlined in a briefing note like this, if we turn to the final page, you set out -- sorry, not the final page, that is a table, but just before the table. Yes, that's right.

At the top of the page it sets out some options:

1. Proceed with proposed assessment plan, including activities identified in Appendix 2...

2. Proceed with proposed assessment plan *but cancel the activities identified in Appendix 2*...

3. Engage the Stock Assessment Management Board to determine the final salmon assessment plan.

And then a recommendation, and your recommendation at that time was:

> Given the apparent uncertainty in budgets for 2007/08, Dr. Riddell requested that each Area re-evaluate their projects and develop the plan in Appendix 2 that would deliver an assessment plan ***within the assumed budget***. While each Area and Core Assessment has cooperated in this exercise, SACC notes that the projects included in Appendix 2 represent a significant loss of information. Consequently, it is very difficult for SACC to recommend Option 2 but in the absence of available relief funds in Science (to our knowledge at this time) and in light of Paul Sprout's memo in early June, Option 2 seems the only responsible action within SACC's authority.

And then the recommendation is made. And this, I take it, is a situation you find yourself in when the budgets are being cut that you have to make recommendations dealing with reducing funds and with pressure to continue to reduce your operating cost?

DR. RIDDELL: Yes, and earlier in that page there was a table of the allocations in previous years and in that table it's bolded, because as we've talked about this morning, when we are doing this process we wouldn't know the final budget but we would have a notional budget. And that I would typically work with the staff to come down to the best solution we could. But you're always going to come in with a number of projects that you

can't quite fund, and that's the intention of providing this summary document with some options for senior management.

Q And just looking at that table, what are -- what are the abbreviated letters there, "S&W $K", O&M $K"?

DR. RIDDELL: S&W is salary and wages, and O&M is operating and maintenance.

Q Okay. And then we see "Abase", which we've talked about already, and "PST", I take it that is the funding under the Treaty?

DR. RIDDELL: Yes.

Q Which is B-base, or A-base?

DR. RIDDELL: Well, it's a special allocation.

Q It's a special allocation.

DR. RIDDELL: Right. So it's not a guaranteed ongoing fund, so it's not A-base.

Q But this is where you identified that certain funds in 1999 were moved into A-base and then additional funds were available for the PST allocation. That's the distinction that we see there?

DR. RIDDELL: That's the PST, yes.

MS. BAKER: Okay. Thank you. Can I have that marked, please, as the next exhibit.

THE CLERK: Exhibit 382.

EXHIBIT 382: Draft Decision Note from Brian Riddell to Regional Director General, July 9, 2007

THE COMMISSIONER: Ms. Baker, could I just ask very briefly this question. I've heard a large body of evidence around pre-season, in-season and post-season management and all that falls under those headings. This is the first time I've gotten into this funding side. What exactly is covered by this area of funding? In other words, within the Stock Assessment Plan, you mentioned forecasting, for example, and other areas. Is it all covered under this Plan? What exactly is covered in here?

DR. RIDDELL: What's covered here is all stock assessment of salmon in the Pacific Region, including the Yukon. So when you heard forecasting described, and now we have Sue Grant is the person responsible for Fraser sockeye forecasting, Sue would be part of the salary and

wages and have some operating funds. The basic operating funds here are the major annual projects for estimating escapements. They would not necessarily include in-season test fisheries, because a lot of that is under resource management. But it would include things, in the Skeena, for example, there's a longstanding tyee test fishery in the river, and that is part of stock assessment. Those things actually differ just due to the way things developed through time a little bit. But this is all of the core information that would be used in actually making assessments.

MR. WHITEHOUSE: If I can add to that. From the Fraser perspective it almost exclusively through this venue is the terminal area spawning escapement estimates. None of the test fisheries are funded through this route. In addition, none of the catch monitoring, which could be considered a component of stock assessment, as it represents that calculation of total return, none of the catch monitoring programs are included here, either, so they're under a different funding envelope.

MS. BAKER:

Q So all of the programs that we talked about first thing this morning, with the exception of the Chilko smolt POST program that is being funded through a variety of sources coordinated with the Salmon Foundation, all those programs are funded out of this budget?

DR. RIDDELL: Yes, correct.

Q Okay. and I just wanted to go back to the treaty, just to identify the areas that are covered off for DFO's management in this area. And if we have that at Exhibit 65, please, a copy of the Treaty, page 126. Down to - it's hard to see - paragraph F -- keep going, there.

And what's the relevance of Paragraph F in terms of the Stock Assessment Program for Fraser River sockeye?

MR. WHITEHOUSE: So this entire MOU is attached to the both '85 and '99 Pacific Salmon Treaty. This MOU is related to the transfer of responsibilities from the IPSFC to DFO in '85. Paragraph F specifically speaks to the issue of the continuity of the enumeration methods, the collection of bio-

sample data, and population abundance information, as well as the extent of coverage that needs to occur to meet Canada's obligations to the management assessment framework, management objectives. It recognizes that estimation of total annual return is a component and as such, escapement monitoring of all stocks is important. It also recognizes that for the perspective of continuity in method types to ensure precision and accuracy is consistent through time, that these approaches to enumeration are consistent, as well.

Q And is this one of the objectives when you are looking at funding for stock assessment, is this one of the priorities that you have to consider?

MR. WHITEHOUSE: Yes, it's key.

Q Okay. We've talked today quite a bit about funding cuts, and I know funding cuts were discussed in December when Dr. Riddell was here earlier. The question I want to ask you on cuts right now is there have been cuts in the past. What direction have you been given as to future planned cuts? Are future cuts planned for stock assessment, or are they -- are future plan cuts planned for government, which will have an impact on stock assessment?

MR. WHITEHOUSE: In terms of this upcoming planning year, we're being advised that there are likely government-wide pressures associated with funding coming down. There are some notional targets that have been discussed in terms of potentials, and we're talking approximately five percent cuts right now as targets. But as Brian mentioned, through this process it's quite iterative through the year. We see many potential changes to the budget until it ultimately is delivered in the August to October timeline. But there are talks of continued fiscal pressures on the budgets.

Q Right.

DR. RIDDELL: Could I just add, it's sometimes easy to forget exactly what five percent means, because the five percent expression now is five percent on total budgets. So it sounds a fairly small percent. But you also have government guidelines where you're not allowed to reduce staff, unless they're term field staff working in projects on a very short-term basis. So what that means to a senior manager is five percent of your total

budget. Very broad terms, at least 70 percent of your total budget is likely taken up in salary -- well, salary, wages, benefits, and all that. And so really you're looking at five percent of a total that turns into more like 15 to 20 percent of operating at times. All right? And so these small cuts have a very almost insidious way of accumulating to significant reductions in programs.

Q Okay. And the five percent that's being discussed, Mr. Whitehouse, is that five percent per year over a number of years, or is that five percent total over a number of years?

MR. WHITEHOUSE: It's an interesting question because it hasn't been treated consistently through past years. In some years it compounds from year to year, so it's a five percent on a five percent. Sometimes it's represented five percent cut against a base level. So we have not got the understanding at this point in time, looking forward, to know whether it's compounded or a one-time assessment against a base reference level.

Q All right, thank you. And then just following up on your comment just now, Dr. Riddell. When you were here in December you indicated that there had been cuts since 1999 in the range of 10 to 20 percent, and I take it this is on the global budget. How does that number translate into cuts to the operating funds for stock assessment?

DR. RIDDELL: Well, when I made that comment, I was thinking in terms of the total budget allocation for all salaries and wages, and operating and maintenance. And the total budget for the Region could have been in the range of about 16.5, 16.8 is their highest value, and at time it's been as low as about 13.5. And then sometimes of course you get relief because there are special allocations. But when I use that percentage, I was using percent of total value. And so when that gets down to program costs, now I have salaries that have to be paid and then it would be translated into operating costs. So it would be bigger than that. If you had 10 percent reduction on total, it could easily be 25 percent on operating.

Q And if the range that you were talking about earlier was 10 to 20 percent, then your range

would be 25 percent plus for operational cuts; is that fair?
DR. RIDDELL: Yes.
Q When we started this morning we talked about the different programs that are operated through stock assessment, and we talked about what were originally in place with the old Salmon Commission and what changes had been made to those programs over time. And I just want to go through some of those and ask you whether those reductions, for the most part those were reductions, in programs are a result of budget cuts.
So first of all, I don't know that you had with respect to adult enumeration on the spawning grounds, you identified that aside from a few years where you were unable to complete a full assessment, that program has remained intact. Is that fair, Mr. Whitehouse?
MR. WHITEHOUSE: That's correct.
Q Okay.
MR. WHITEHOUSE: With the exceptions noted.
Q Okay. You've also talked about cuts made to the juvenile program, so the fry programs. Were those reductions made as a result of budget cut pressures?
MR. WHITEHOUSE: Yes, the virtual elimination of fry programs responded to budgetary pressures.
Q You also talked about changes to the smolt program, or sorry, juvenile assessment programs, that the years in which those were conducted have been reduced somewhat. Were those changes also as a result of budget cuts?
MR. WHITEHOUSE: Yes, I was referring specifically here to the in-lake hydroacoustic and trawl surveys and the limnological assessment of Fraser lakes, a marked decrease in the amount of activity due to budget restraints.
Q What is the impact on a global level, what's the impact of those kinds of reductions in programs. What does that do to the knowledge that the Department and science has as to the life history of salmon?
MR. WHITEHOUSE: I think there's a number of things to think about in responding. I think the key is, is that the purpose of the various layers, in terms of assessing different life history stages are explanatory power for identifying shifts in

production trends, for example, changes in fish production patterns that could not be explained by simply tracking adults. So all of these components can be looked at as incremental add-ons to improve understanding and certainty with which we are able to provide advice, science-based advice to managers. As you remove the capacity to understand these life history based studies, we reduce the ability to explain variation in patterns that we see.

Q We have obtained some documents that show some funding levels required for the programs over different years, and I think it might be helpful just to review that. If you could turn to Tab 5 of the binder, which is CAN058261, and CAN058262. They should be kept together. I hope that is how they have been presented. There should be this e-mail page from Chuck Parken to Brian Riddell, and a Summary of Historical funding for Stock Assessment Budgets should be the second page. Is that what I see down at the bottom there.

MR. LUNN: They are two separate pages.

MS. BAKER: Okay. All right, thank you.

Q So I understand that these two documents go together, that the spreadsheet on the back was an attachment to the e-mail. Do you have that document?

DR. RIDDELL: Yes.

Q Okay, thank you. And this, if we turn to the spreadsheet, the Summary of Historical Funding for Stock Assessment Budgets, this covers a period '98/'99 through to '05/'06. And you'll see some fluctuations in the total allocations for the operational budgets starting in '98/'99, the total is in millions -- well, maybe you can tell me what is the "Sockeye Total". Is that millions, or what's the value that we're looking at there?

DR. RIDDELL: 1.73 million --

Q Okay.

DR. RIDDELL: -- in 1998/'99. That's the sockeye total

Q Okay. And then it drops by 400,000, stays more or less, just a little bit more, goes up again, back up 17, then down to 14, down to 8, down to 798. Is there some explanation you can give us as to those fluctuations in funding?

MR. WHITEHOUSE: Yeah, I think there's some important patterns that need to be pointed out here. As we

spoke earlier, sockeye funding needs based on the program profile and the number of high precision estimates required, linked to the expected abundance returning to the spawning grounds, fluctuates with cycles in Fraser sockeye abundance. So Late run populations represent an increase in pressure. That's the '98/'99, 2000, 2003, cycle that you see here. The numbers which are elevated during those years represent increased costs associated with enumeration.

In the years between that there are reduced requirements, so the budgets commensurately are reduced to reflect that reduced need in terms of enumeration.

MS. BAKER: All right. And can I have this marked, please, this combined document as one exhibit.

THE COMMISSIONER: Exhibit 383.

EXHIBIT 383: E-mail from Chuck Parken to Brian Riddell, July 7, 2005, with attached Summary of Historical Funding for Stock Assessment Budgets, BCIA, FY 98/99 - FY 05/06

MS. BAKER:

Q And what do those fluctuations year to year in funding requirements, does that create any difficulties in planning and difficulties in budgeting for the program?

MR. WHITEHOUSE: It indeed does, associated with a fluctuation on that dominant year represents an increase in budget pressure that while it should be foreseeable, given we know population abundance cycle across this four-year pattern, the reality is, given the pressure on budgets, it has represented an additional burden to the regional assessment budgets that have been very difficult to accommodate.

Q So once people get used to funding at a lower level, you find it hard to get money to go back up; is that the problem?

MR. WHITEHOUSE: Basically in order to accommodate the increase in funding requirements on a dominant cycle year, there's no new money coming in, means something has to fall off the table somewhere else. So the 400,000 increase approximately that you see, although it would be much greater in the latter years in this table, that increase is

associated with lowering the priority on other projects that would have been delivered during the non-dominant year. And those aren't necessarily Fraser sockeye or even Fraser salmon programs that would be accommodating Fraser sockeye interests ahead of a number of other species interests, coast-wide.

Q Okay. And 2010 was a year where the numbers came back bigger than expected, or at least on the very high side of what was expected. What did that do, how was that accommodated within your programs?

MR. WHITEHOUSE: Well, first off, planning process provided adequate budget for expected levels of abundance coming back in 2010. When we got signal early on in the season that abundances were going to be substantially greater than we had anticipated, I flagged this to the division head, and said "I'm going to likely need substantial additional resources in order to be able to address this", and the Department was able to identify these resources. So we did not have any gaps this year in terms of the program profile as implemented.

Q Has that been the case, that where you have had extraordinary needs, money has been found to provide you with the resources that you need for at least managing the Fraser River stocks?

MR. WHITEHOUSE: In most cases, yes. However, there are exceptions that are flagged in this table, for example, where we were unable to meet due to budgetary constraints the ability to deliver all necessary program elements.

Q And would one of those examples be the Horsefly River/Quesnel, which you see there's a zero with an asterisk beside it in the -- I can't see the year, Mr. Lunn, can you just move it down. I think it's 2002, but if you can move the other direction just so we can see the top of the table. I think it's the 2002/2003 year, you see the Horsefly has a zero with a star beside it, an asterisk, and at the bottom it says:

> Project was required but was unfunded and not delivered in 2002...

Is that an example?

MR. WHITEHOUSE: That is exactly an example thereof,

yes.
Q Okay. And I'd like to just turn to the 2002 year. In 2002 you had that problem as identified with that stock, and there was a memo prepared - excuse me, let me just find that - Tab 3, this is CAN008206. This is an Impact Statement for Budget Challenges in 2002/2003. Are you familiar with this document?
MR. WHITEHOUSE: Yes, I'm the author.
Q Okay. And why was this document prepared?
MR. WHITEHOUSE: It was a summary of the budgetary challenges in terms of program planning based on our first evaluation of likely budget status to come to our program in the 2002/2003 fiscal year.
Q At the bottom of that first page, the last paragraph, identifies that:

> Reductions of this magnitude will have a marked negative impact on management and assessment of Fraser River sockeye fisheries and population dynamics in the immediate and long term. The current configuration fails to meet Canada's obligations under the [Salmon Treaty], some aspects of which have already been agreed to for 2002/2003 field season... Failure to adequately deliver the Fraser River sockeye enumeration program mandate will seriously erode client and stakeholder confidence in the Department.

And that was your view at that time?
MR. WHITEHOUSE: Yeah, and I think it's important to point out the two bullets immediately above that, because that's not simply not delivering the Quesnel, which was the ultimate outcome. At this point, and this was a May-time meeting, we would have had no ability to enumerate Summer runs in 2002 -- sorry, Early Summer runs and no ability to assess three of the major four components of the Summer run. So it would have represented a major hole in the stock assessment program. So between the time that this was drafted and the ultimate program delivery, there were a number of pieces of emergency relief funding that were delivered, such that two major gaps existed in the 2002 program. Quesnel, as was already highlighted, and Birkenhead, which was another component that was

not estimated.
MS. BAKER: I'd like that memo marked, please, as the next exhibit.
THE REGISTRAR: Exhibit 384.

EXHIBIT 384: Impact Statement STAD Budget Challenge 2002-2003 BCIA - FRS enumeration, 2003

MS. BAKER:
Q And in 2002 the concerns were raised also by the Salmon Commission itself. I want to ask you if you are familiar with the document that you can find at Tab 13 of the binder. It's a Salmon Commission document. This was written in August 2002 and it's from Don Kowal. If you could turn to the next page, please. Thank you. And this also identifies in the second paragraph the importance of catch and escapement monitoring, and second line:

> The Pacific Salmon Treaty recognized the importance of these data and Canada was committed to continue to carry out essential stock assessment activities such as the escapement enumeration programs when the management of Fraser River sockeye and pink salmon was repatriated to Canada.

The bottom paragraph on that page:

> The Panel's most urgent and immediate request is for the reinstatement of critical assessment programs on the Quesnel River system for summer run sockeye, specifically the Horsefly River mark-recapture study and the Quesnel Lake visual surveys.

And it goes on.
Were you aware of the concerns raised by the Salmon Commission at that time in 2002?
MR. WHITEHOUSE: Specific timing of delivery of this document, I can't comment on. I would have been aware through the chain of communication that the Fraser Panel and the management infrastructure would have been concerned about this. And I ultimately at some point later in the season would

have seen this document.
MS. BAKER: Okay. Have that marked, please, as the next exhibit.
THE REGISTRAR: Exhibit 385.

EXHIBIT 385: Letter from Pacific Salmon Commission, Concern re Escapement Assessment Programs, August 26, 2002

MS. BAKER:
Q And what was the outcome of the 2002 year and the concerns which we've just identified in Exhibits 384 and 385?
MR. WHITEHOUSE: I think we've covered it, but just to restate, there was substantial relief funding to address gaps associated with earlier components of the program to address all Early Summer runs and most Summer run components. But we did fall short and were unable to identify funding or a way to deliver programs associated with the Quesnel assessment and Birkenhead River assessment.
Q And did those reductions impact Fraser River sockeye management for that year?
MR. WHITEHOUSE: They will for a number of reasons stated earlier, associated with determination of total return, and evaluating management performance, and specifically with respect to Summer run stocks have had the impact of increasing the uncertainty with which we could evaluate the fishery performance.
Q And if you turn to the next tab, Tab 14 in the binder, this is a memo from the Salmon Commission dated May 5, 2003. And again in this letter, the Commission is reporting concerns from the Panel with respect to planned reductions stock escapement enumeration programs in 2003. There's a memo and a presentation attached to that, setting out some of the concerns raised by the Salmon Commission. If you can just flip through those pages.
Do you remember an issue in 2003 with respect to planned reductions in stock escapement, or excuse me, escapement enumeration?
MR. WHITEHOUSE: Yes, I do, and I would frame the context here, again May timeline, so this would be early in the process. Considerable amount of uncertainty with respect to budgets, but the

notional budgets that would have allocated were indicating significant problems in terms of our ability to deliver the full suite of assessment programs, and this would have been a response from the Salmon Commission and Canadian and U.S. Commissioners raising their concerns that something akin to 2002 was happening again.

Q And do you remember what the outcome was in 2003?

MR. WHITEHOUSE: We were largely able to implement most of the assessment framework.

DR. RIDDELL: With the exception of Fraser pinks. I would point out that.

MR. WHITEHOUSE: That's a good point, yes.

DR. RIDDELL: That is the first year that assessment was not done on Fraser pink salmon, other than the fry downstream.

Q So the money for sockeye was pulled from pinks to a certain extent, is that what happened, or was it just pinks eliminated?

DR. RIDDELL: Well, I can point out I wasn't there, so I can't really answer that.

MR. WHITEHOUSE: That is a reasonable characterization. Given the funding pressures across the region, we had to basically dig into the money used to fund pink to fund other higher priority items within the assessment framework.

MS. BAKER: Thank you. I'd like that document marked as the next exhibit, please.

THE REGISTRAR: Exhibit 386.

EXHIBIT 386: Memorandum from Pacific Salmon Commission with attachments, Fraser River Sockeye and Pink Spawning Enumeration Programs, May 1, 2003

MS. BAKER:

Q Have the concerns identified in 2002 and 2003 continued at any point up to the present? I guess what I could ask is have there been other years where funding proposals for and planned programs for escapement enumeration have raised concerns with the Salmon Commission and have potentially put Canada in a position where it was unable to meet its Treaty obligations?

MR. WHITEHOUSE: We have experienced budget challenges of variable magnitudes annually since that point in time. I don't recall off the top of my head

whether we've had formal correspondence from the Fraser Panel in relation to their concerns, but there have been years where we did not deliver the entire Fraser assessment program. 2006 jumps to mind, again pressures in Quesnel where we had a few projects that were not able to be fully implemented.

Q I just wanted to touch on the point that you raised, Dr. Riddell, impacts on non-Fraser River sockeye stocks. When we talk about the priorities for funding and for stock assessment, I take it Fraser River sockeye is the top priority stock; is that fair?

DR. RIDDELL: Yes.

Q Okay. And the focus on maintaining programs for sockeye means that there are impacts on other species and that there's not enough money to perform full enumeration or assessment programs for those other species; is that correct?

DR. RIDDELL: Yes, and it goes back to my earlier description about how the money is managed under the core funding and the Pacific Salmon Treaty funding after '99. When the original funding for the Fraser sockeye to a very large extent was included in the '85 Treaty, that money subsequently became A-based or core funding, and that then opened it up to Departmental reductions for a number of, well, national and more local pressures. And so when those pressures caused our budget to go down, then we would have to dip into the Pacific Salmon Treaty funding to ensure that we were meeting most of the requirements for Fraser sockeye salmon. And as Timber has described, to a very large extent we have met those through the time, but there have been where we've tried to cut down, so we minimize the loss on other populations.

Q So some of the impacts would be the elimination, as you said, of pink enumeration, adult pink enumeration?

DR. RIDDELL: Pink has been an ongoing loss since our most numerous single population of salmon in Canada and it's currently not assessed.

Q And then have there been reductions in chum, Coho and Chinook assessments, as well?

MR. WHITEHOUSE: Yes, there have. Yes.

Q Okay. And we're here to talk about Fraser River

sockeye, so let me ask you whether there's any impact on Fraser River sockeye from the diminished funding available to enumerate and assess those other stocks I just mentioned. And if I could start maybe with Mr. Whitehouse.

MR. WHITEHOUSE: I think there's a number of things that you have to think about, because considering Fraser management, sockeye management, recognizing it's not only a mixed stock in terms of numbers of sockeye populations impacted, but it's also a multispecies fishery, where Chinook and Coho are captured as a by-catch in sockeye directed fisheries. If we lose the resolution to be able to identify either emerging conservation concerns due to cuts associated with reductions in Chinook or Coho assessment, and Coho is a very good example in the Fraser. If we lose the capacity to be able to inform management as to status of Coho or Chinook stocks, we may be in a place where we have to unnecessarily constrain sockeye fisheries to deal with the uncertainty around status on co-migrating species. So there are implications that can be quite far-reaching in seeing a degradation in the information that is collected on other species, as well.

Q Did you have anything to add that, Dr. Riddell?

DR. RIDDELL: Just to reinforce that there could be ecological issues of extremely large pink salmon returns and we have no assessments on that. I don't think that you could really time any Chinook issues to it. Most of the fisheries are non-retention Chinook now in the large seine fisheries for sockeye. The conservation concern for Chinook in the Fraser is really on the Early time component mostly, and that's not in conflict with fisheries on Fraser sockeye, including the Early Stuart run. With the exception, I guess, of in-river management would be --

MR. WHITEHOUSE: Yes.

DR. RIDDELL: -- under consideration there. And the other one that we should note is, I mean, there is minimal assessment of Southern B.C. chum and have been for a number of years. And again because there hasn't been the sort of value placed on them, and they simply have not been closely monitored through time.

MR. WHITEHOUSE: Can I just reinforce.

Q Yes.
MR. WHITEHOUSE: I would like to clarify that there would potentially be significant impacts to in-river fisheries management on a Chinook perspective.
DR. RIDDELL: Chinook, yes.
MR. WHITEHOUSE: Particularly for the up-river five-year-old stocks, which are substantially impacted by a number of in-river fisheries.
Q Thank you. I'd like to move to a new area, the Wild Salmon Policy and Fraser River stock assessment. We have, of course, heard about the Wild Salmon Policy in these hearings and we have heard discussions about CUs under that policy, and we touched a little bit on that this morning. Can the current levels of funding available for Fraser River stock assessment provide the information needed to evaluate and manage at a CU level? I'm going to start with you, Mr. Whitehouse.
MR. WHITEHOUSE: Fraser sockeye I think is unique, and I think we have to step back to the discussion that we just had. We have the most robust and complete data series on Fraser sockeye, it's probably the strongest dataset that exists on the Eastern Coast of North America -- Eastern Coast of the Pacific, I should say. And ability to address WSP implementation is probably most robust there, that is with respect to any species on the Coast.
However, I don't think when you talk about WSP implementation, you can simply take a single species focus. The WSP is an integrated planning and evaluation process that considers ecosystem and multispecies impacts. So we really have to be careful when we say fully implementing sockeye management under a WSP provision is adequately addressing salmon management coast-wide from a CU perspective, because it's quite a different perspective when we look at the quality of information outside of the Fraser, or even within the Fraser for non-sockeye CUs.
Q Okay, thank you. Dr. Riddell.
DR. RIDDELL: I would agree with Timber that for sockeye I think you're probably in pretty good shape for doing the assessments, and he spoke to that earlier this morning. My only, I guess, caveat on that would really be when we do define the lower benchmarks, do we have adequate in-

season assessments to ensure that certain conservation units are managed to try and meet the lower benchmarks so that we don't have to implement major recovery efforts. There may be an assessment issue at that point. But I think that the broader point that Timber has just made about the other species and how they would affect fishing opportunities is the more important one.

Q I'd like to move to another new topic, looking at First Nations and involvement of First Nations in in-river stock assessment. And again these questions are primarily directed to Timber Whitehouse. First of all, I understand that some Fraser River First Nations have been involved in working with DFO to do stock assessment in the Fraser River watershed for sockeye and other salmon species.

MR. WHITEHOUSE: That's correct, there's quite extensive involvement.

Q Could you describe what that involvement is?

MR. WHITEHOUSE: Through a number of processes, but primarily supported through the Aboriginal Fisheries Strategy, DFO has undertaken capacity development as a major mandate with First Nations to participate in management and stock assessment. Numerous agreements throughout the watershed with First Nations support, delivery of capacity development, to allow First Nations to begin to work in a meaningful way on in-stock assessment projects.

Q Okay. And are you aware that some First Nations have asked for further involvement in Fraser River stock assessment projects in their traditional territories?

MR. WHITEHOUSE: It's quite a common theme. We hear from First Nations on a regular basis that they would like to, their aspirations are a greater involvement with stock assessment.

Q Okay. And I'm just going to ask you to turn to Tab 15 of the binder before you. It's an e-mail which doesn't have a CAN number, but it's an e-mail from Gord Sterritt to you and others about stock assessment opportunities they'd like to pursue. Do you remember receiving this e-mail? It's dated May 5, 2009.

MR. WHITEHOUSE: Yes, I do.

MS. BAKER: Okay. Can I have that marked, please.

THE REGISTRAR: Exhibit 387.

EXHIBIT 387: E-mail from Gord Sterritt to Timber Whitehouse and others, NSTC - DFO STAD Activities in the NStQ Territories for 2009, May 5, 2009

MS. BAKER:

Q In this e-mail Mr. Sterritt says that it has been difficult to get stock assessment involved in discussions with his tribal council regarding greater involvement in stock assessment programs. Do you agree that that's an issue?

MR. WHITEHOUSE: I think my perspective is slightly different. I think we have quite a productive working relationship. We've worked with the NStQ for a large number of years in delivery of not only sockeye but other species assessments in their traditional area. I fully acknowledge that this note expresses a desire for increased participation.

Q He says in the second paragraph, second line:

> On the part of [Stock Assessment] this engagement has been minimal to say the least.

You don't agree with that?

MR. WHITEHOUSE: No, I cannot. I think there's a number of examples that I can point to that indicate that we've been working fairly productively, although perhaps not as rapidly as Mr. Sterritt would hope to see, towards developing capacity within First Nations in their area. There are specific funds set aside in their AFS agreement to specifically participate in sockeye assessment. We've worked with them in conjunction with other partners in terms of developing alternate assessment methodologies within the Quesnel. That relates to the use and application of high-tech DIDSON counters in the main stem of the Quesnel. We have in addition directly hired members of the NStQ as direct DFO staff to try and assist in developing their capacity further. So while it may not be enough progress, I think we have been working quite productively together to attempt to move forward on that capacity development.

Q My understanding that the NSTC is involved in Chinook and Coho stock assessment, is that right?
MR. WHITEHOUSE: That's correct.
Q Okay. And has the partnership with DFO with respect to Fraser River sockeye been at the same level as their involvement in Chinook and Coho stock assessment?
MR. WHITEHOUSE: You have to separate and understand the complexities of the programs to understand whether the engagement would likely be at the same level. The Coho program is a very simple one that involves the operation of a fence. The complexity of the assessment elements associated with sockeye on most years require a fair bit more technical integration and understanding. The components are quite closely linked to both mark-recapture and visual surveys. And as such you're not comparing the same skill set, suite of skill sets, in implementing the similar or the dissimilar project types.
Q Are you familiar with the in-season abundance and health indicator program that the NSTC, the northern Shuswap Tribal Council has?
MR. WHITEHOUSE: Yes, I am.
Q And what do you think of that program, has it got any usefulness to your programs?
MR. WHITEHOUSE: It's largely structured not as a stock assessment tool per se, but its purpose is of supporting in-season process for evaluation of in-season run strengths, as opposed to terminal area assessments. It is structured to try and attempt to provide information on the condition of fish through capturing them on their migratory route up to terminal spawning areas but before reaching them, and also to attempt to try and provide some sort of an indication of relative abundance. I think the concept is generally well-meaning. However, when talk with resource managers in terms of the utility of the information, right now it's not particularly well-positioned to be providing advice that would assist managers in-season.
Q And this is the fish wheel program that they are operating.
MR. WHITEHOUSE: Yes.
Q Okay. Dr. Riddell, have you got any comments on in-river assessment being done by First Nations?

DR. RIDDELL: No. No.
MS. BAKER: Thank you.
THE COMMISSIONER: I wonder if I could ask, Ms. Baker, either Dr. Riddell or Mr. Whitehouse, you used that term "the complexity of assessment components associated with sockeye". I wonder if one of you could just tell me the main characteristics that differentiate sockeye from the other species in terms of stock assessment. I realize sockeye spend longer in freshwater than some of the other species, but apart from that.
MR. WHITEHOUSE: Yes, certainly. Key is the relative complexity of population structure when we're talking about the enumeration of spawning populations. There are in excess of 80 distinct spawning sites spread throughout the Quesnel system, and there are two very major stocks that on two or three out of the four cycle years require the use of the high precision mark-recapture techniques, or alternately DIDSON techniques, which we've been evaluating there.

When we're dealing with mark-recapture program implementation, there is a large number of factors associated with bias evaluation that make it very critical that not only in the main population, the main, let's use Horsefly as the example, a body of fish that may be a million plus centred amongst 60 or 70 other spawning streams that may be from a couple of hundred to several tens of thousands. While the general perception is that sockeye have high fidelity to their spawning streams, there is a lot of straying and mixing of those populations en route.

Tagging programs are specifically prone to sources of bias. If very careful care isn't made in structuring the programs that evaluate populations to the spawning sites outside of the main rivers, so outside of Horsefly River in this case, so that you get information on tagged/untagged fish, these are all relating to the bias and the reliability of the estimate. These programs have to be very carefully intertwined and linked, and there cannot be significant breakdowns between the delivery of the mark-recapture and the delivery of the visual surveys which are the low-precision surveys on the streams outside the mark-recapture area, or you

will be subject to significant negative bias.

A great deal of coordination is required in order to deliver those programs, and as such, it doesn't make for a piece that is readily cleave-offable. You can't cut off a piece to say here is a piece of work that could be discrete and delivered through another mechanism without having a potential negative bias to the mark-recapture. So they're very closely intertwined, and this is the complexity.

Coho enumeration, there are one or two populations. The Coho head to a single stream. The stream that they use in the Horsefly system can be fenced using a very small temporary fence. A fence operation is very simplistic. It really simply needs someone sitting on the fence, manning it and counting fish through a passage in the fence. So you can stop fish migrating overnight, open the fence during the day and count the fish through visually, one at a time. And there would be on the order of a couple of hundred to a couple of thousand fish at most.

When you're dealing with sockeye populations, in the Horsefly system, Horsefly/Quesnel, you're dealing with up to two-and-a-half million fish. So it's the order of magnitude reflects the complexity in terms of evaluating it.

MS. BAKER:

Q And just a couple of recommendations from prior studies, reports. The Chamut Report, 2003, so that's in Exhibit 14 again, at page 217. Thank you. It's recommendation number 9.

> It is recommended that monitoring and assessment studies be continued to improve understanding of the effects of high spawner density (e.g. Adams River, 2002) and the migration behaviour and in-river mortality among Late run sockeye. As well, external members of the Steering Committee advocate undertaking more extensive stock assessment studies on all Fraser River sockeye stocks.

I don't see in the response from the Department a specific response. Do you know if anything was done in response to these recommendations, particularly the more extensive stock assessment

studies, which were recommended for all Fraser River sockeye stocks?

MR. WHITEHOUSE: I'll actually tackle the first one, because it's quite clear that the Department, through number of partnerships with universities and consulting agencies made a major effort to address the issues surrounding Late run mortality. There have been extensive studies implemented since 2001. Very large budget, you know, $1 million to $1.2 million specific projects implemented to address these in 2002, 2003, subsequently in 2006. So very easy to demonstrate that there's been significant movement in addressing the issue of in-river mortality.

Q What about the recommendation that more extensive stock assessment studies on all Fraser River sockeye stocks be done?

MR. WHITEHOUSE: It's difficult for me to understand what the writers of the recommendation might have been pointing at. But I think there are a couple of things that clearly overlap with the Late run mortality evaluation that has extended much broader to Fraser sockeye run timing groups in general. So a lot of the work on the telemetry extended on to Summer run stocks, and Early Summer run stocks. So there has been work there through the academic institutes, in particular collaborating with UBC, Dr. Hinch and his group working on energetics. There's been a substantial amount of work looking at issues affecting migration in the Fraser. We also have added a fair bit of environmental assessment associated with water temperatures and predicting potential migratory success. That was brought on sort of in the 2000 timeline. So that has been developed and is going forward and playing a significant role in management at present.

When I take that recommendation down to the more narrowly focused stock level, and reflect back on some of the comments that we've been discussing earlier today, like evaluation of nursery lake trophic status, the research into incubation habitat, fry programs, we haven't made as much progress there. In fact probably less work being done there than say in the '95 to 2000 timeline.

DR. RIDDELL: I think you also have to consider in 2002

you've touched on the number of the sensitivities a few times today. That was the Quesnel year. That was the period of the Fraser pinks, that was the year that - I'm just thinking of another discussion we had earlier - reductions in budget that year was a major drop. I think it was about $2.5 million because of the drop in the -- what was that program called --

MR. WHITEHOUSE: CFAR.

DR. RIDDELL: -- CFAR, yeah, Canadian...

MR. WHITEHOUSE: Canadian Fisheries Adjustment and Realignment.

DR. RIDDELL: It was another special allocation for about five years and it terminated. So there were a number of sensitivities at that time. But I think that Timber's response is appropriate. And when you look at the coverage that one of your exhibits on the budget addressed just recently, and we've acknowledged a few times, I mean, Fraser sockeye as much as we can put into it, we put that as a first priority. And so there wasn't a great deal more you could do without having significant impacts in other stock assessments in the region.

Q Thank you. And then staying in Exhibit 14 at page 246, the Wappel 2005 report, recommendation number 8. They recommended that knowledge gaps regarding quantitative estimates of spawning fish should be investigation, and in response the Department has said that it:

> ...restructured its Pacific science program to have a dedicated focus on salmon stock assessment and scientific research.

Dr. Riddell, what was involved in that?

DR. RIDDELL: So we're talking 2005?

Q Right.

DR. RIDDELL: Well, there was a small reorganization, but I wouldn't call that significant. That was the year that we did form the SAFE Division. There was extensive collaboration going on with other Departmental groups. There was extensive work on the Late run Fraser sockeye, including much of the research that we've seen recently in a Science publication by Dr. Kristi Milli-Saunders. So there was a lot of work going on as described in the paragraph here, but we didn't change the

stock assessment program substantially. That was the year that I took over. There were some reorganizations within the Fraser, so we went to a single stock assessment group within the Fraser River, but we didn't change any real people there, in that some little bit of reporting. Nothing that I would qualify as major at all.

Q Okay. I think I've just got one or two final questions, and I'd like to just complete them. In terms of long-term monitoring programs, we've talked a lot so far in these hearings about different programs that have been in place since the 1940s or earlier. And I take it there's significant value in long-term monitoring for Science and for Management; is that fair?

MR. WHITEHOUSE: Absolutely.

Q Okay. Should it be the Department of Fisheries and Oceans who is responsible for long-term monitoring programs and maintaining long-term programs in relation to Fraser River sockeye?

DR. RIDDELL: Well, I would say it's even more general than Fraser River sockeye. To be honest, I've made this point several times in my career that universities are not a centre that wants to do long-term collection of data. They want to do specific tasks, do an investigation, and publish and move on.

The legacy of the Department of Fisheries as a government agency really is one of having good quality data for long-term monitoring. So if we do want to monitor the effects of climate change through time, then we have the baseline. If we can look at the effects on various populations of salmon, I think it's a core responsibility of the Department to maintain legacies of long-term data.

Q Do you have anything to add to that, Mr. Whitehouse?

MR. WHITEHOUSE: Other than I agree completely, nothing additional.

Q Okay. This is my final question for each of you. Is there anything that you think the Department of Fisheries and Oceans could be doing better with respect to stock assessment needed for Fraser River sockeye management. So basically I'm asking you are there recommendations that you would like to leave with the Commissioner before we complete.

DR. RIDDELL: Well, I hope it's not ten words or less,

because I probably have a number of thoughts.

Well, number one, I think you've heard that in stock assessment on the Pacific Region, Fraser sockeye salmon is number one. And a number of the other resources have obviously over time suffered to some extent because we have tried to direct money to Fraser sockeye. Have we done enough? Well, you've also heard that we could probably do more in ecological studies of the large lakes and looking at the effects on productivity over time.

In terms of explanation for what's happened over the past decade, I think we need to recognize that the Department needs to put more into early marine survival and likely now downstream survival of smolts leaving the lakes. I'm not sure that we can do a lot more in smolt enumeration. We could probably do some more in fry evaluations in the fall. I don't think you need to do a lot more in the DNA studies, because we've done extensive work there, but we definitely are lacking in understanding of what's limiting marine survival in the first few months at sea, and how the animal actually utilizes the Strait of Georgia. If a lot of the mortality is occurring then, what are the mortality mechanisms? How quickly do they leave the Strait? There's quite a bit of debate on that at this moment, and that we do have some tools we can try and apply to improve our understanding there.

So I think that in terms of freshwater assessment of escapement work, we can probably improve our understanding about the utilization of freshwater habitats and spawning grounds. We're going to hear discussion about the over-spawning, so we can do more to understand the ecological impact of large numbers of spawners. Those are things we can do right now. But we need to have new programs, I believe, in the Strait of Georgia so we can really address these concerns about early marine survival.

Q Thank you. Mr. Whitehouse.

MR. WHITEHOUSE: I agree with Brian. I would also like to make a couple of additional comments because it's easy to lose track of the potential risks that you're exposed to in looking at accommodating needs for new information emerging from specific management issues, climate change, et cetera.

Very fundamental to the ability to assess what's going on in Fraser sockeye management, is the escapement time series. It's a critical baseline against which everything else that we collect is evaluated. We have to be careful not to think that we can trade off moving to the marine environment at the cost of dropping escapement monitoring, for example. It's quite critical that in order to have much meaning and explanatory power, by moving to enhanced lake assessment or enhanced assessment of survival in the marine areas, that we have that key fundamental, the escapement. That's the ultimate signal that the fish send us as a result of their experience of environment or exposure to harvest. That escapement forms the platform. Recognizing what has gone on in the past 50 years without the escapement information that we have, would be much more difficult and it's questionable whether it would be doable at all. So escapement monitoring forms a backbone upon which the rest of management is really built.

And then I agree with Brian, strategically there are a number of other areas that have the potential to add significant explanatory power to the data that we collect, to improve our understanding of factors that limit production. Early marine life history is clearly in current science thinking leaping out as one area that has a significant potential explanatory power.

But I think there are a number of examples within the Fraser River watershed in freshwater itself that need to be seriously considered, and elements like freshwater assessment of nursery lakes, elements associated with evaluating incubation habitat quality and its ability to accept very large escapements like we just saw last fall, are also important to consider in the mix.

I don't think going to the marine environment exclusively is a single fix, and I don't think looking in freshwater is going to be a fix in terms of explanatory fact. We really need to look at where the risks lay, where the information gaps lay, and where we're likely going to be able to actually generate meaningful add-on value in terms of the data we collect. Things like the acoustic

tagging program on smolts have a significant potential and from information perspective, significant value in a leading forecast in terms of survival, but they have to be doable.

So I think it's critical that we take a very holistic and ecosystem-based approach to evaluating where pressures are. You need to be extremely forward looking around the type of processes that may represent change to Fraser sockeye.

A very good example is the recent clarification of en route losses due to the marine area telemetry program. If you look at the management system, it's based on catch plus escapement, and the significant gap and one of the major problems between 2002 and the present is the fact that at least for a significant period of that stanza there was losses of fish en route that represented bias.

I come back to my comment earlier with respect to accuracy. We did not have a good handle on what was going on. The research pieces were needed. They answered those questions.

And we have to be forward-looking in order to understand where those pressures may come from. What are the likely drivers from climate change perspective? Shifts in lake productivity, shifts in marine productivity in the Strait of Georgia, and how we incorporate those I think are critical to any source of recommendations that go forward in supporting the development and support of the information collecting system to support management.

MS. BAKER: Thank you.

THE COMMISSIONER: I wonder if I could just ask either you, or Dr. Riddell, or both of you. This Commission of Inquiry was established because of the significant decline of '09, followed by a larger than expected abundance in 2010. In terms of your comments, given the bookends of a significant decline and a larger than expected abundance, do the programs that you and Dr. Riddell have been describing here today, are they satisfactory in dealing with what appears to be two extremes happening a year apart? In other words, this last piece that you've just described, is that ultimately going to help address these

kinds of situations? But what will it take to do that? I don't quite understand what more could be done in the context of the programs you've described and the recordkeeping you've described, to address these kinds of extremes.

DR. RIDDELL: Well, I'll lead off. I think that if we had a rigorous early marine survival study, that you would have seen the explanation for both years in one place. Now, I mean, that's a limited number of scientists that believe this at this point, but I think that the inferences being drawn from just the marine surveys in the Strait of Georgia and the consistency of the change in the abundance of the juvenile sockeye we've seen, and other salmon species, as well, with these marine conditions and with better understanding of how the sockeye use the Strait of Georgia in terms of a period of residence, and with monitoring the biological productivity of the Strait of Georgia, that we could have possibly explained both of these events. I may be a little overly naïve on this, but I just see that the information that's been accumulating really leads me to think that we're missing a major signal in the early marine survival.

In terms of explaining the difference that you've pointed out, Mr. Commissioner, I agree with Timber in long-term assessments, and of course last week we talked about the Count on Salmon Program and the use of radio tags, you know that I recommended building that program. I see that as a way of explaining the impacts within the river, but it doesn't explain your question in terms of what caused the difference in marine production. Whereas I think the early marine survival is the first place we should look.

Some people disagree with me that it's that narrowly focused. I'm open to being wrong in this case, but I don't see any merit of starting a study in the ocean where it's extremely costly to be out there and it's extremely difficult to recognize Fraser sockeye, whereas in the Strait of Georgia, you can recognize Fraser sockeye. We can do the work, it's confined, we can use small vessels from communities to do much of the work. I think we could make major progress in understanding with a focused program in the

Strait. But only because of exactly your sort of question: What is it that could possibly explain such events in two years.

THE COMMISSIONER: Thank you. Mr. Whitehouse, do you have anything you want to add to that?

DR. RIDDELL: I think he's thinking.

THE COMMISSIONER: It's hard to tell when a scientist is thinking. They're always thinking.

DR. RIDDELL: We're always thinking, thank you.

MR. WHITEHOUSE: It's difficult not to agree with Brian in terms of --

DR. RIDDELL: But...

MR. WHITEHOUSE: -- in terms of the gap. You've framed it, the $64 million question here is what additional information could we have collected or could we have been collecting in a systematic way that might, and it's I consider it to be a leading indicator. We need to understand more early in the life history the factors that are influencing production.

I think there's a very good reason to focus on the Strait of Georgia. It represents a very critical time in the life history, that transition from freshwater to marine residency. There's a lot of interaction in terms of competitors, predators, that are new to sockeye. That the Strait is also highly dynamic in undergoing a number of different changes associated with drivers from outside and inside its basin. It is the logical first place to look.

There are also, and just to confuse the situation, I can point to situations, circumstances where on a stock-specific basis, and I think the key to the approach that Brian is suggesting is there's synchrony amongst all Fraser stocks on different time steps in terms of their decline in production. There's synchrony that began in the late '60s for some stocks, in the mid-'80s and early '90s for others, and suggesting that there's got to be something common in their life history that is resulting in this depressed production and then, boom, a spike, a turnaround of 180 degrees in one year. Something substantial is occurring.

But I can also point to examples where there's been flip-flops of those magnitudes within the freshwater environment as well. Chilko

represents a system for which in this decade we have seen absolute peak levels of smolt production for no apparent reason. No significant habitat change, or at least nothing that you would identify as being clear, as having a positive impact on sockeye production, yet it's pushed sockeye production through the roof with respect to a couple of brood years.

In the same decade, and for stock, not really much more than a couple of hundred kilometres away, in the Quesnel system, we've seen back-to-back very high recruitments of adults, high escapement levels and what is akin to recruitment collapses off of back-to-back large escapements. So there are processes operating at both levels of scale, at individual lakes, and on all stocks in common.

The likely explanation is that for the big downturn in production and then this big turnaround, there has to be something that's happening common to all of them, and the marine environment is the place to look. So we cannot forget that there are processes that are changing within the watershed that are going to have an impact on production on the local stock or, to use the terminology that's more appropriate now under WSP, at the CU level.

DR. RIDDELL: Mr. Commissioner, I should really quickly add to that. I think given the recent Science papers coming out, we really can't forget about extensive study of the fish health concern, because this could really have a major long-term effect if there's something going on here and we clearly don't understand that yet.

THE COMMISSIONER: Thank you both very much.

MS. BAKER: Thank you. Now, I think we were planning to sit late tonight. You had --

THE COMMISSIONER: Until 4:15.

MS. BAKER: To 4:15, okay. So can we take a 10-minute break, then?

THE COMMISSIONER: Yes, that's fine. Thank you.

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

(PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)
(PROCEEDINGS RECONVENED)

MS. BAKER: First counsel up, today, will be counsel for Canada.

MR. MacAULAY: Thank you. Mr. Commissioner, for the record, Hugh MacAulay, for the Government of Canada. With me is Jonah Spiegelman.

CROSS-EXAMINATION BY MR. MacAULAY:

Q Mr. Whitehouse and Dr. Riddell, I have not too many questions, a few clarification questions, and then a number of questions arising from your responses to some of the questions that Ms. Baker asked you earlier today. I've got a couple of questions about resources for stock assessment work, a couple of questions about linkages between stock assessment work and other initiatives, a few questions about collaborations around stock assessment, and then a question or two about the future of stock assessment.

So I'll start with just a couple of hopefully fairly straightforward questions in terms of clarifications, and I'd ask that Mr. Lunn bring up the Harvest Management Policy and Practice Report, which is PPR-5, I understand. And Mr. Lunn, if you could go to paragraph 26, which is on page 16?

Mr. Whitehouse or Dr. Riddell, there is a reference in both paragraphs 26 and 27 to the Stock Assessment Coordination Committee, which you've spoken to being a subcommittee of the Salmon Working Group, or SWG; is that accurate?

MR. WHITEHOUSE: No, the Salmon Working Group is not a subcommittee. It certainly shares a number of members in common, but it's not a subcommittee.

Q Is it fair to say that there's a working relationship, but it's not a subcommittee?

MR. WHITEHOUSE: Correct, there is a working relationship.

Q Good. Thank you. Mr. Lunn, could you go, then, to page 80, paragraph 205(b)(i)? And the last two sentences of that subparagraph I'll just read:

> Visual surveys are done on foot, by boat or by air (helicopter or plane) and are calibrated annually. Visual surveys tend to underestimate populations.

Mr. Whitehouse or Dr. Riddell, is there anything

you'd like to say in terms of clarifying or correcting anything in those two sentences?

Q Yeah, a couple of things. First of all, their visual surveys do represent the class of estimation techniques that are identified here. They also extend, for example, a fence count is based on visual observation, so visual surveys also include a number of activities that aren't specifically captured in the foot, boat or air surveys.

The other thing I think that's important to clarify is with respect to calibration. So there are places where calibration is conducted annually in association with cyclical visual surveys. We didn't have the chance, earlier today, to get into the specific details, but there are two applications within the Fraser Watershed of the visual survey techniques broadly categorized. In the Early Stuart system we use annually calibrated visual escapement estimates, so we implement fences, and in those same streams a paired visual survey to generate an annual calibration comparison between a visual survey and a total count into the system, and generate a calibration estimate on an annual basis for the remainder of the 38 streams within that group.

The rest of the watershed is estimated using the visual techniques - this is the low precision estimates - but we don't calibrate that annually; we apply a standard expansion. So the standard expansion factor is based on historic work that was done by the International Pacific Salmon Fisheries Commission, and has been validated recently, in the '90s, by DFO.

Q Okay, Mr. Whitehouse. Dr. Riddell?

DR. RIDDELL: I think we should -- I'm not sure what this document is - I didn't catch the initial page - but this last statement, "visual surveys tend to underestimate populations," that's not strictly true, because of the use of calibration. So if you're calibrating, you're trying to go from what we typically would call an index to a fixed number. That number and its accuracy to the true value is very much dependent on how many you count and whether you count them at the right portion of the run, and so on, and so it's not true to say that it's always an underestimate. If you have an

uncalibrated count, there's no question it's an underestimate, because you count during just a few days when the run's protracted over maybe a month. But if you're calibrating, that statement is not always true.

Q Thank you, that's helpful. And Dr Riddell, for your benefit, this comes from the policy and practice Report with respect to harvest management, just for your reference.

Thank you very much, that was helpful. A question about allocation of resources for stock assessment. I'd ask Mr. Lunn to pull up document 1 from Canada's list of documents for stock assessment.

Question to you, Mr. Whitehouse, this spreadsheet, as I understand it, serves to essentially bring forward information that Ms. Baker referred you to in a spreadsheet that's been marked as Exhibit 383. That information, as I understand it and as I recall, went up until 2005/2006. This document serves to bring that forward to 2008/2009, and also, as I read it, is a more comprehensive listing of stock assessment budgets. I think that pink salmon, for example, are referred to.

I guess my question is: What other information should we draw from this document in terms of context and trends and that kind of thing?

MR. WHITEHOUSE: I think a couple of pieces of clarification are required, first of all. This sheet does compare to the sheet that was presented earlier. It represents all species assessment budgets within the Fraser. It represents additional information to that, which was presented earlier as the earlier spreadsheet focused on a slightly different administrative structure at the time, so it was only programs that were implemented out of the B.C. Interior area. As Brian mentioned, we reorganized right around the time that that earlier sheet was prepared, so this is a much more comprehensive accounting of budgets for stock assessment activities.

It shows the same type of information, well, exactly the same information, with a couple of updates. In the 2005/6 year, there is new

information that wasn't available at the time the earlier spreadsheet was prepared, which was May, so those extraordinary injections of dollars to address gaps in the assessment program are reflected in this sheet; they were not in the earlier sheet.

MR. MacAULAY: Thank you. I'd ask that that be marked as the next exhibit.

THE REGISTRAR: Exhibit Number 388.

EXHIBIT 388: Fraser Stock Assessment: Operational Project Budgets 2000/01 - 2009/10 ($K's)

MR. MacAULAY:

Q Turning, then, to just a couple of questions about some linkages between DFO's stock assessment work and some other initiatives that Mr. Commissioner has heard some testimony about, and I know that Mr. Commissioner and Ms. Baker have asked you about the Wild Salmon Policy and you've spoken about alignment, in terms of CUs, and DFO's stock assessment work. Are there other examples of stock assessment work being aligned with implementation of the Wild Salmon Policy?

DR. RIDDELL: Sorry, I don't know that I follow the question. Do you mean outside of the Fraser?

Q No, just beyond simple alignment with CUs. Are there other examples, other parts of the Wild Salmon Policy implementation that stock assessment is being aligned with? Sorry.

DR. RIDDELL: Yes, absolutely. Well, after the conservation units, then, in the fall, there was the presentation of the estimation of benchmarks for Fraser sockeye for the first time. That's a major step forward, and that was Sue Grant and Carrie Holt and a number of people in science branch as the primary authors. There's been extensive work in the region on definition of habitat indicators under Strategy 2. Some of those have not been implemented in any sense yet, but there has been agreement reached on the indicators to measure. Less work on the ecosystem indicators yet, but as you've heard in our discussions today for Fraser sockeye, certainly part of their ecosystem indicators is going to be dealing with the freshwater lakes' system, so that

would be underway. And there has been very limited progress in trying to implement a couple of pilots for integrated regional planning, under Strategy 4. Neither of those examples that I'm aware of, though, are in the Fraser system.

MR. WHITEHOUSE: Well, no, I think FRSSI --

DR. RIDDELL: Oh, FRSSI, yes.

MR. WHITEHOUSE: The FRSSI process would be specifically directed at implementing the integrated planning.

DR. RIDDELL: Yeah. So there's actually three sort of pilots: in Barclay Sound; Skeena River; and FRSSI.

Q Thank you. And I think you've touched on this, and I know that you spoke of this, this morning, in reference to the nursery lake productivity assessments being an example of an ecosystem focus for stock assessment work. Are there other examples of the concept of ecosystem-based management being employed in DFO's stock assessment work?

MR. WHITEHOUSE: I think there's a number of examples, particularly arising from some of the challenges associated with explaining patterns that we're seeing. The Strait of Georgia Ecosystem Initiative, under the direction of Dr. Beamish, would represent a specific and directed attempt at incorporating ecosystem values and assessment into management.

When I step back and think about the Wild Salmon Policy implementation, I have a slightly different perspective as to what the pieces, in terms of are we moving forward, are. The reality, to me, a number of the activities that we do have always been well aligned with that, and the stock assessment, in fact, supports the delivery of the Wild Salmon Policy. It's just the frame through which you're looking at it, really, that brings a number of the context pieces together under that particular construct.

So taking an approach that looks at life history-based assessment really does align with the concept of ecosystem-based approach and integrated planning in understanding stock dynamics. So I think there's a number of examples within Fraser sockeye and outside Fraser sockeye with respect to management approaches used in Chinook and Coho, where we use coded wire tagging

to understand life history and fishery-specific impacts, really plug into that same sort of framework, in a general sense.

Q Thank you. Dr. Riddell?

DR. RIDDELL: Well, I mean, this is all true, but I think the new element, where we talk about the benchmarks, certainly a major change in implementation of the policy will be the definition of the lower benchmark, not just the upper benchmark, which is more typically described as the management target. So the lower benchmark is very new and will be a significant addition.

The ecosystem-based really depends on where you're looking. Of course, we look at marine indicators, now, as far as affecting marine survival of sockeye.

I think, as we look more in the Strait of Georgia, for example, when I was listening to Sue Grant's presentation on forecasting and she put up plots of the marine indicators that are currently discussed in forecasting, you may have noticed that there was not a single indicator there for the Strait of Georgia. So would it have improved if we had had indicators of the Strait of Georgia and not the open ocean, all right? So there are steps that we need to take to really improve that.

Q Thank you. Turning to just a few questions about collaborations between DFO and other organizations with respect to stock assessment work, you've spoken about collaboration between DFO and First Nations and, in particular, projects with the NStQ. Perhaps a question to Mr. Whitehouse: Are there other examples in the Fraser Watershed of collaborations between DFO and First Nations or Aboriginal organizations that you'd like to describe for us?

MR. WHITEHOUSE: Numerous examples that I can highlight. We work extensively throughout the watershed with First Nations groups through the AFS agreement in the northern part of the watershed. We undertake joint, both adult and juvenile assessments, with the Carrier Sekani Tribal Council. I spoke about the arrangements that we've had with the NStQ, in the Quesnel system, partnering with external funding sources, Fraser Salmon and Watersheds Initiative, and an umbrella group that represents a collective of

First Nations in the upper portion of the watershed, the Upper Fraser Fisheries Conservation Alliance. I've been partnered in that project.

We've worked extensively with the Chilcotin national government in the Chilko system on both sockeye stock assessment at the adult and at the juvenile stages. We're working extensively with them on a Chinook program as well.

I can highlight numerous examples of additional collaborative efforts with First Nations throughout most of the rest of the watershed. We have a variety of different business models, depending upon the various capacities that First Nations groups have to engage in stock assessment work, and we're working to assist through participation both directly and indirectly in DFO-delivered projects.

We also had a substantial degree of interaction and work with groups other than First Nations, funding sources through the Pacific Salmon Treaty Southern Boundary Fund, have contributed in a substantial way in supporting stock assessment work within the Fraser, telemetry work, evaluating migratory success for Late runs, Summer runs, and Early Summer runs throughout the watershed. We've worked with Brian's group, the Salmon Foundation in evaluating new technology associated with assessing smolts, as we talked about earlier, the telemetry work.

There are additional linkages to groups like the Fraser Salmon Watersheds Initiative, which is another externally-funded -- well, DFO funds it, but it's managed by an external board in terms of priority identification, and we worked on calibration programs to assist DFO with a better understanding of the relationship associated with change in methodologies. I talked about a number of these things earlier.

And, finally, a substantial amount of work in association with academic institutes. In particular, Dr. Scott Hinch's lab at UBC, and his association with Dr. Cooke, out of Carlton University, who specializes in bioenergetics and fish migration. Our program has served as an essential springboard to facilitate a great deal of that research that has gone on, both in the main stem of the Fraser and the lower river, and

in the terminal areas where they've been investigating fish health and fish bioenergetics issues. So there's a great deal of integration in terms of the stock assessment components delivery, tapping into sources of expertise external to the department, and in attempts to develop capacity with other groups to contribute in a meaningful way to stock assessment.

It's a big job. There's a lot of work in managing these collaborations, but I think we get significant benefit out of them.

Q In terms of the collaborations with First Nations, you've referred to funding for those projects that DFO does with First Nations, being funded from the Aboriginal Fisheries Strategy. Just to link this back to my question and the questions you had from Ms. Baker about budgets and whatnot: Does that money supplement the stock assessment budgets that we've been looking at, or is that part of?

MR. WHITEHOUSE: It is a supplement. It has a specific purpose. Within the Aboriginal Fisheries Strategy, capacity-building is one of the specific objectives, and as we've heard, stock assessment is a specific aspiration, participation, meaningfully, is a specific objective for First Nations, and a number of groups have chosen, within their AFS agreements, to particularly target stock assessment as a capacity-building area. So that funding brings the capacity to allow people to participate in the projects where we would not have the money to treat our budgets as a training budget. So there has been substantial benefit to that approach in capacity development.

Q Thank you. Just segueing to - and you've already done it - but broadening the scope to collaboration with other partners, you referred to the Fraser Salmon and Watersheds Program, which, as I understand it, is a program that's got a number of partners, and I'll ask you about that, but I think it's run, and you can correct me, by the Pacific Salmon Foundation and the Fraser Basin Council. One or both of you, and perhaps Dr. Riddell would be well placed to respond to this: Could you just describe what that program is and what its objectives are?

DR. RIDDELL: Well, the Fraser Salmon Watershed Program

was a five-year program implemented in 2006. It builds on an initial grant from B.C. Living Rivers Funds for the province, and our share is about 12.5 million dollars. That money was then used to go to the Federal Government and seek matching funds, which they got five million in cash and five million dollars of in kind labour from staff within the Fraser Basin. The objectives of the program are to develop a more sustainable set of communities within the Fraser Basin -- sorry, sustainability of salmon in the Fraser Basin, so we work in agriculture, habitat restoration, water management, new assessment tools, and fisheries planning and governance. So it's fairly widely diversified. It is jointly managed by the Fraser Basin Council and the Pacific Salmon Foundation, and it's a major problem right now, because it terminates March 2011. And so we are in the last year of these funds. The program will be reduced, because we actually saved money to extend it one year, but there is no continuation of those funds agreed to at this time.

Q Thank you.

MR. WHITEHOUSE: Could I pick up on a point here?

Q Yes.

MR. WHITEHOUSE: I think it's important to understanding the ability of programs with limited time funding to actually meaningfully contribute to stock assessment objectives.

We talked about, earlier today, it's very important that we have consistency and long-term commitment to ongoing assessment when it comes to Fraser sockeye and all species. It's crucial.

One of the business models that has been forwarded as a way to continue with the delivery of a number of program aspects associated with stock assessment is tapping into sources like the Salmon Watersheds Initiative, like the Southern Boundary Fund. One of the real risks that creates is the short-term nature of those fundings. What happens, and we have to be quite careful in managing this, is the expectations created along the lines of what is doable with the resourcing available and what are priorities, because there is a potential cross-messaging that occurs when a short-term funding strategy comes in, injects some money into something that may be a short-term

priority, but then potentially is viewed as something that elevates in priority when that money goes away and potentially cuts into core funding. That's the importance of my stressing, earlier on, that there needs to be, for example, a commitment to making certain that that escapement monitoring is the core base and that we don't see that if the Salmon Watersheds Initiative goes away and has funded a program that is linked to hydroacoustics at Mission, that we then have to go and find a source within the internal funds to find that.

There are clearly strategic places where significant value added to short-term funding sources, but when you look at the short-term nature of them, by design there's a disconnect with what we need to support as the underlying foundation for stock assessment and salmon management assessment.

Q Dr. Riddell?

DR. RIDDELL: Well, Timber makes me think of probably an important point. I mean, the Salmon Foundation has one of the originators of the Fraser Salmon Watershed Program. We are talking to government about new types of funding, but we're not asking directly for more funding. And the reason for this - and obviously I'm sensitive to this from my background - but if there's a continuous reduction of funds, asking them for more money for fisheries work will very likely impact DFO. I'm telling people that I talk to in Ottawa that I would rather you put your money into stabilizing stock assessment so you have this core ongoing task, and just open up how we can raise money and we can do it ourselves.

Right now, there are a number of regulations that limit how I can raise funds to put into various salmon activities. If those were more flexible on how we could raise funds, I'd rather see government stabilizing the resources in a place like the Fraser sockeye, for example, or doing the early marine survival work in the Strait of Georgia, but right now it's, who do you take the money or give the money to? Within government, or do you give it to a non-profit?

Q Thank you. A question to both of you: Do you see more opportunities in the future for collaboration

between DFO and partner organizations, thinking of First Nations and Interior universities and other outside organizations, for freshwater ecology research generally, and stock assessment work, in particular? Dr. Riddell?

DR. RIDDELL: Absolutely. I won't make a joke, but, I mean, I've been talking to people for months about exactly that. Things have changed in the Interior. We have two universities, previously colleges, now fully-rated universities, that are required to do science, they're required to research to keep their status, and that's the Thompson River University, it's small but growing. Substantial money from advanced education program in the province.

For the first time this year, I spent a couple of days up in Prince George at UNBC. Excellent people there with wanting to work in freshwater ecology. And so we're talking about setting up - I'm saying "we" again, to confuse the Commissioner - but this time, sir, I'm talking about myself finding money through the Pacific Salmon Foundation working with the universities through NSERC, because they can apply for their science programs and with students, and the intention would be to establish a freshwater ecology centre at the old Quesnel hatchery.

And in Timber's area, in Kamloops, there is significant interest in working with students there on understanding the dynamics of Shuswap Lake. UNBC could be ideally suited to study the Stuart Lake system and what's limiting production of juvenile sockeye in that lake.

So I think we have great new opportunities for developing what I'm calling a network of common interests, and First Nations, clearly, are interested. I've even talked to the universities about a U.S. model. For years they called it the Fisheries Co-Op Program, and what they were is applied science through the universities directed to conservation and restoration of salmon and their particular interests on the west coast.

The aspect of that is you could have a fisheries or a salmon cooperative that is targeted at building capacity in First Nations right in their particular areas. You could do it through a networked university. You don't have to go to

Vancouver. And so I think we have opportunities, now, to build networks that we've never done before, and to draw in more money through multiple sources.

Q Thank you. Mr. Whitehouse, did you have anything to add to that?

MR. WHITEHOUSE: I agree with Brian's characterization. I think that the First Nations aspect of this is an important one. I think that we clearly, as we see the ability of these organizations to support science-based organizations, and this is one of the keys in making the connection, but stock assessment work is a science-based activity. When we see the move, and we're seeing it on numerous fronts and various degrees throughout the watershed, First Nations organizations able to support science-based programming, and it will only improve the ability to collaborate on project delivery and potentially extension through accession additional resources that can extend the ability of the programs overall to meet resource assessment objectives.

So I see that as very critical. I think the work that we're doing with the academic institutes has already demonstrated the potential value for strategic input, and I think the model that Brian has identified has real potential as well.

Q Thank you. My last question is about the future of stock assessment and specifically about the use of technology. You've spoken about DIDSON technology and the use of it, about sonic tagging and other things. Does the use of more technology provide opportunities for doing better and perhaps more cost-effective stock assessment work in the future?

MR. WHITEHOUSE: I'll tackle that initially from the perspective of spawning grounds. I think we've already got demonstration that new technology - and this is the DIDSON that I'm referring to - has a potential to allow us to estimate stocks to high level of precision more cost-effectively. It's important to understand, though, that DIDSON has a specific application. It isn't going to work everywhere. There are a number of places in the watershed you're simply not going to be able to overcome the issues of fish migration patterns, the configuration types of water, the mixed stock

nature for providing resolution down to individual spawning levels, that the technology will not be the panacea. It's not going to come in and solve all issues. We're not going to be able to avoid having large mark recapture high intensity, high cost programs throughout the watershed, but we will be able to make smaller incremental gains through the use of technology.

There is other technology, it's not particularly new, but it is being applied more and more; resistivity counters, different types of electronic counting gear that have the potential to aid in assessing more cost-effectively smaller populations to a higher degree of precision. It's mapping the information need with tools and the range of tools that you have.

When you start to extend to things like the tagging programs, they've already demonstrated radio telemetry is not new, acoustic telemetry is newer; both of them have already been able to assist in clarifying issues of migratory success of returning adults as they move through marine approach areas into the river.

When you couple telemetry with some of the projects that we've worked collaboratively with Brian and others on at Qualark, there may be alternate ways of understanding potential system bias associated with some of the tools that we use currently. So they have an opportunity to impact. There's nothing that looks like the sort of silver bullet that's going to answer all the questions, and we have to rigorously evaluate what kind of contributions these tools can make to our overall assessment objectives such that we are staying true to the management objectives within the system.

Q Thank you. Dr. Riddell?

DR. RIDDELL: Well, I agree with what Timber is saying. There will be a difficult transition, particularly under the MOU that was pointed out. There's always great hesitation to change how we're doing Fraser sockeye assessment. So, I mean, I think the reality is that you probably would have to have a targeted sort of five-year program to look at implementation and verification that it's just as good, and build some confidence in that program.

I think people have simply not spent a great deal of time looking at the scale of what that full implementation would be, because there simply is not reality of getting money to do that in the immediate term. If we thought we could really implement that and we had access to a few new DIDSONs and we could apply some of these technologies, including the lower cost resistivity counters. These are mats, basically, that you put on the floor of the stream and they do very well counting fish going across them. They have to be put in the right place, just like a DIDSON.

So there are clearly opportunities for us to apply technology. I think it would be cheaper overall, in the long run, but I do think you have an upfront cost that is going to be fairly substantial in initial capital and then testing.

MR. WHITEHOUSE: Could I flag one more thing, because Brian raised it earlier --

Q Please do.

MR. WHITEHOUSE: -- and I think it would be an omission not to flag it here, and that is biotechnology and its ability to help understand fish health issues. I think the work that Kristi Miller-Saunders is doing with genetic arrays, looking at the ability to understand fish health well away from the freshwater approach areas has significant ability to improve understanding of potential disease pathogens and their impact on production pattern, so we should also acknowledge that as a high tech issue, I think, technology.

MR. MacAULAY: Thank you, that's helpful. Thank you, Mr. Commissioner. Those are my questions.

MS. BAKER: Thank you. The next counsel is Tim Leadem.

MR. ROSENBLOOM: Mr. Commissioner, I understand that you want to adjourn at 4:15. I wondered if you'd be kind enough to reserve a few minutes before the 4:15 cut-off to discuss scheduling. I do have something I wish to raise with the commission regarding the future scheduling. Thank you.

MR. LEADEM: Thank you. For the record, Leadem, initial T., appearing as counsel for the Conservation Coalition.

CROSS-EXAMINATION BY MR. LEADEM:

Q I find that most of the questions that I was going

to put to you gentlemen have already been asked and answered. They dealt primarily with the Wild Salmon Policy. It's gratifying that other participants are asking those kinds of questions.

The one area that I wanted to focus on the Wild Salmon Policy was on Strategy 2, the habitat that you alluded to, Dr. Riddell. And I'm wondering if there's some linkages, Mr. Whitehouse, to some of the evidence that you gave earlier with respect to the juvenile fry assessment, where you were actually looking at habitat as well, and I'm wondering if that information can somehow be fed into developing habitat indicators for the Wild Salmon Policy so that we can actually have some cost-saving measures here?

MR. WHITEHOUSE: I'm not sure I fully understand the question, but I'll take a stab at it. I think there are, in association with a number of the assessment pieces, clear linkages to habitat. For example, incubation habitat and fry assessment programs understanding the coupling between capacity of spawning grounds to support productive incubation and understanding the relationship between spawner density and declines in production. There could be links that could establish whether or not we're seeing, if we were to assess in a systematic way fry production out of incubation habitat, there may be ways to link processes operating on river-type scales that would assist in understanding whether or not we're seeing processes that have eroded habitat capacity as opposed to representing density-dependant impacts.

But as I extend that into understanding the impact and the relationship between lake environment, for example, it gets more difficult because there's a much more broad suite of impacting factors development in addition to fish-related impacts. Broad indicators, nothing is leaping to mind to me right now with that respect.

Q Okay. I'll leave that.

DR. RIDDELL: Well, could I add just quickly? I think maybe you're touching on something that we've actually been talking about within the Fraser Salmon Watershed Program that we just referred to in the sense that the critical thing in the future

for Fraser sockeye, of course, is to sustain high quality water in the lakes, and so I think that a habitat indicator could well be shoreline development, road access, and simple things like this that measure the distribution of developments and cottages and what is the current effluent policies around the lakes.

Certainly, this year up at the Adams brought home to me very clearly that there was this significant debate in that area in the past two years about the development of a huge marina that would have butted up very close to the Adams River. I think that developments like that are not going to be good for the sustainability of some of these important stocks, and maybe we really need to look at targeting property acquisition. And it doesn't have to be government, because we have things like nature trusts that exist to do that sort of thing, where we could buy reserves and put in conservation easements. But we should be looking at critical habitats for these very important sockeye salmon, in particular, we're talking about. I think it could be more general to other salmon, but I think there are very close ties between Strategies 1 and 2.

In implementation of these, we see the Strategies 1, 2, and 3 as all being integrated in a sort of water, while really it's a conservation unit plan to look at the importance of habitat and how you have to manage it in the future.

MR. LEADEM: Mr. Commissioner, I'm mindful of the time, and I know we want to get going at 4:15. Perhaps I'll just cede the floor to Mr. Rosenbloom at this time.

THE COMMISSIONER: Thank you.

MR. ROSENBLOOM: Mr. Commissioner, I don't wish my remarks to be in the slightest interpreted as a criticism of the Commission counsel and their conduct in this section of the hearing; quite the contrary. I think the evidence has gone in in, obviously, a very professional way.

However, what is developing here is a situation where panels are being called, where cross-examination is sometimes embarked upon but not completed. We're ending up in a situation where this is, I believe, the fourth occasion

where a panel has been put over to another date for cross-examination. In the case of the Wild Salmon Policy, I was in the middle of a cross-examination that's been put off, and who knows when that might be carried on.

It becomes, obviously, a danger to this process where too many panels are sitting out there in orbit, waiting for instructions to land and to come back before this inquiry, and it puts a tremendous challenge on counsel, in terms of resuscitating their own interest, their own area of review of the file and the areas that they want to cover in cross-examination when there is this disjointed process where a panel tenders part of its evidence but the cross-examination takes place another time.

There may not be an easy answer to this. I totally respect the problems that commission counsel is facing in terms of panels that are upcoming that are committed to those dates that are being brought before this inquiry, some of them having to fly into town from other regions of the province, but I would ask the commission to really reflect upon how this habit, if I can put it this way, has developed, so that as of today, this is the fourth panel that I believe has been put into abeyance, where there will be cross-examination on some occasion other than with complete continuity, day-to-day, in succession, and it concerns me, and it will even more concern me if this continues where, instead of four panels we have five, six and seven panels. It puts a lot of pressure on, I believe, you, Mr. Commissioner, in terms of your continuity of understanding, and it certainly does of counsel in the cross-examination.

I simply wanted to put that to you. Thank you.

THE COMMISSIONER: Thank you, Mr. Rosenbloom. I can say that I am mindful of the concern you raise. I can assure you that no one is more mindful of that than is commission counsel, because they, too, have these pressures of trying to juggle the attendance of these witnesses. So thank you for your remarks. We certainly will keep it in mind and reflect upon it as we move forward into the balance of the hearings and the scheduling

challenges that we will face, no doubt, in ensuring that we can try to do as you're suggesting, which is keep the flow in a way that doesn't have witnesses under cross-examination out, as it were, from the witness box for days or weeks at a time. So I am grateful for your comments, thank you.

MR. ROSENBLOOM: Thank you. Could commission counsel inform us, as I'm sure you would have, in any event, when we might anticipate this panel to return for the completion of the cross-examination?

MS. BAKER: Yes, Mr. Commissioner, our plan for tomorrow is to start with Gord Sterritt, who has been brought down from the Interior and has been waiting to go on for a few days now, so I want to have him go up first thing in the morning. And I don't think his evidence will be very long, so I'm hoping that we can complete his evidence before the morning break, if possible. Hopefully that's possible. And then bring back the panel that we started yesterday, to complete that cross-examination.

Now, if my friends think that the cross-examination of that panel can complete before the end of the day tomorrow, we might be able to -- I've asked both these witnesses, they're able to be here tomorrow, but it really depends on the time that my friends will be taking with yesterday's panel to complete that cross-examination. So there the ball's in the air. If people can complete their cross-examination of the decision-making panel by three o'clock, depending on how much time they think they're going to need, or 2:30? I don't know. It's difficult to say, because I don't know exactly where people are going to land on that time, but these witnesses are able to come back tomorrow, and if that works with my friends' timing, we might be able to complete both the decision-making panel and these witnesses both tomorrow. But as I said, it's up to my friends as to their timing.

THE COMMISSIONER: All right. Well, Mr. Rosenbloom, as you can see, counsel will reflect on that overnight and look at the balance of the schedule going forward for the next couple of weeks and see just exactly where we can accommodate your

concern, which is to finish this panel as quickly as we can.

MS. BAKER: And I can also advise that our plan is to start on Monday with the different witnesses that will be addressing FRSSI, followed by over-escapement, and then bring back, on the 11th, the panel that was originally slated for tomorrow, so that would be the second decision-making panel.

We also have to find a bit of time for David Patterson's evidence, to complete that.

Now, we have 9:00 a.m. Tuesday, I believe, is a possibility that we had talked about, to add another hour.

THE COMMISSIONER: Yes, I have to check back with you on that.

MS. BAKER: Okay. So I guess we will advise counsel if we can --

THE COMMISSIONER: Right.

MS. BAKER: -- add some hours next week, but we'd be looking at possibly nine o'clock or possibly at the end of the day, but we'll have to just let you know, but those are our challenges for next week.

So I guess if people could talk to me at the end of the day about their expectations for the decision-making panel tomorrow, and timing estimates for these witnesses, we might be able to complete everything tomorrow. I'm probably overoptimistic, but hope springs eternal.

THE COMMISSIONER: Thank you very much. Mr. Rosenbloom didn't say it, but I know, Dr. Riddell, you've heard me say this before, but where we have a break and you're not back on the stand immediately, I have asked, respectfully asked, witnesses not to discuss their evidence until they've concluded cross-examination. It's a standard rule that I've used in the courtroom and I've decided to use it here as well. I know you'll accommodate me in that regard, and I'm very grateful for that.

Thank you very much.

THE REGISTRAR: The hearing is now adjourned for the day and will resume at ten o'clock tomorrow morning.

(PROCEEDINGS ADJOURNED AT 4:16 P.M. TO THURSDAY, FEBRUARY 3, 2011, 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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Diane Rochfort

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 Acaster

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

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Pat Neumann

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

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Karen Hefferland