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

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

Public Hearings

Audience publique

Commissioner

L'Honorable juge /
The Honourable Justice
Bruce Cohen

Commissaire

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Errata for the Transcript of Hearings on June 6, 2011

Page	Line	Error	Correction
45	34	brush first	brush fires

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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")
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No appearance	Métis Nation British Columbia ("MNBC")

APPEARANCES / COMPARUTIONS, cont'd.

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

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Vancouver, B.C./Vancouver
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June 6, 2011/le 6 juin 2011

THE REGISTRAR: The hearing is now resumed.

MS. BAKER: Thank you, Mr. Commissioner. It's Wendy Baker for the Commission. With me is Maia Tsurumi.

Today, tomorrow and Wednesday, we'll be dealing with the topic of freshwater urbanization, and we have broken this up into three different groups of witnesses. The first group today is Robie Macdonald - I'll get his pronunciation right - and André Talbot. Dr. Macdonald is from Fisheries and Oceans and Dr. Talbot is from Environment Canada. Tomorrow we will have Sylvain Paradis, Lisa Walls and John Carey. Again Dr. Paradis is from Fisheries and Oceans, and the other two witnesses are from Environment Canada. And with those witnesses we'll be talking about non-point source contaminants in the freshwater environment, and toxics research, et cetera. The last panel will involve two people from Fisheries and Oceans, Michael Crowe and Corino Salmi, from Habitat Management, and Stacey Wilkerson from the Province and we'll be dealing with physical impacts on freshwater environment and primarily focusing on riparian impacts.

So today I'm hoping to finish with this panel before the end of the day and start the second panel before the end of the day is my plan, because we have a lot to cover in these three days.

Before we start I do need to mark the PPR for this topic. It was circulated to all parties on May 11, 2011, and it's called "Policy and Practice Report: Overview of Freshwater Urbanization Impacts and Management".

THE REGISTRAR: That will be marked as PPR number 14.

PPR14: Freshwater Urbanization Impacts and Management, May 11, 2011

MS. BAKER: Thank you. We'll begin, then, with the swearing in of the two witnesses, please.

THE REGISTRAR: Please turn on your microphone, please. Good morning.

ANDRÉ TALBOT, affirmed.

ROBIE MACDONALD, affirmed.

THE REGISTRAR: State your name, please.
DR. TALBOT: André Talbot.
DR. MACDONALD: Robie Macdonald.
THE REGISTRAR: Thank you. Counsel.
MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER:

Q I'll start with you, Dr. Talbot. Dr. Talbot's biography is document number 19 on our list, if that could be pulled up. You are right now the Director of Aquatic Ecosystem Protection Research Division in the Water Science and Technology Division of Environment Canada, is that right?
DR. TALBOT: That's correct.
Q Okay. And this is you biography that's on the screen in front of you?
DR. TALBOT: That's correct.
Q All right. An affirmative answer to both questions. Could I have the biography marked as the next exhibit, please.
THE REGISTRAR: Exhibit 973.

EXHIBIT 973: *Curriculum vitae* of André J. Talbot

MS. BAKER:
Q And we'll just identify that you have a Ph.D. in Biology and Population Dynamics with an emphasis on modelling and statistical methods?
DR. TALBOT: Yes.
Q And you've been with Environment Canada since 2004?
DR. TALBOT: That's right.
Q Beginning as a Section Head for Effluvial Ecosystem Research and moving then to your current position in 2008?
DR. TALBOT: That's correct.
Q And your work over the years has included conservation biology, eco-toxicology, biostatistics, population dynamics and quantitative population genetics?
DR. TALBOT: That's right, along with a number of other

things.
Q Okay, thank you. And, Dr. Macdonald -- Dr. Macdonald's biography is under number 2 of our list of documents. Dr. Macdonald, you're presently the Section Head of the Marine Environmental Quality Section at Fisheries and Oceans Institute of Ocean Sciences in B.C.?
DR. MACDONALD: That is correct.
Q And this is your biography you see on the screen in front of you?
DR. MACDONALD: Yes.
MS. BAKER: Have that marked, please.
THE REGISTRAR: Exhibit 974.

EXHIBIT 974: *Curriculum vitae* of R.W. Macdonald

MS. BAKER: Thank you.
Q And you have done extensive research over the 35 years, which is all set out in your biography, but your focus has been on, as you identify, three major subjects: the cycling of organic carbon in the ocean, the cycling of freshwater in the Arctic Ocean, and contaminant pathways in temperate and polar aquatic systems.
DR. MACDONALD: That's correct.
Q Thank you. And how long have you been the Section Head of the Marine Environmental Quality Section?
DR. MACDONALD: I think it's approximately eight or nine years. I was an Acting Head for a fair period of that time.
Q During the eight to nine years you were an acting, or before that you were acting?
DR. MACDONALD: No, I was during the past two years, I think, I actually formally was sworn in.
Q Okay. Now, so I want to just ask a little bit about your research focus on dates and transport of contaminants. Can you explain what that is?
DR. MACDONALD: Well, as the *c.v.* says, I specialize in pathways, and when we release contaminants to the environment, they enter naturally cycling systems. Some of them are volatile, some of them tend to stick on particles, some of them like to go to organic systems. And so to understand the pathway part of this and the transport, you have to understand how the various systems move these around. The two great cycling fluids, water, the

oceans basically, and the hydrological cycle, and the atmosphere get into that and they will move contaminants long distances. And then within local sites they'll start to move through particular pathways, including food webs, which is really what puts them at risk to ecosystems.

Q All right. So this work that you do, it looks at large scale transport processes that can concentrate contaminants and maybe put ecosystems at risk; is that right?

DR. MACDONALD: It looks at large scale but also small scale. There are many ways that contaminants get concentrated and I'm interested in all of those.

Q Can you tell us what phenomenon, physical phenomena, like biomagnification or migration, how do those -- what are those concepts and how do they relate, or are they relevant to Pacific salmon.

DR. MACDONALD: They are very relevant to Pacific salmon. For many of the contaminants we put out into the circulating systems, like PCBs, their concentrations are very low in water and atmosphere. So it requires some kind of process to concentrate them to make them a risk. And animals themselves can be part of this process. And, for example, the concentration of a PCB in the water, compared to what it might be in a top predator, can be a factor of a million or more higher, right, in the predator.

So what happens is when animals feed in trophic systems, they are basically transferring fat from lower levels to higher levels. And with the fat they tend to transfer fat soluble contaminants like PCBs and PBDEs. So they get concentrated as you go up the food web. They get concentrated initially because they like to transfer out of the water into the bottom end of the food web, like phytoplankton, and then when zooplankton eat the phytoplankton they metabolize some of the fat, but they maintain the organo fat soluble contaminants. And this goes on up into the zooplankton, into fish, and then into those things that eat fish. And salmon are seated about trophic level 3 in the middle, so they're not the worst exposed, but they're certainly accumulating these contaminants as they feed in the ocean to levels that are easily detectible.

Now, the other part you've talked about in transport, salmon have this particular property of congregating in the same place. So what happens is these salmon all go out to sea and feed and accumulate their body mass, and they accumulate contaminants, and then they come back to a particular lake or natal stream. And so there might be a million fish that come into a particular lake, and there could be 40,000 of these per hectare. They spawn, they die. So the contaminants they bring back that way can sometimes exceed the contaminants that deposit in the system to start with from the atmosphere.

Q Thank you. We understand that there was a Toxic Chemicals program or mandate in the early part of the 2000s and prior, within DFO. Was that changed in 2004/2005?

DR. MACDONALD: Yes. We went through a couple of program reviews, 2005 and 2006 was a program review, and at that time the toxics program that we had was clearly headed for a change. And we were tasked at a meeting in Ottawa to prepare for white papers on what the next Toxic Chemicals program would or could look like, and four papers were produced in the end of the day, I believe. And these would suggest a new focus on toxicity to fish, but really lose the pathway work.

We had a funding, an ESSRF fund at that time, or before that time, that was proposal money that annually we put proposals in and we did reviews of work we had in progress, and those funds disappeared at that time.

Q Right. So that ESSRF, that's the Environmental Science Strategic Research Fund?

DR. MACDONALD: That's correct.

Q And that funded research within DFO on the types of things that you're talking about?

DR. MACDONALD: That's correct. It was distributed across DFO and it basically supported a toxic chemicals perspective and we would all put proposals in, and in Ottawa there was a vetting process that tried to make sure the funds were distributed on high priority proposals, and with some equality across regions.

Q And so was contaminant work relevant to the Fraser system funded through that fund?

DR. MACDONALD: Yes, there was some work that was

funded through that. In fact, I think the salmon transport work I mentioned, we got funds to do part of that.

Q Okay. When that fund was eliminated in -- what year was that, 2005?

DR. MACDONALD: I believe it was 2005, yes.

Q What funding came in to replace that?

DR. MACDONALD: Within DFO, none, really. We depended on other external funds. There were pesticide funds that came in a different pot, and myself, I depended on things like Northern Contaminants program, which is Arctic funds.

Q Okay. As part of the changes to the Toxic Chemicals program, were labs of expertise created within DFO?

DR. MACDONALD: They were created in a sense. We already had the labs, really, but the perspective was to develop these labs into -- into particular labs that would be used across Canada. So prior to that we had regional labs and we did our regional work, and the notion here was to render it down to having labs that would cover all of the toxic chemicals that we had an interest in, and have these distributed in different places for the sake of efficiency. So one was held at the Institute of Ocean Sciences, and that was an organic lab.

Q That's your lab?

DR. MACDONALD: That's our lab. Another one was held in Quebec. It was a combination of an organic lab, but they had lower resolution in the organo context, and they also did the metals work. In addition to that, we had a pesticide lab at Winnipeg. And we had what was called COOGER, which was a hydrocarbon lab at BIO, and we also had a radionuclide lab at BIO. Those were longstanding labs that were -- I don't believe they were part of LEACA.

Q I'm sorry, what's BIO?

DR. MACDONALD: Bedford Institute of Oceanography. So in fact within the Department of Fisheries and Oceans we had lab expertise to do pretty well all the contaminants.

Q And how did that changing of the labs fit in with the new mandate for toxic research?

DR. MACDONALD: Well, it gave us certainly a lab facility to do the analyses, and we got high

quality analyses in that way, and that was clearly available. And certainly if we had -- if we could attract funding to do toxic chemical research on toxicity to fish, with a broad definition to fish, then we could use these labs to send our samples to, and there was some savings in the cost in those labs because we were charged only operating expenses to do analyses, which made them fairly cheaper inside DFO than it would have been to go to a contract lab.

Q All right. In your view has access to lab facilities improved for DFO, given this change in the structure?

DR. MACDONALD: I would say yes. I think that the lab system did improve. Certainly the access to it across Canada was better, and it was much more transparent, so I think it was an improvement.

Q Okay. So before we were talking about the labs, we were talking about funding, and you identified that there was no new fund created to replace ESSRF. So where do contaminant researchers within DFO get their funds now?

DR. MACDONALD: Well, they get them by putting proposals into other programs that come along. IPY would be an example, although IPY really didn't do contaminants --

Q What does that stand for?

DR. MACDONALD: The International Polar Year, they put a lot of money in, starting in 2007, to do Arctic and Antarctic work. Contaminants were not a big part of that, but that would be one source. There was a pesticide fund, so that was also a possibility. You could do collaborative work with industry, so we get some funds in that way, as well. So basically it was looking for places you could put a proposal in, or partner with other organizations, or through universities. There have been networks are created in Canada to do research. These are cutting-edge networks. One of them is ArcticNet, and again you can do work through that. So basically it was finding funds outside of DFO.

Q Okay. And so does it mean that the DFO contaminant researchers are now essentially supporting other research priorities within the Department at large, or within other Departments in government?

DR. MACDONALD: That's certainly a risk. I think most of the scientists try to find a win/win position, but for sure when you do get money from another pot somewhere, it usually has some mandated mission, and that might not align exactly with DFO's mission.

Q So have there been changes then in how -- what research is done in the Fraser system since the changes were made to the toxics program in 2005?

DR. MACDONALD: Yes, I would say so. As I mentioned earlier, the pathways work has been dropped officially from the system. So you can't really do that within DFO. Toxic chemical work you can do, but again, you have to find the funds somehow. And there have been various places that have come and gone to do that.

Q The phenomena that you were describing earlier, which is the transport of salmon back to their natal lakes and contaminant accumulation that results, is that part of a pathways research that's no longer -- that you would no longer have any funding to do research on that aspect?

DR. MACDONALD: Strictly speaking, by itself, yes. It would be -- it's a pathways piece of research, we did not connect that to the toxicity, to the fish.

Q Okay. What funding is available for non-point source contaminants research? How do you do that?

DR. MACDONALD: You mean specifically like long-range transport?

Q Anything like that, yes.

DR. MACDONALD: Again, most of the work that I've been involved with has been Arctic work, because we've had a Northern Contaminants program that has been mandated to look at contaminants in the polar ecosystem and health effects on humans. So they have been initially very interested in pathways and latterly more interested in human health. That in the Arctic, local contaminants and point sources are much less an issue, so they really are focused on long-range transport. So that's where we've gotten a lot of our funding.

Those ecosystems are really set up no differently than ecosystems in the Strait of Georgia. So that what we've learned up there doesn't hurt us in understanding the Strait of Georgia, except that you might anticipate that being close to industrial and temperate

agricultural sources, the Strait of Georgia is probably even more impacted by these kind of contaminants.

Q And that non-point source research in the Lower Fraser area is not being worked on right now by DFO?

DR. MACDONALD: Not really, no.

Q If I can ask you to turn to a couple of emails that are in the materials. Start with Tab 4. This should come up on your screen in a minute. It's in the binder at Tab 4, if you want to follow it there. So this is an email from Robin Brown. Now, who is Robin Brown?

DR. MACDONALD: Robin Brown is presently my boss, and he's the Division Chief for Ocean Sciences, the Ocean Sciences Division in the Institute of Ocean Sciences.

Q Okay. And he's writing this email to Laura Richards and others, and you are copied with this email, so you've seen it before?

DR. MACDONALD: Yes.

Q Okay. And the "re" line is "Effect of Pesticide Spraying on Pacific Salmon", and if you look at paragraphs 1 and 2, this identifies -- well, if we look at paragraph 2:

> This is an area of complex jurisdiction. Health Canada/PMRA...

That's the Pesticide Management Agency; is that right?

DR. MACDONALD: That's correct.

Q

> ...regulates the use of pesticides. [Environment Canada] focuses on "point source" deposition of deleterious substances under the ***Fisheries Act***. DFO worries about more subtle ecosystem impacts of (primarily) non-point sources (like surface run-off) and complex mixtures of contaminants that are poorly addressed with [Environment Canada's] primary emphasis on point sources. This is exactly the kind of problem that is likely to slip through the research and regulatory "cracks".

And is it fair to say then that this pesticide

spraying, the effects of pesticide spraying on Pacific salmon is that kind of non-point source contaminant impact that's not presently being researched by DFO?

DR. MACDONALD: We have some research on it, because Peter Ross is working on this issue from a fish toxicity perspective, but we certainly don't have a large program on it.

MS. BAKER: I'd like that to mark, please, as the next exhibit.

THE REGISTRAR: Exhibit 975.

EXHIBIT 975: Email thread between R. Brown and L. Richards et al, re Issues Management - Effect of Pesticide Spraying on Pacific Salmon, ending November 19, 2008

MS. BAKER:

Q And the next tab, Tab 5, is an email again from Robin Brown to Kate Ladell. I think you were -- you're aware of this email, you've seen it before?

DR. MACDONALD: I think I've been shown this in our discussions, but it was not copied to me.

Q All right. It says, the first paragraph that Robin Brown, first full paragraph, says:

> This is an area of "tension" --

Oh, sorry, the "re" line is "Impacts of copper on salmon", and it says:

> This is an area of "tension" between [Environment Canada] and DFO. DFO has largely withdrawn from the 'contaminants research' field (at least on paper - there are still internally subversive elements at work and I leave it up to your imagination to decide where those elements might be located).

The first part of that sentence, that there's a tension between DFO and Environment Canada and that DFO has withdrawn from contaminants research in this area, is that consistent with your understanding?

DR. MACDONALD: Yes. I would agree that the tension was that DFO had withdrawn from certain components

of looking at contaminants, pathways being one of them, with the notion that Environment Canada was going to pick these up. But I think Environment Canada wasn't on the same page there, because they were not necessarily given resources to pick things up, and some things they were doing but some things they weren't doing, and I don't think they picked those up. So there was an inter-departmental disagreement, I think, on what was being given over and what was being taken over.

Q And then the third paragraph, third full paragraph, the very last line says:

> There is a pretty large gaps (sic) between what [Environment Canada] is prepared to do and what DFO is prepared to do, and this gap is largest in the marine environment.

And you agree with that?

DR. MACDONALD: I would agree with that, yes.

MS. BAKER: Could I have this marked, please, as the next exhibit.

THE REGISTRAR: Exhibit 976.

> EXHIBIT 976: Email thread between R. Brown and K. Ladell et al, re Questions re Impacts of Copper on Salmon, ending June 10, 2010

MS. BAKER:

Q Is there a coordinated approach within DFO as to what contaminants work will be done across the country?

DR. MACDONALD: Not really, not since we stopped our ESSRF proposal meetings in Ottawa annually, and having proposal reviews. I think DFO has drifted apart since that time. We have a notion of what we do in region, and if scientists work together, as we did on a polybrominated diphenyl ether paper that we wrote, other than that we tend to work in our own selected regions of interest and not so much with the others.

Q So could you explain again how the ESSRF fund worked to coordinate research interests across the country?

DR. MACDONALD: Well, there was a requirement -- there is a funding pot that you could put proposals in annually, and you would do this with certain

rules. There was some gate-keeping on it that said what kind of proposals would be looked at, and the division of kind of emphasis on targeted items, for example, toxicity versus pathways, and these proposals will be collected together and we'd have a meeting in Ottawa to go over them and vet these proposals to rank them and come up with some view on how the next year's money would be split between regions and what they'd work on.

We'd also have from time to time meetings in Ottawa that were program reviews, where we would get up and we would present our findings. So with those two kinds of processes, we had a communication that was Canada-wide and within DFO, so we had a pretty good notion about what other people were doing and proposing. And indeed there was some encouragement, I think, too, where appropriate, for regions to work with one another on a problem. For example, the St. Lawrence is part Maritime, part Quebec, and so there's an interest for both parties to collaborate.

Q And that, as I think you've just described, that process is no longer available to you with the dissolution of the ESSRF?

DR. MACDONALD: That's correct.

Q Okay. Is any environmental monitoring being done as part of the contaminants research that is still being done by DFO?

DR. MACDONALD: It depends on how you define "monitoring". In my definition, the answer is no. We make measurements on things as part of proposal work. Sometimes you have funding for one to three years and you might collect a set of time series data by doing this, but it can't be called organized monitoring.

Q Okay. Was baseline monitoring done by DFO in the past in the Pacific region?

DR. MACDONALD: For toxic chemicals, not really. There was some -- there were ad hoc things done for some chemicals, and one can hind-cast the time series by using archived samples. But I don't recall any deliberate strategy to collect time series data for contaminants and fish, for example, or seals.

Q Is it your view that monitoring is important -- monitoring for contaminants in the Fraser River system is important from a science or research perspective?

DR. MACDONALD: Yes, absolutely. Monitoring has from time to time had a bad connotation in science, that some people think it's not science and don't like it. But I think monitoring is one of the ways that you can actually see what's happening in the environment. And you have to be frugal with your funds, and so you target things. But I think it's crucial to maintain a watch on your resources and monitoring is one way you do that.

They've recognized this as a central element in the Arctic and the Arctic Monitoring and Assessment program and the Canadian Northern Contaminants program have both had long-term vested interests in monitoring. That monitoring is connected to the research that's done, and those two together help very much to assess what trends are, why things happen, when they happen, and who does it.

Q Does it also help to evaluate the success of a regulatory regime?

DR. MACDONALD: Yes. Very clearly it's a way of looking at what the performance is. Sometimes surprises come out of that, because if your regulation is not appropriate to the contaminant source, nothing happens, or there are other components in the environment that cause things to go awry. So you have to have a fair amount of environmental understanding to understand exactly what means your monitoring results. But having said all that, very often monitoring is really the key tool to tell you whether your regulation has had some effect that you wanted to make.

Q And you had mentioned earlier sediment sampling and can you explain how that works, and what its usefulness is?

DR. MACDONALD: Well, you talk to the heart of one of the things I like to do. If you don't have monitoring in place, and often we don't, because sometimes we wouldn't be aware of what to monitor for, and sometimes early in our chemistry we might not have tools adequate to monitor, in other words, we didn't have detection limits or sensitivity. But there are archives out in the environment that naturally assemble records. Sediments are one of those archives.

So if you think about how sediments accumulate, each year a certain amount of new

sediment is dropped on top of old sediment, and many contaminants are very sticky. They like to go to particles. PCBs are one such. PDBEs, the flame retardants, are also like that. And so what happens is these sediments, while they're accumulating, are accumulating a record of their exposure to contaminants. So if you measure, if you collect a sediment core, and you date it with radiometric dating tools, and then you analyze the sediments for a suite of contaminants, you can very often hind-cast what's been going on in the contaminant exposure.

We did exactly that with the dioxin and furan business that we had in the early '90s. We had this sudden emergent chemical nobody knew what had been happening with it. We collected several sediment cores, dated them out, and then we could say very clearly these things started coming in when chlorination in pulp mills started, and we could see the rise of them, we could even see the effect of the first year in the decline. We saw the whole story with those. So sediments provide a monitoring tool.

Q And is that sediment sampling that you've just described, something that there's expertise for within DFO in the Pacific region?

DR. MACDONALD: Yes. There's expertise for that in all DFO regions.

Q Okay. And is there a difference in how that's done in a marine environment versus a freshwater environment?

DR. MACDONALD: There can be very much. Freshwater environments, and people generally target lakes and lake sediments. Lakes are oligotrophic, they tend to be to be -- they tend to be not very productive, so they don't have a very large carbon cycle compared to the marine systems. What that means is that sediments accumulating in lakes often don't get mixed. They accumulate very nicely and they form very stable records, so you can set years of sediments against the contaminants. And so you get a very clear record. And in some lakes you get varved sediments. That is, there's actual annual layers and you can go down to annual.

In the marine systems, frequently there's enough organic carbon and benthic activity that

the sediments get mixed on the surface. So that kind of smears your record. You can recapture that record by modeling it. But the tools to model it and the understanding of marine cores is quite different than freshwater cores, just for that context alone. The other context is that there's a lot of salt in marine systems and you have to worry about that in the analytical part of it, but I think we understand that one pretty well.

Q Do you know what environmental water quality monitoring is currently being done by Environment Canada in the Fraser?

DR. MACDONALD: I was shown the -- they have a report there, and I was shown a particular document that paged out what they were monitoring, yes.

Q Okay. I'm going to take you that. That's Tab 8, then, this is an email that summarizes what contaminants are being monitored in the Fraser system. That's an email, it was actually produced by Environment Canada as an assembly of information for the Cohen Commission. And you'll see at the bottom it says "Core monitoring parameters" and that actually goes over to the next page, as well. All right. Is that what you're referring to, or you're remembering?

DR. MACDONALD: This one partly, and also there was a table with a list of things that they measured in rivers, in freshwater going across Canada, in fact --

Q Okay.

DR. MACDONALD: -- by province.

Q Is that in the freshwater quality indicator document?

DR. MACDONALD: I believe it was.

Q Tab 24. And then if you turn to page 15 of that document, it sets out parameters used across the country. That's probably not going to be 15 on Ringtail. Yeah, it's two pages further. There.

DR. MACDONALD: Yes, that's the table there.

MS. BAKER: Okay. So if I can just go back to Tab 8, which is the email that has the summary of what's relevant for the Fraser system. Reviewing this email, are any of these --

MR. LUNN: Do you want the --

MS. BAKER: Yes, all the parameters there. Stop there. Yes.

Q Are those parameters useful for the work that your group would do in contaminants research relevant to Pacific salmon?

DR. MACDONALD: You might describe them as necessary but not sufficient. These are what you'd call the pulse and blood pressure of rivers, most of these. In other words, they tell you about the general functioning. There's a certain amount of nutrient work being done there, nitrogen and phosphorus, and that tells you whether you've got a eutrification problem, or, you know, in other words, is this river behaving normally. It's got temperature, and these are things you'd like to know.

But like blood pressure and pulse, these don't tell you really anything at all about the contaminants we're talking about, the biomagnifying accumulating contaminants, for example, PCBs. You would get no information on those exposures. You would get no information on pesticide exposure. You wouldn't know anything here about mercury uptake, for example. So none of those kind of contaminants that really concern us, and pharmaceuticals, et cetera.

MS. BAKER: Could I have that email marked, please, as the next exhibit.

THE REGISTRAR: Are you referring to Tab 8?

MS. BAKER: Yes, Tab 8.

THE REGISTRAR: Yes, that's 977.

EXHIBIT 977: Email thread between B. McNaughten and J. Carey et al, re Urgent - Sockeye Inquiry and databases, ending March 16, 2010

MS. BAKER: Thank you.

Q Are you aware of any work being done by Environment Canada in B.C. and in the Fraser system on contaminants?

DR. MACDONALD: We have some collaborations with people in Environment Canada to do contaminant work, and they provided us with data. So I know they have made measurements on water, PCB, for example, partly at our request that they do so. We've partnered these things up. I know they've had a large program, they've measured a lot of things like PAH's, polyaromatic hydrocarbons. So there

is some work being done in freshwater environment.
Q Are you aware of a buoy that's monitoring water quality in the Fraser estuary?
DR. MACDONALD: Yes.
Q And do you know what that is, what it's monitoring?
DR. MACDONALD: I don't remember the exact shopping list.
Q This is something that your group has used in their work?
DR. MACDONALD: We might use it, again as background information, the same as we'd use this, but it wouldn't really help us with the contaminant business. It's not a way that you can do PCBs or pesticides or other contaminants of interest.
Q Is there any agreements right now between Environment Canada and DFO on monitoring in the Fraser system that you're aware of?
DR. MACDONALD: None that I'm aware of.
Q I'm just going back to the toxics program and the refocusing of that program in 2005. Toxicology remained with DFO, toxicology of contaminants on fish; is that right?
DR. MACDONALD: That's correct.
Q Okay. And is that toxicology work sufficient to provide advice for regulators on contaminants?
DR. MACDONALD: No. You could provide some advice. For example, if you found certain contaminants passing toxic thresholds, you might red flag those and write a briefing note to your management and say "We've got a concern with PCBs." You would really be not able to say why you had that.
Q What about this -- we've heard before in these hearings about L50 tests, lethality tests. Are those appropriate for migratory fish?
DR. MACDONALD: Well, it depends on the context of the question. The L50 tests, or these toxicity tests are what I -- I'm not a toxicologist, and I should be very clear about that, but I call them a belly-upness kind of test: does this kill the fish. The contaminants that we're talking about, and the stresses on fish themselves in their lifecycles, isn't really about belly-upness. I mean, I think we know very well when we have a spill of something and we kill a lot of fish. We've seen that and that was certainly something we saw a lot more of in the 1950s and '60s, and we understand

that pretty well.

What we're talking about here is sub-lethal effects, things that affect endocrine development, that affect immediate immune function, affect olfaction, for fish, and these are very subtle. They fly under the death radar. You're not going to see them show up in an L50. And yet they may be every bit as risky for the fish and their lifecycle as these things that kill them on the spot. What happens, and we have one case from New Brunswick, well, some research done by Wayne Fairchild, that showed exposure to nonylphenol in the river didn't kill the fish outright. They went out to sea. They just did not come back.

Q And was that research that you're referring to, did that have a regulatory impact ultimately?

DR. MACDONALD: Yes, I think it did. I mean, the -- it was a very nice piece of science work, and I think they learned a lot out of that. And of course they realized that the nonylphenol, which was actually not the pesticide, it just carried the pesticide, was something that they would not want to be spraying in the drainage basins at sensitive times in salmon habitat.

Q Does the toxicology work that is now being done by Fisheries and Oceans address the cumulative effects of contaminants or non-lethal, sub-lethal effects of contaminants?

DR. MACDONALD: Could you clarify what you mean by "cumulative"?

Q Does it address the effect of multiple contaminants being received by fish or contaminants being received over various stages of the lifecycle of the fish?

DR. MACDONALD: No, it does not do that. And these are very difficult topics, but -- and are really the topics at the heart of whether or not these contaminants have an effect. But, no, we don't.

Q Dr. Talbot, you've been sitting there without a question to answer, so I'm going to throw a question your way now. Do toxic chemical and contaminant scientists or managers within Environment Canada sit down with their Fisheries and Oceans counterparts to discuss what work Environment Canada is going to be doing on contaminants, and what work Fisheries and Oceans is going to be doing?

DR. TALBOT: Yeah, not to my knowledge. The communication on work planning is more ad hoc, where either managers that have an issue in common, or scientists have an issue in common will come together and will discuss how to work on a specific issue, how to collaborate. But to my knowledge there's no formal process to do that between DFO and EC.

Q And, Dr. Macdonald, do you have any different perspective on that?

DR. MACDONALD: My perspective would be more at the scientific level, and again the word "ad hoc" would come up.

Q And, Dr. Macdonald, is there a coordinated approach within Environment Canada as to work being done that's relevant to fish health in the Pacific, just to bring it closer to home here.

DR. MACDONALD: Not that I'm aware of. We collaborate with them, as I said, on an ad hoc basis, and some work we've done together with people, with scientists in Environment Canada, based on programs, the Fraser River Action Plan was one such, but it's not an organized thing.

Q Now, your section, Marine Environmental Quality Section in B.C. does provide some science advice on contaminants that affect Pacific salmon still; is that right?

DR. MACDONALD: That is correct.

Q And if that work stopped being done by your section, is there another branch within Canada or Department within Canada that would pick up that work?

DR. MACDONALD: None that I know of.

Q Dr. Talbot, is it work that you think would be picked up by Environment Canada?

DR. TALBOT: Could you repeat the whole question just so to be clear.

Q Sure. I was asking Dr. Macdonald if his section, the Marine Environmental Quality Section stopped doing the science advice on contaminants work relevant to Pacific salmon that it's presently doing, if that worked stopped being done by the Department of Fisheries and Oceans here in B.C., would it be picked up by your Department anywhere in Canada?

DR. TALBOT: Likely not. The work that we do tends to focus more on contaminants and their potential

risks to the environment. We don't really focus on a species, such as a salmon, and particularly not if they're in the ocean. It's not strictly part of our mandate. So for us to pick up this kind of work, we would really have to go back, up to a policy level discussion and determine if that becomes an issue for Environment Canada to get involved in. At this point it's considered to be a DFO mandate issue within Environment Canada.

Q Thank you. Dr. Macdonald, at Tab 11 of the materials, there's an email from Peter Ross to Jocelyne Hellou. Who is that, Jocelyne Hellou?

DR. MACDONALD: Jocelyne Hellou is a research scientist at the Bedford Institute of Oceanography. She works very much on toxicity and metabolic pathways of organic compounds, polyaromatic hydrocarbons is one such, but she also works with organochlorines.

Q Okay. If you move to the second page of this email, this is a correspondence between her and Peter Ross, and it's outlining some of the difficulties in understanding which Department is doing what research. And if you see, almost at the bottom of the page that you see on your screen there - stop moving the screen - okay. Let me count off again, four bullets up or so, there it says:

> - there has been no clarification between DFO and [Environment Canada] as to which agency is responsible for conducting contaminant/effects work in aquatic/marine environments, such that no agency presently admits responsibility for this activity.

And that, I take it, you would agree with that?

DR. MACDONALD: Yeah, I would agree with that view.

Q And, Dr. Talbot, is that also something you would agree with?

DR. TALBOT: I think there's a lot of subtlety here. It's difficult. It depends what they mean by "this activity". I'm not familiar with the email. I would have to look at it fairly carefully. But we do have a prioritization process for our work, and that prioritization process might include some of the work, you know, that would concern sockeye in the Fraser River in a broad sense. Particularly with respect to contaminants of

interest for the discussion, or conditions under which those contaminants are found in the environment and their sources.

Q What about in the marine environment?

DR. TALBOT: The marine environment we would -- again we do some work, it's of limited jurisdiction, or it's limited capacity right now, simply because of availability of funding to do that.

MS. BAKER: Could I have that marked, please, as the next exhibit.

THE REGISTRAR: Exhibit 978.

EXHIBIT 978: Email thread between J. Hellou and P. Ross et al, re Cohesion, ending November 7, 2008

MS. BAKER:

Q If I could ask you to turn to Tab 13, it's another email with Jocelyne Hellou. It's from you, Dr. Macdonald, to her. And you'll see the embedded email which is from her to Robin Brown and you're copied on it, and she says here in the second paragraph:

> Government research should also be preventive, discover potential problems before they arise. This is what the handful of "toxic chemicals" researcher should be funded to do. I will let you decide if we should have an exchange about that. Robie was going to but seems to have changed his mind it seems.

And then you respond and you identify that you're:

> ...still a strong supporter of a healthy contaminants program within DFO both in terms of analytical skill and ability to focus on leading issues of importance to fish.

Can you explain what that dialogue is referencing?

DR. MACDONALD: Well, I think at this time, this is written in 2009 here, we had had this toxic chemicals review and we had been tasked to produce white papers, and we had produced those and they had gone up the system. The money had disappeared from DFO and the contaminant people working in the

system here felt abandoned, I mean, they did. And emails like this came to me to say, you know, what's happening here, what are we supposed to do? And basically the mandate was it's toxic chemicals, go find its toxic effects and find your own money.

So there was a bit of a groundswell to say it's not unlike the mice that were looking around for somebody to tie a bell on the cat. And what they felt was that somebody should go to a high level in Ottawa and raise this issue. In other words, Wendy Watson-Wright, you know, the ADM, or at that level, and say, "We have a contaminant community. They've got a history of expertise. We've asked them to turn a corner, and they're floundering a bit because they need some direction, and maybe we, you know, is money going to come back as was not promised, but at least that was a conclusion that was possible, but there was a lack of communication downward on it, to the various players."

And so as the person that would perhaps face this problem, I got selected for a number of reasons, one of which is I'm a senior, another of which is which I'm so senior that I'm retireable, so that if I got in trouble it wouldn't matter, and I was perfectly happy to do that. But as I noted here, I think timing was important, and we were going through a new budget right at that time, and I said, "You know, this -- management's got a lot more on its plate than this. And we want to come out with a well-phrased, well-formulated question to them." I also didn't want to just give my opinion on this. I had communications with people when I was at meetings and that, and said that this is a community thing and I expect everybody would contribute to this conversation, and I would be willing to take our community view in a respectful conversation with management and see where got with it.

Q And what ultimately happened?

DR. MACDONALD: Wendy took a job over in France, I think. Nothing happened on it.

Q Yes.

DR. TALBOT: Yeah, if I can jut add very briefly to that. We have to be fairly careful with these kinds of emails. Scientists, when there are

changes to priorities and as programs are maturing, sometimes their sources of funding or their directions will change, and there's always a natural reaction of pushing back and saying, "Well, my work is extremely important." And a lot of these emails occur when there's a transitions phase, you know, as programs mature. And some of these are questions to management. While the prioritization, and I think we're probably talking -- I'll be talking about that maybe a little bit later on, prioritization is both a top-down and a bottom-up approach, where we have -- where management will determine what the priorities are for programs and direct its scientists to focus on those.

Q Thank you. So I have just a few more questions for Dr. Macdonald, and then I am going to be moving on to Dr. Talbot -- or, sorry, yes. I should mark that as the next exhibit.

THE REGISTRAR: Exhibit 979.

EXHIBIT 979: Email thread between R. Macdonald and J. Hellou et al, re Environment Canada ban on DecaPBDE - NOAA Concerns, ending April 2, 2009

MS. BAKER: Thank you.

Q Dr. Macdonald, is measurement of contaminants a useful thing in supporting ecosystem-based management?

DR. MACDONALD: I think it's certainly a necessary tool, yes.

Q Why?

DR. MACDONALD: Contaminants have been shown to cause ecosystem health problems. So if you're not measuring them, you're missing a piece of your ecosystem health.

Q And in your view, does Environment Canada have the capacity to do contaminant fates and transport and pathways work in relation to Pacific salmon?

DR. MACDONALD: They haven't had the interest and I don't think they have exactly the expertise to do it. The expertise to do the marine side toxic chemical work really resided in DFO, in my view. So I think it was a DFO specialty.

Q And, Dr. Talbot, what's your view on that? Does Environment Canada have the capacity to do

contaminant fates and transport, pathways work in relation to Pacific salmon?

DR. TALBOT: Environment Canada does have a substantial capacity to do fate and transport research on contaminants, and we do, it's part of a central mandate of my division under Water Science and Technology. We would be particularly capable of doing that type of work on freshwater fishes. As the work concerns marine species, we don't have the exact expertise, and we would have to develop some expertise in this area where we would need to understand mode of action of contaminants in saltwater fishes. And that really hasn't been our mandate or our interest in the past.

Q And I guess I'll ask both of you, as well, starting with you, Dr. Macdonald, does Environment Canada have the capacity to do toxicology work on Pacific salmon, in your view?

DR. MACDONALD: They have capacity to do toxicology work because they do it, they have labs in Burlington, and they've done such work. They have not been doing it with Pacific salmon, and I think, given the expertise on genetics and other things on fish lives, on marine fish lives, which resides in DFO, if they did do it, they would be better served to do it in collaboration with DFO scientists.

Q Including the scientists in your department?

DR. MACDONALD: Yes.

Q Such as Peter Ross?

DR. MACDONALD: Such as Peter Ross.

Q And, Dr. Talbot, do you have views on that? Does Environment Canada -- or do you want to add to what Robie Macdonald just said?

DR. TALBOT: Yeah, Environment Canada, and especially Water Science and Technology, does have the expertise and a substantial amount of expertise on toxicology work for many living organisms, all the way from salmonids to very primitive forms of life. Again the work is -- the type of work that we would be doing on Pacific salmon would be somewhat outside of our mandate or interests at present, because of the responsibility for anadromous fish relying on DFO, and this is the way Environment Canada has interpreted the mandate.

We would be capable of doing toxicological

work on many salmonids, particularly in freshwater phases. It would be more difficult for us in our -- given our expertise and our facilities to do work on saltwater phases or saltwater fishes.

Q And what about -- we might have touched on this already, but maybe I'll just ask it to both of you. Does Environment Canada have the capacity to do research on non-point source contaminants in marine systems. Dr. Talbot, I'll ask you.

DR. TALBOT: We make in terms of our mandate, we do not distinguish between contaminants that are from point sources or non-point sources. We focus on the fate, transport and presence and effects of contaminants of point and non-point sources in my division on aquatic ecosystems. And we also work on the toxicity of the substances that might originate from non-point sources. So we have the capacity and we have the mandate to do so. The question is more what's the context for the work in particular, because as we deal with non-point sources, the work on the sources of the contaminants, or how the contaminants are managed is of a mixed jurisdiction at this point.

Q What about in the marine area. Does the answer that you just gave apply to marine systems, as well?

DR. TALBOT: It would also apply to the marine environment. We would do work, for example, on -- we could potentially do work on the presence of contaminants in marine systems and the transport. For example, we do work on appearance of contaminants in the Arctic as they are transported through the atmosphere, or the ocean currents. But that is very limited amount of work, and it's on the -- it's directed to the prioritization that we would have in our specific programs, and our interests in those programs and to the level at which we would want to be involved. Some of that work is funded from external sources, such as the Arctic work is funded by Indian and --

Q Northern Affairs?

DR. TALBOT: Yes, thank you.

Q And how much of that kind of work is being done in the Pacific Region by Environment Canada in the marine environment?

DR. TALBOT: To my knowledge there is no work of this nature.

Q You had mentioned earlier priority setting, and I'd like to ask you now how is priority setting done for Environment Canada research programs, Dr. Talbot?

DR. TALBOT: Well, the prioritization of research, it involves many steps. First is we obviously rise to the mandate where our mandates originate from. And a substantial component of our mandate comes from the ***Canadian Environmental Protection Act***, Part 3 of the ***Act***, which directs us to look at the effects of contaminants on ecosystems and how ecosystems alter the contaminants and their persistence, bioavailability, and effects on living organisms. And we also do work on -- through Part 5 of the ***CEPA***, the ***Canadian Environmental Protection Act***, which directs us to look at the toxicity of specific substances, as identified by the risk assessment process which is a confidential government program under the Chemical Management Plan, to provide the types of information that risk assessments and regulators need to determine if a substance should be managed as a toxic substance in the environment.

There's other ***Acts***, as well, such as ***Canada Water Act***, which gives us broad responsibilities under the Action Plan for Clean Water, and other types of policies of that nature, specific ecosystem programs to work on specific hot spots ecosystems, such as Lake Winnipeg or Lake Simcoe, or the Great Lakes, St. Lawrence ecosystem, for example. And in those programs, we are to look at what are the factors that are causing ecosystems to be in decline and altered by contaminants or multiple sources of pressures, in fact, not just contaminants, but all stressors to the environment. And to develop an understanding of how those ecosystems are affected, and eventually provide information for compliance or regulatory activities.

Q And the ecosystems that you're referring to that are prioritized right now, do any of those include the Pacific region, where we would have sockeye salmon moving through?

DR. TALBOT: We don't have a Fraser River or Pacific Coast ecosystem program right now that allows us to prioritize the work on Pacific salmon rivers and streams.

Q Thank you. And Robie -- Dr. Macdonald, sorry, you had something you wanted to add.
DR. MACDONALD: That's fine. You suggested I would comment on the earlier question about transport.
Q Oh, I'm sorry, yes, I moved along.
DR. MACDONALD: Would you like to repeat the question?
Q I think what I had asked was whether the Environment Canada has the capacity to do research on non-point source contaminants in the marine system.
DR. MACDONALD: Right. My viewpoint is a bit different. Environment Canada, in my association with them, has been a very strong partner in atmospheric transport, and that has been definitely a huge focus for them. Any time I've wanted advice or written a review paper on transport systems, I've gotten Environment Canada scientists to help me with the atmosphere.

In the marine system, they are much weaker, and basically when it comes to reviews and whatever, it's the other way around, and I have been asked numerous times on assessments to provide the marine transport context. That's both in the Arctic and the Pacific. Virtually all of the marine transport knowledge we have that comes out of the Arctic Ocean is DFO on the NCP side of things. It's either work that I've done, or John Smith at Bedford Institute.

MS. BAKER: Mr. Commissioner, we could take the morning break now. I've only got a few, maybe 15 minutes left of this panel.
THE COMMISSIONER: 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:

Q Dr. Talbot, how much funding does your group have nationally to do research on contaminants? How big is that budget or pot of money available to your group?

DR. TALBOT: Ballpark number would be about three million dollars for research on contaminants. And if we add monitoring to that, it probably goes to six million. But strictly speaking, it would be three million dollars for research throughout Canada.

Q Okay. Dr. Macdonald, in your view, who should have responsibility for research and regulating impacts of non-point source contaminants in the marine and aquatic environment?

DR. MACDONALD: Well, this would be my view. I definitely think that whoever does it needs to have a good understanding of the marine resources and their life habits. That's certainly a very important component. You can't monitor a system without understanding what it is you're monitoring. That expertise resides with DFO so I see DFO as being definitely implicated in running it or being a full partner in it.

Q Move on to some pesticide questions, Dr. Macdonald. Does the Department of Fisheries and Oceans communicate science advice on pesticides to the province to its Integrated Pest Management Section?

DR. MACDONALD: I'm not aware of that.

Q Okay. And what about for both Dr. Macdonald and Dr. Talbot, is there a formal mechanism for DFO science to provide advice to Environment Canada regulators? I'm going to start with you, Dr. Macdonald.

DR. MACDONALD: None that I'm aware of. We certainly have conversations that run below the formal level and the best recent case I can think of is when Environment Canada was looking at regulating the flame retardants. And there, we felt that DFO had a lot of expertise and a lot of interest in how that regulation went. Environment Canada was a lead agency and it was their responsibility to do the regulation but they had called for stakeholders to provide input before they made their decision. And we felt it was very important that DFO would make a statement of its position was. That was a difficult process and certainly that was not something that was clean and easy to do.

Q And Dr. Talbot?

DR. TALBOT: Yeah, I have basically the same answer.

There's no formal process. However, there are some specific conversations. Again, it depends on the issue. It'll be between managers or between scientists, as they develop the information necessary to provide the best advice for risk assessment or other such process.

Q And Dr. Macdonald, as I understand, the CSAS process, the science advice process for DFO, which we've heard about already in these hearings, is available if a request is made through that process for science advice to DFO Science; is that right?

DR. MACDONALD: That is correct. I believe it can also be operated in a bottom-up manner. It's not hard to send a message up and say something is important and then have a top-down command to do it.

Q All right. But it does require that top-down command, as you described it?

DR. MACDONALD: Yes.

Q And is that process adequate, in your view, for getting science advice to Environment Canada or regulators where it's needed?

DR. MACDONALD: No, I don't think it is. It wasn't designed for that.

Q Okay. It's designed for answering questions posed, not advising upwards?

DR. MACDONALD: It's designed for answering questions posed and basically within DFO advice to bring science advice to management within DFO. You can Google CSAS and you can see the kinds of reports and get a pretty good grasp of what it does.

Q Okay. Dr. Talbot, earlier, you had spoken about the kinds of research that your Department engages in. You talked about transport research and toxicology and I just want to confirm, is any of that work being done for Pacific salmon right now?

DR. TALBOT: No, there's no work under our mandate right now that we're doing specifically for Pacific salmon.

Q And that includes ecosystem research on the Fraser; is that right? You're not doing ecosystem research on the Fraser?

DR. TALBOT: That's correct. No ecosystem research on the Fraser at present.

Q All right. Environment Canada does do research on pesticides, though. And how does that take place?

DR. TALBOT: Well, there's basically a number of ways that we can do research on pesticides. The most important one is through an agreement with PMRA, the Pesticide Management Regulatory Agency. They have funded over the years a pesticide science fund that Environment Canada uses to look at fate and transport and effects of pesticides to non-target organisms, as the pesticides are distributed in ecosystems. And that process, over the years, has been anywhere between $300,000 to a million dollars over the last five years at least that I am aware of in my position as director. There is also some work that we do on pesticides because they're related to specific ecosystem issues.

For example, if we're doing contaminants in an area of concern, and we'd like to understand what's happening in specific areas of concern, we will try to attempt to understand the priority contaminants in those areas of concern either in the water or in the sediments. And in that kind of process, we'll look at pesticides or we'll look for pesticides and report on them. And there's also some additional work on pesticides, as we try to advance our work on providing relevant information for enforcement and compliance. So over the years, we have done some work on pesticides in the context of what kind of buffer zones do we need between application areas and water bodies to ensure that pesticides don't run off into rivers and streams.

Q You referenced the funding agreement you had with PMRA. Is that agreement still in place? Are you still receiving funding from PMRA to do pesticide research?

DR. TALBOT: The agreement that's still in place and I believe it's a continuous agreement. I don't think there is a termination date on the agreement. In terms of the funding, I think this year the levels of funding currently continue to be discussed at a higher level. I'm not aware exactly what the envelope could be or would be this year.

Q Last year, was there funding for pesticide research?

DR. TALBOT: Last year, we had about $300,000 for pesticide research and about another 300,000 for

monitoring of pesticides.
Q Okay. Has the funding under that agreement decreased over the years?
DR. TALBOT: It has decreased in the five years that I'm aware of. Since I've been Environment Canada, it's gone from a million dollars to about that amount that I just stated.
Q Okay. And if there is no funding providing in the funding envelope for this year, is there another agency that would do the kind of work on pesticides that is being done right now by Environment Canada?
DR. TALBOT: Not to my knowledge, no. The work that's done on pesticides, fate and transport and effects to non-target organisms is work that Environment Canada alone ahs been doing in recent years.
Q You talked about some different research that's done by your group on pesticides outside of the PMRA-funded work. What proportion of your budget is spent on that pesticide work that's not associated with PMRA?
DR. TALBOT: It would be a very small amount, perhaps 5 percent of our research budget.
Q Okay. Pesticide work, is it considered part of Environment Canada's mandate?
DR. TALBOT: Pesticide research in terms of an environment contaminant is part of our mandate. However, there's a fine line here and perhaps some level of discussion exactly what the responsibilities are. PMRA asked us to look at the non-target effects and environmental fate of pesticides, as it develops the approval process and regulations for use of those pesticides in a Canadian environment. Work on effectiveness of pesticides and best practices for use of pesticides belongs more in Agriculture Canada, to my understanding. So our mandate is strictly restricted to pesticides as a potential environmental contaminant under ***CEPA***.
Q And are pesticides on the domestic substances list?
DR. TALBOT: Not to my knowledge, no. Environment Canada right now is going down the list of contaminants that have been identified through a length process as substances in commerce through the Chemical Management Plan. And that list is developed by another group, risk assessment

people. And they need information from our scientists to determine if those substances should be managed as toxic substances. And pesticides are not a priority in the Chemical Management Plan. And supporting the Chemical Management Plan is our priority right now.

MS. BAKER: Thank you. Thank you very much. Those are my questions for these two witnesses. Canada will be the next questioner.

MR. EAST: Mr. Commissioner, Mark East for the Department of Justice. I'm with my colleague, Charles Fugère. And I have about 25 minutes. I hope to be done before that time.

CROSS-EXAMINATION BY MR. EAST:

Q Dr. Macdonald and Dr. Talbot, I have a few questions. I just wanted to step back a bit and talk a little bit about the terminology and discuss the respective mandates of the two departments. And maybe my first question is for Dr. Macdonald. Your unit, I understand, is the Marine Environmental Quality Section of the Institute of Ocean Sciences. And I just wanted to ask you, does that mean that your unit only does toxic chemicals research within the marine environment? Marine being ocean/saltwater environment.

DR. MACDONALD: No, not entirely. We do research on contaminants, as they affect fisheries resources, and that certainly has included freshwater resources at times.

Q And would that be particularly the case with respect to anadromous species like salmon?

DR. MACDONALD: I think probably yes is the simple answer. And partly because they are marine fish, they come back and are reared and breed in lakes. But certainly, we have had an interest in them because they're an iconic species as well.

Q Okay. I also want to talk a little bit about, we hear the term point source contaminants versus non-point source contaminants and the respective mandates of the departments. And I just want to clarify something.

MR. EAST: Maybe we can go to Tab 4, Exhibit 975.

Q And this is a question for Dr. Talbot. And this is the email from Robin Brown of DFO. And I just

want to get your opinion, Dr. Talbot, on the paragraph that starts number 2, and maybe I'll just read it again.

> This is an area of complex jurisdiction. Health Canada PMRA regulates the use of pesticides. EC focuses on 'point source' deposition of deleterious substances under the ***Fisheries Act***. DFO worries about more subtle ecosystem impacts of (primarily) non-point sources (like surface run-off) and complex mixtures of contaminants that are poorly address with EC's primary emphasis on point sources. This is exactly the kind of problem that is likely to slip through the research and regulatory 'cracks'.

I guess my first question for Dr. Talbot is, would you agree with this characterization of Environment Canada's mandate with respect to regulation of non-point source contaminants?

DR. TALBOT: If you're asking just the specific question about the regulatory process, I think there might be some better people to answer that than I. But I can tell you from a research perspective that we make no real distinction between point and non-point sources. We have research activities that concern contaminants whether they're dispersed from a point source like effluents or whether they're dispersed through the air and transported through the air like pesticides and other volatile substances. Our research is focused really on contaminants as a concern for ecosystem health and also a concern for the water quality standards that we are committed to provide information on through ***CEPA***, for example. So from the research perspective, I don't think this point 2 is really accurate from a research perspective.

Q Okay. Thank you. And maybe just to follow up on this email with Dr. Macdonald, I just want to get a sense of to the extent to which your unit does research into non-source point contaminant work, I note, for example, on this email, if you scroll down a bit, there are some references to Peter Ross and some papers and I know his name is Peter Lott. And is there a distinction made in your

unit between work done on point sources and non-point sources as far as a distinction that you're supposed to be drawing within DFO or within your unit?

DR. MACDONALD: No, there's not a particular distinction that we're instructed to consider here. I think it's as Dr. Talbot has said, in a way, the problem is different depending on whether you're talking about regulatory or you're talking about effects in the environment. For regulatory people, it makes a very big difference about point sources and distributed sources because you have to tackle those very differently.

In terms of an analyst living in the environment that's receiving some of this and some of that, it's more about what it has to deal with and where it comes from that becomes important in which case we try to understand the receptor in DFO. Our research perspective has been the receptor and whether or not harm is being done. And then trying to understand which agents it is that are causing that harm. That then would feed into policy to the regulatory side.

Q Okay. Thank you for that clarification. I want to talk a little bit about the context or I guess the funding environment that your units have been in the last five to ten years.

MR. EAST: And maybe to help out with that I'd like to go to Commission's documents, Tab 14.

Q And these are really questions for Dr. Macdonald, as they relate to DFO. Now, this is CAN394637. And it's a paper entitled "Strategic Review of Toxic Chemicals Research in the Environmental Science Program and the Arctic Science Program, Science Sector, Fisheries and Oceans Canada", dated June 9th, 2003. Dr. Macdonald, are you familiar with this document?

DR. MACDONALD: I've seen it, yes.

Q And is this strategic review, is that what led to the changes that you testified about earlier in your testimony?

DR. MACDONALD: I think this was one step along the way. I'm not sure that this was the initial step. We had earlier meetings and we had been going along this road for quite a while, I think, in DFO. Certainly, this would have been a prelude, though, looking at how we emphasize our research

with limited funds.
Q Okay. And if we could go to page 3 of this document, ringtail page 3, because it provides maybe a little bit of context for some of these discussions. Maybe starting with the executive summary and I just want to ask you some questions about what was going on at the time. In the second paragraph, there's a reference to:

> As a follow-up to the Science Assessment, the National Science Directors Committee --

And I'll just stop there. Do you know what that is?
DR. MACDONALD: Yes.
Q Can you explain what that committee is?
DR. MACDONALD: Basically, there are a set of directors, high-level executives in Ottawa, and they meet at times to work out DFO priorities and match things like budgets to responsibilities.
Q Thank you. And so continuing on in that sentence:

> -- directed that a review of the toxic chemicals research within DFO be undertaken for the period 1997/1998 to 2001/2002. The goal of the review was to conduct an assessment of the relevance, success and effectiveness of DFO's past effort on toxics research and to provide options on the future direction of the Department's research on toxic chemicals. The review was conducted within the context that the Departmental *status quo* remains non-viable and was based on information received from regional Environmental Science managers, clients and the Science Project Inventory.

Can we stop there? What does that mean that the *status quo* remains non-viable?
DR. MACDONALD: Well, in my view, and I didn't write this text but I read into it that the non-viability has to do with the amount of funding, resources available within the Department to carry out its mandate and the amount of funding required to do all of the kinds of research that were proposed. So what I read here is that there is not enough funding to continue to put into this kind of research.

Q And I'm going to let you take a drink of water, Dr. Macdonald, and then I'll ask the next question of Dr. Talbot.

DR. MACDONALD: Certainly.

Q And maybe just to follow, Dr. Talbot. Is it your sense in the period of time that we're talking about, I'm going to say the last five to ten years, has this been generally a period of fiscal restraint in the area of toxic chemicals and research and science research generally in your Department?

DR. TALBOT: In my experience, the question depends a little bit on the context on the priorities within Water Science and Technology or Science and Technology Branch in general. In some years, we found that the water contaminant research agenda was extremely high-priority activity. For example, in the last two or three years, oil sands impact has been a very high priority within my Division. And we've been funded at the level that we needed to investigate oil sands as a hotspot, as an ecosystem issue. And in other years, though, funding is allocated elsewhere. I would say in general our funding levels for water contaminant research has declined somewhat or has remained stable while the costs of doing business has increased somewhat over the last five years that I've been as a director. The allocation of resources is more of a variable among priorities than the Department's overall budget, I would say.

MR. EAST: Okay, thank you. And I'll maybe follow-up on this theme. What I'd like to do now, perhaps I should mark this document as an exhibit. I think we'll probably hear more about it in the next panel. If I can mark this paper, "Strategic Review of Toxic Chemicals Research".

THE REGISTRAR: Exhibit 980.

EXHIBIT 980: Strategic Review of Toxic Chemicals Research in the Environmental Science Program and the Arctic Science Program, Science Sector, Fisheries and Oceans Canada dated June 9, 2003

THE COMMISSIONER: Mr. East, which tab? This is the one at Tab 14, is it?

MR. EAST: Tab 14 of the Commission's list of

documents.
THE COMMISSIONER: Right. Thank you.
MR. EAST: Thank you. On the same thing, I'd like now to turn to Tab 1 of Canada's list of documents.
Q And Dr. Macdonald, I don't know if you've seen this particular document. It's a deck obviously with the same title, "Strategic Review of Toxic Chemicals Research Presentation to NSDC June 17th, 2003". Have you seen this before or do you know anything about this document?
DR. MACDONALD: I had not seen it until this proceedings here.
Q Okay. What I thought I would do is perhaps just take you to some slides and just ask you some questions and use this as a foundation for some questions I'd like to ask you about what was happening at this time.
MR. EAST: Maybe go to page 5 of the document.
Q And the first bullet:

> Toxic chemicals research is relevant to DFO's mandate and to addressing client needs.

The second bullet is interesting. I just want to ask you something about this.

> Toxics research effort was allocated --

And this is in 2003 or the five-year time period prior to that. Biological affects 51 percent of the projects. And I think this is national. And chemical fate and transport, 42 percent of projects. Can I stop right there and ask, we've heard some testimony about fate and transport. Can you maybe just discuss a little bit what the different is between work that's focused on biological effects versus work that's focused on chemical fate and transport?
DR. MACDONALD: Right. Biological effects has to do with when an aquatic resource, a fish in a broad context, is exposed to some chemical or chemicals, whether or not that triggers a harmful effect, which, in scientific jargon, we'd say turns it from a contaminant into a pollutant. We see something happen. For example, you could impair reproduction. And so that's the kind of thing you're looking for. Specifically, you're trying

to match exposures to something that happens to the fish.

The chemical fate and transport has to do with a system science of understanding why the fish has that chemical in it anyway? Where is it getting it from? Who is putting it into the system? Is it long-range transport? Is it local industry? Where does it come from? And if you do the science right, you could also answer the question that if you withdrew resources or withdrew sources, you turned off the tap for some of these, you could project how long and how much the contaminant would turn down and whether it would come down below levels of toxic concern.

MR. EAST: Okay. Thank you. And then I want to go to Tab 9 to follow on this discussion about biological effects. I'm sorry, page 9, not Tab 9. I apologize. And I'm jumping around in this document. I'm going to go back to some earlier slides but I just wanted to continue this theme. In this deck, it talks about new directions. In the first bullet:

> Maintain adequate in-house expertise for toxic chemicals research.

Q In your view, has this objective been maintained?

DR. MACDONALD: Over the past few years, I think we've been losing this expertise. We certainly have been losing the expertise on pathways because we haven't supported that. We still have a lot of remainder expertise on it but we're not developing new expertise in that direction.

Q Okay. And the second bullet, in particular:

> Allocate higher priority to studies on biological effects on toxic chemicals on fishery resources and habitat and lower priority to stand-alone studies on fate or residues not linked to effects.

Is this your understanding of where DFO was going after this?

DR. MACDONALD: Yes.

Q Okay. And so that number we saw earlier of 51 percent versus 42 percent, they wanted to change that ratio to make it even wider, I suppose.

DR. MACDONALD: They wanted to remove the 41 percent, I think, really.
Q Has that 41 percent disappeared entirely in the last five years?
DR. MACDONALD: Yes.
MR. EAST: Maybe I'll go back to the previous slide, slide 8. I believe this chart actually is in the Policy and Practice Report. I may be wrong about that but I've seen it. I think I saw it there.
Q But this is a chart that talks about ESSRF allocations - that's the fund that you talked about earlier - for the time period 1997 to 2003. And if you look on the left, it says:

> Total toxic chemical funding reduced from 11.6 million to 7 million to address other pressures.

And there was a bump up, I think, in 2001/2002 to address concerns on new chemicals. Is that a trend that you saw that you've seen over time, a decline in funding for toxic chemical research?
DR. MACDONALD: Yes. Within DFO.
Q Within DFO.
DR. MACDONALD: Yes.
Q And maybe go down to the last line. It says:

> ESSRF funding decreased due to realignment to other priority areas.

Maybe just put it this way. Why do you think that toxic chemical research funding as a stand-alone function has been declining? Well, I'll just leave it at that. Why do you think that has been the case?
DR. MACDONALD: Well, you're asking for my opinion?
Q Yes.
DR. MACDONALD: And I've not been party to NSDC meetings and other things but I think really that DFO, as all Departments, have a lot of priorities, a lot of mandate to do. And I think they were strapped for funding and they looked over their mandate and asked some hard questions about what it is they had to cut. Generally, in my view, you have two kinds of cuts you can make. We offer up efficiency cuts and trimming of fat and all that. But there comes a point when that doesn't work

anymore and you have to do some kind of amputation. And in the 2005 meeting, I think the decision had come to the point of whether or not DFO would excise the contaminant's work entirely.

I mean I think that was really on the table from what I heard and what I saw. They came back to a position of saying, well, let's maintain an expertise but we have to limit it. And it will be limited to this. We will maintain our laboratories. I think that was a wise decision. And we will make those more efficient. I think that was a wise decision. And we will limit our research to toxic effects on fish with a broad context fish and that way we will save this amount of dollars and they will go to other priorities that are above this priority.

Q And we'd agree that's kind of reflected, at least for this five-year time period, by this chart that's in front of you on page 8 where the yellow bar is coming down, "Toxic Chemical Research", some of the other ones, "Oil and Gas" is a good example, are becoming greater priorities for the funds that are available. Is toxic chemicals research a sub-component of some of these other areas?

DR. MACDONALD: It could be. You could cast a research proposal for habitat with some contaminants in it and you could do likewise with hydro-electric development. And certainly, if oil and gas comes into the picture, yes. Pesticides are clearly toxic chemicals. So they are a little bit embedded into other proposals quite often, yes.

MR. EAST: And maybe if we can go back just to page 9.

Q If you look on the third bullet:

> The focus on solving practical problems that are essential to DFO's mandate obligations and needs and clients.

Is this a reference to focusing the work more on responding to priorities identified by DFO in other areas? Like supporting other areas of DFO Science?

DR. MACDONALD: I'm not sure exactly what's meant here. I can read into it what I think is meant but I'm not sure what is meant.

Q Okay. Well, we'll leave it at that. And then

just over onto page 10, maybe just to close this off just with some of the other and asking about these.

> New directions continued. Develop alternative delivery for Science functions that can be done outside of DFO.

Do you know what that's referring to? Do you have a sense?

DR. MACDONALD: Again, I'd have to guess.

Q Okay. Well, maybe the next bullet, I'm curious if this has occurred.

> Investigate strengthening relationship between DFO, Environment Canada and universities through virtual centres, especially in freshwater toxicology.

DR. MACDONALD: That sounds like a good idea but I have no recollection that any such was done.

Q Okay. And third bullet:

> Clarify Science roles and responsibilities of DFO and Environment Canada and strengthen cooperation.

I think we've heard some discussion.

DR. MACDONALD: Again, it sounds like a good thing to do but I'm certainly not clear that something was done.

Q Okay.

> And enhanced partnering with universities, OGDs and industry.

Is that something that's happened in the last five years?

DR. MACDONALD: In my experience, that has happened and it's been driven largely by the scientists themselves because when they can't get the funding from DFO, of course, they are going to look for partnering and other funds. Myself, I work in what's called ArcticNet. It's a large network; it's a university network. And I become an adjunct professor somewhere to do that. I also collaborate with industry when I see there's

something that we can do that makes sense and will serve understanding of contaminants. So that has been done not, I don't think, with direct guidance but because it's a product of removing other sources of funding.

MR. EAST: Thank you. I'd like to mark as an exhibit Canada's Tab Number 1. "Strategic Review --

THE REGISTRAR: Exhibit 981.

EXHIBIT 981: Strategic Review of Toxic Chemicals Research, Presentation to NSDC, June 17, 2003

MR. EAST: Thank you.

THE COMMISSIONER: I'm sorry. What exhibit is that? What was the exhibit number? I'm sorry.

THE REGISTRAR: 981.

THE COMMISSIONER: 981.

MR. EAST: I'll just finish up with one more question. I'm interested in Tab 5.

THE COMMISSIONER: Sorry. Mr. Registrar, just go back to the exhibit numbers. I guess I've lost my count here of exhibits. Can we just go back and see, what was 980? What was 980?

MR. LUNN: This document on the screen.

THE COMMISSIONER: I see, okay. Thank you very much. Thank you.

MR. EAST: So if we can go to Tab 5, Exhibit 976. This is one of my favourite references in the first line. It talks about the area of "tension" between Environment Canada and DFO.

> DFO has largely withdrawn from the 'contaminants research' field (at least on paper - there are still internally subversive elements at work and I leave it up to your imagination to decide where those elements might be located).

Is that actually a reference to you, Dr. Macdonald, and your team?

DR. MACDONALD: Well, quite likely I'm implicated but I don't think I'm alone. We do maintain some things and in some ways it's doing two jobs instead of one job but yeah, I'd be one of those subversive elements.

Q And maybe if I could paraphrase. This is an

example of where you and your unit have been doing work in this area but have had a constant struggle to find funding to do it?

DR. MACDONALD: Yes, if I could add?

Q Please do.

DR. MACDONALD: And this is something that I think is really an important question to ask. What is the role of a government scientist? And I think the number one thing is to provide sound advice to the government of the day. And to do that, I think in science, you want your scientists working at the edge. And whether or not they're exactly on the topic that's crucial of the day is not as much to the question of whether or not their science is relevant, can guide policy and is informative about things coming at us. In other words, I feel like we have let the system down if management tell us about an emerging problem and not the other way around. So my perspective is that there's things we should be doing that sometimes are not necessarily on the exact mandate but are coming at us.

MR. EAST: Well, actually I think that's probably a pretty good place to leave my questions and I'll thank the witnesses and I'll turn it back over to Wendy.

MR. PROWSE: So my name is Cliff Prowse. I'm the lawyer for the provincial government and I should preface my questions by saying that funding shortages are not confined to the federal government, in my experience, and so that leaves, I think, the province in a similar position that the federal government is demonstrating in these emails that we've just discussed. As a participant in this Inquiry, I'm struck by the fact that we've had 12 or so Science reports, almost all of which recommend further research be done with respect to each of the different subjects within there. And I guess the one that maybe is most relevant to this panel is the contaminant report, which put the whole question of chemicals and endocrine disruptors in a somewhat alarming context. And I think the implication of that is that a lot of money should be spent somewhere by somebody doing a lot of research on that.

CROSS-EXAMINATION BY MR. PROWSE:

Q So my question is, within the two exhibits that we've just seen, where would that decision be made within government? And how would that decision be made? And what discussions have there been about that? You, Dr. Macdonald, seem to be the lucky near retiree who gets to answer these questions.

DR. MACDONALD: Normally, within DFO those decisions are made top-down. We do not make decisions on government priorities or Departmental priorities at the bench level. Having said that, we do have mechanisms, briefing notes and discussions to inform our management about what we see as urgent issues. And when we had an ESSRF program, we had review and the ADM would go to those and listen to what we had to say and sometimes we have these toxic chemical reviews and perspectives will be developed and then we would get a mandate that would come down. The orders, if you'd like to put it that way, or the directions that were set were set from the top down, both in terms of text about what our priorities should be and in terms of the allotments of money really, the second being probably the most relevant part because that tells you how much something's important. That's how the process works.

Q Can you comment from an Environment Canada perspective?

DR. TALBOT: Yeah, Environment Canada has got perhaps several ways of determining how funding is prioritized. We do have programs that become high-level priorities within Environment Canada and, for example, I come back again to the Chemical Management Plan. Canada has to go through a very long list, several thousands of substances, and determine if those substances should be managed as toxic substances. And that mandate is urgent. We have very little time to go through. There is international agreements to do that. So we have to put a lot of our resources towards that and that uses quite a bit of our resources in that way.

And the issue of whether we should be continuing to work on an issue that's been a priority in the past and falls not only in the context of these urgent requests, as the one

example I've just given you, but it also, as a report is produced, the question that is asked by management, is it sufficient information to address the deliverables that we had agreed upon or is it sufficient to develop information necessary for a risk assessment or compliance of some nature?

And even though it might be of great value to society to continue and do additional work, because resources are so short and because we always have many, many more priorities and requests than we can fund, then we have to determine whether it's necessary or desirable to do additional work in this area or move on to something else even though we may not have complete information.

Q These seem like very difficult choices and again at some perhaps likely over-simplified level, difficulties in forecasting are something that we're familiar with. I think there were difficulties in our context of forecasting the 2009 salmon run, which turned out to be very low. And once the Commission got started, I don't think anybody anticipated that in 2010 there would be a record run. So that's not relevant, I don't think, to your exact fields. But the question I have is, isn't there a danger in setting priorities according to perhaps the political need of the moment that some basic research that needs to be maintained over time will be lost in the shuffle.

DR. MACDONALD: Of course. You're absolutely right. There is a risk in doing it this way and in putting all of your energy on brush first and emergencies. Sometimes it works out very well. I can tell you that the early contaminants program was well-funded over the first five- year period and it got that funding because of a front-page article in the Globe & Mail that said mother's milk on Broughton Island is unfit to drink; it had PCBs in it. So some of the ways that things get currency is that they get exposure in the media and the media comes back to the political agenda and the political agenda comes down. It can work for good and it can work for bad. I think this is one of those cases where you have to be careful what you wish for when you do these things because

you may get it. And in the case of the NCP, I can only say good things about it and about the collaboration that was done by government and universities to produce that work so in that case it worked very well.

In the case of contaminants or other issues that come along occasionally and reach a fairly high profile in the mind of the political system or the media, there is risk in pulling away funds from long-term considered research and placing it under short-term brush fires. I really think that that is a risk and it requires a certain amount of body of inertia, if you like, of research that's fore-thinking and looking forward on these. And we've discussed monitoring before. Monitoring is part of that.

Q Do you have a comment on contaminants in particular or generally do you have a comment?

DR. TALBOT: Perhaps to add to that. I disagree with Dr. Macdonald's comments. I agree with his comments in general. The only thing that I would add is that in our risk management when we prioritize our project, we do an informal risk analysis of what our program ought to look like and what we need to get into. So I would not agree with your statement that we're dealing with just short-term issues. There is consideration for long-term monitoring or long-term assessments or projects that need to be carried over very long periods of time. And we do consider those in our appropriation of funds or distribution of funds in the different programs. For example, our mercury fate and transport program has been ongoing for many years and while some other projects need to be resolved within one to three years and once we have that answer, the project is simply terminated and we move to something else.

DR. MACDONALD: If I could, I just would like to comment. I didn't mean to imply that Environment Canada was driven by short-term problems. All I meant to say is that there's risk in driving a system that way. I think Environment Canada does not do that actually.

MR. PROWSE: Thank you very much.

MS. BAKER: Thank you. Mr. Hopkins-Utter, are you going to be asking questions?

MR. HOPKINS-UTTER: Good morning, Mr. Commissioner,

panel members, my name is Shane Hopkins-Utter, appearing for the B.C. Salmon Farmers Association. I just have a few quick questions for Dr. Macdonald. Mr. Lunn, could you please bring up Commission Tab 13? This is an email from Dr. Macdonald, April 2nd, 2009.

CROSS-EXAMINATION BY MR. HOPKINS-UTTER:

Q Do you recognize this email?
DR. MACDONALD: Yes, I do.
MR. HOPKINS-UTTER: Thank you. Mr. Lunn, could you please turn to page 4? In the middle of the page, there is an abstract which says:

> The abstract is a nice summery of the advice provided by this team.

At the top of that page, Dr. Macdonald, are you identified as one of the authors of this paper?
DR. MACDONALD: I am.
Q Looking at the lower part of that abstract, the last five or six lines starting with the sentence, "The ready breakdown", I'm just going to read a short part. You noted that the BDE-209 is insidious and is found to biomagnifying in aquatic food webs. You also note, this is where I'm quoting:

> The ready breakdown of BDE-209 and to more bioaccumulative and toxic lighter PBDE forms in the environment presents perhaps the most insidious threat to aquatic biota.

And you also go on to note:

> These PBDEs have endocrine-disrupting potential.

Now, the endocrine disruptors, you mentioned a couple of effects that these can have on fish health, did you not just this morning?
DR. MACDONALD: I did.
Q And those were sub-lethal effects. Can you tell me what they were again?
DR. MACDONALD: The ones that we worry about most are effects on reproduction and effects on immune

function.
Q And there are other effects, though, are there not, just referring to PPR-14, Policy and Practice Report that we received.
MR. HOPKINS-UTTER: At paragraph 117, Mr. Lunn, if you wish to bring it up, it lists a number of other effects.
Q And you can confirm whether or not these are, in fact, some of the other considerations. Does it not also affect migration through effects on neurotoxicity or olfactory effects?
DR. MACDONALD: As I stated earlier, I'm not a toxicologist and I don't count that my expertise. That question would be better put to Peter Ross.
Q Peter Ross?
DR. MACDONALD: Yes.
Q Okay. You are aware of these concerns, though?
DR. MACDONALD: I am.
Q Have you ever heard of endocrine disruptors affecting maturation rates?
DR. MACDONALD: I have.
Q And obviously that's something we should put to Peter Ross as well, as to those potential effects?
DR. MACDONALD: That is correct.
Q And are you aware that in the Commission technical report, this is Exhibit 826, Tab 26 of the Commission binder, at page 143 under "Sufficiency", it actually talks about near the top of that page:

> However, exposure to certain endocrine disrupting compounds, such as PBDEs and PBBs, has likely increased exponentially over the past two decades.

Do you agree that it does, in fact, appear to be an exponential increase in the concentration?
DR. MACDONALD: Exponential increase is a particular form of increase, like a percentage increase, where it curves upward. We have several different records of time series that have been created and they all are not linear. They all increase upwards. So yes.
Q And this has been over the last few decades?
DR. MACDONALD: I'm not sure exactly the timeframe but I'd say the past two decades about, yeah.
Q So given all the concerns of the endocrine

disruptors and the potential effects on fish health, do you not think that it's of utmost and critical importance to study these chemicals and these contaminants further and to understand how they're getting into the environment so that we can limit those?

DR. MACDONALD: Yes, I think that's very true. I think even more important and urgent and the reason we went to a CSAS document and tried to provide advice to Environment Canada was we felt that continuing to produce and use the 209 would be loading the environment with this chemical when we were really very uncertain about what its downstream effects would be. So we were more interested in providing a DFO Science opinion on the regulatory process to Environment Canada.

Q How long was 209 in use?

DR. MACDONALD: I don't recall exactly when its use started but two decades probably anyway.

MR. HOPKINS-UTTER: Just turning to Tab 8, this is Exhibit 977, Tab 8. I got the nod from the Registrar.

Q Just looking at that list, I didn't get everything that you said there. Did you say that it doesn't capture pharmaceuticals? What else is not captured by this list?

DR. MACDONALD: Well, if you look, the only new age modern chemical bio-magnifier that you might worry about is AOX, organo-halides. That's a measurement that was usually applied to pulp mills, especially ones using chlorine to make their products. So they're producing chlorinated products. And AOX means, the X is a chlorine and the AO part says that we actually don't know quite what it's stuck on because there are a lot of complicated compounds but it's chlorinated. What's missing from this? Well, if you look at a top predator in any system, you'd expect to see things like endosulfan, chlordane, PCBs, PBDEs, DDT, it's still cycling, and there are others. None of those are in there.

Q And those are also, I believe, endocrine disruptors?

DR. MACDONALD: In various forms, endocrine disruptors. They also affect immune function, yeah.

MR. HOPKINS-UTTER: Okay. Thank you very much, Mr. Commissioner. Those are my questions.

MS. BAKER: Looks like it's time for the break.
THE REGISTRAR: The hearing is now adjourned till 2:00 p.m.

(PROCEEDINGS ADJOURNED FOR NOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: Order. The hearing is now resumed.
MR. HARRISON: Good afternoon, Mr. Commissioner and panel. My name is Judah Harrison, and I'm with the Conservation Coalition, which is a group of six non-governmental organizations and one individual.
Mr. Lunn, can you bring up Exhibit 976, please?
MR. LUNN: Certainly.

CROSS-EXAMINATION BY MR. HARRISON:

Q Dr. Macdonald, this morning we were speaking, or you were speaking about this email to various counsel. I wanted to specifically focus on the last line of the third paragraph where it reads, "There is a pretty large gaps" -- well:

> There [are] pretty large gaps between what [Environment Canada] is prepared to do and what DFO is prepared to do and this gap is largest in the marine environment.

I take it that you did not write this email but you are familiar with it; is that correct?
DR. MACDONALD: I did not write it. I am familiar with it by virtue of this process.
Q Thank you. Now, could you, as in succinct a manner as possible, explain what those gaps are? Give us specific gaps that are not being regulated by either Environment Canada or DFO.
DR. MACDONALD: Well, I think it's along the lines of what we've been discussing so far; that is, DFO did not -- is not doing any more toxic pathway source-sync work in the marine environment, nor really monitoring marine environment, and Environment Canada is not doing that, either.
Q Okay. Is there any other regulatory gaps that you can think of where neither ministry is effectively regulating contaminants?

DR. MACDONALD: I'm not thinking of something in particular. As I understand how the system works with transfers, Environment Canada was really strongly the regulator in this system and DFO was a partner in that, but under ***CEPA***, certainly Environment Canada had the lead on providing regulations.

Q Okay, thank you. In the same document, this morning we heard that you were listed as among the subversive elements that work here; is that correct?

DR. MACDONALD: Well, I don't know. I didn't write that memo and it was referred to very vaguely, but I would consider myself to be working on some of these issues to complete them, if nothing else, when they were not a departmental priority anymore.

Q So just to be clear, in your understanding, you were called subversive for completing research, even though Departmental priorities had moved on?

DR. MACDONALD: Yeah, that's my take on it. I was continuing to do research or finish research on the pathways when the Department said, "We've moved on."

Q Thank you. Mr. Lunn, do you mind bringing up document 9 from Commission Counsel's list, please? I just spoke with counsel for Canada who informs me that this may already be an exhibit, Exhibit 742. But I'll stick with you, Dr. Macdonald. This is an email from Dr. Peter Ross, who -- with respect to PBDEs, and I actually don't know what that acronym stands for, but I heard you say it this morning, so -- and there's three types of PBDEs, one of which was not banned, that being Deca. And then, after a series of letters and pressure from scientists the Deca was actually banned. Is my understanding correct?

DR. MACDONALD: Firstly, PDBEs are polybrominated diphenyl ethers. There are 209 of them. They're basically brominated ring compounds. Our Environment Canada was deciding on how to regulate these, what to ban, and at the time it appeared that they were going to ban most of the PDBEs, but they were going to leave 209 off until -- and 209 is the heaviest one and it was used, I believe, still in the computer industry as a fire-proofer.

Our research, and most of this research goes

back for a number of years, it came from a basis of research that we'd been doing over all those years, so we felt within DFO we had the science understanding of the risks from these, and we wanted to -- we wanted for DFO to pass the message to Environment Canada in a formal note of what their take was on this, and at that time it looked like Environment Canada was going to leave Deca as still in use, and we felt that was ill-advised from the science point of view and we wanted to get that message across, so we did that.

At the end of the day, Environment Canada also came down on 209 and banned it. They may have done it because of what we did, but there's not a connected line there.

Q Just for my own ignorance, 209 and Deca, are they the same thing, or each is a different type of the 209 PDBEs?

DR. MACDONALD: They're the same thing.

Q They're the same thing. Thank you. And taking a bit of a step back, we hear often, including at this Commission, that the precautionary principle guides decision-making at DFO, Environment Canada, and Canada in general. Now, in my view, if you read this, the way that these chemicals were banned, it would not be in a precautionary manner, it would actually be the opposite. It would be that not until proof is brought do we actually say that certain chemicals are not allowed to be used. And my question to you, first, Dr. Macdonald, is can you please explain how the precautionary principle guides your work, today?

DR. MACDONALD: I should clarify a little bit that there's two components of this. There's the precautionary principle, which throws the onus entirely on the proposed user of something to demonstrate no harm, and then there's another thing called the precautionary approach, which I think is quite a bit softer than that. If you follow the precautionary principle you probably would do nothing, you know, you could justify doing nothing.

So it's a position that is attractive but probably not doable. So what we've tended to do is not necessarily use that principle directly but, rather, try to look at what we felt were the bigger risks in the system and find a way of

taking those ones out. Unfortunately, there are 25,000 or more chemicals that we've got out in circulation and we can't do something on every one of them. Money forbids it. On the other hand, a lot of these chemicals have uses in society that have another function. For example, pharmaceuticals. So to just say, "We stopped using them," is also not on the table. So it kind of leaves us in a bit of a difficulty in that we can't actually execute the precautionary principle, even though we might like to.

So what we've tried to do is to use that approach, if you like, to identify the ones that we think have latent risks, and PDBEs are one of those, and get those curtailed. We know something about PDBEs and the risks they present us, because we've been through a long experience with PCBs, and we know exactly what happened there and how long it's taking for them to turn down.

Q Now, following up on that, is there currently a suite of chemicals that would be defined as toxic within the ***Canadian Environmental Protection Act*** that are nonetheless permissible to use in Canada today?

DR. MACDONALD: I'm sure there are.

Q And Dr. Macdonald, you also, this morning, you were talking about sub-lethal impacts of chemicals, and then you alluded to the fact that cumulative or bioaccumulation of non-lethal chemical contamination would be just as dangerous as, you know, a single source lethal contamination. Well, maybe not just as dangerous, because the lethal source would kill the fish. But my question to you is: Is there specific toxics right now in the Fraser environment that you think or suspect are harming Fraser sockeye and, if so -- and are nonetheless permissible for use?

DR. MACDONALD: I worry about some, but I haven't got evidence to show what the harm is. Paracelsus, many, many years ago, said, "With toxicity it's all in the dose." Everything is toxic if you have enough dose. Water's toxic with enough dose. So our task, here, is to do several things. One, is to identify those compounds that have a definite toxicity and we understand it, and then to look at the environment and ask the question of whether

thresholds of toxicity are being passed. And we certainly don't have the science together for many, many compounds in that context.

Q You said something very interesting, and you said their are some that you suspect are harmful, but you have no evidence of what harm there is. Now, from where I stand, the precautionary principle demands that in such a case you do not allow these chemicals to be used until it's proven to not be harmful. But in my view, we consistently -- Canada consistently regulates in the opposite direction and until independent science has proved harm, it's allowable. Is that fair, in your view?

DR. MACDONALD: I think it needs more context than that. I think you have to weigh risks and benefits of things. I think there are substances and things that we are doing in Canada that would qualify under that, one of which would be putting CO2 in the atmosphere. We continue to do it because the choice of not doing it might have more severe consequences than the choice of continuing it. These decisions -- scientists try to put together a component of the system. They try to advise on what the risks are and who is at risk and why, in the case of all these chemicals.

That information gets fed into a policy somewhere, and that policy is produced by people, not scientists, who consider many other aspects. So I don't think it's surprising that sometimes the advice that we would give, or the desire we would have to have all these chemicals disappear from aquatic systems isn't followed.

Q And I agree with you, but, I mean, my point was that we say the precautionary -- we say we're guided by a precautionary approach, but in action we never are. And so my next question is: In your 25 years experience, can you think of any chemicals that have been banned precautionarily, without proof of harm? And feel free to give an answer as well.

DR. MACDONALD: Yeah, nothing is coming to mind, in particular. I can't think of things that were screened out. Certainly we have screened things out when we found out that they caused harm. And generally, the ones we worry about are what we call persistent bioaccumulative toxic chemicals that -- and of those three words, the one that

rings a bell the most is "persistent". And I would like to give one example to illustrate how difficult this sometimes is. One of the chemicals that's been made in society, a very useful one, are the refrigerants, the freons, CFCs we all them. These have been shown to be among the least toxic chemicals ever made. You can breath them in, you can drink them. They will not harm you. And yet, they were delivered to us as being basically inert. Well, inert sounds very good, but when you turn that inert over, it actually says it's persistent, and persistent brings up an alarm bell. Ultimately, through the science, we discovered that CFCs went up into the stratosphere and they damaged the chemistry up there, damaged the ozone production, and that causes UV penetration.

Well, so those chemicals clearly would not have been put out under a precautionary principle had we known what their mode of action was. But we don't have all that knowledge. So sometimes things are used in the context that they appear very safe, and everything we know about them is okay.

Q And I guess what I'm suggesting is sometimes we know that there's harms or we suspect highly that there's harms, yet we still approve them, anyways, and I would say that that's a much more common occurrence than what you just discussed; is that fair?

DR. MACDONALD: That's probably true. I don't keep up with all of the ins and outs of that.

Q Okay. This morning you also talked about the role of government scientists, and from what I took from what you said, you said, the role of a government scientist is to provide sound advice and then to let the government decision-maker decide -- to use that basis to then make the political decision; is that fair?

DR. MACDONALD: I think it is.

Q And my question is: Has there been, in your experience, has there been a shift in your 25 years at the Department where, early on, including where the Fisheries Research Board existed, that this was a known -- scientists would only provide advice or sound science, and is it your experience in the last number of years there's been a new

role that's been requested of science, or do you still see as the primary role, actual role, being played as providing objective sound advice?

DR. MACDONALD: I still see that as our primary role.

Q Okay, thank you. And my last line of questioning is just about some specific chemicals, and these are chemicals used in the aquaculture industry. I'd like to know if either of you have any familiarity about the chemical SLICE, in particular?

DR. MACDONALD: Should I answer that?

Q Sure.

DR. MACDONALD: I have some familiarity with it.

MR. HOPKINS-UTTER: I'm sorry, I -- Shane Hopkins-Utter, for the B.C. Salmon Farmers Association. I was just wondering if this is a panel on freshwater urbanization and if this chemical that you're now asking about was, in fact, in the witness panel summaries? I don't believe that we've had any notice of this, and we have concerns about discussing the aquaculture industry in a panel on freshwater.

MR. HARRISON: And in my view, this is a panel on pesticides. I'm asking about a specific pesticide. Clearly relevant to the terms of this panel. I will not get into very much specifics, I just want to talk from a regulatory place. Mr. Commissioner?

THE COMMISSIONER: I think in fairness, Mr. Harrison, I'm not sure where you're going with this, so it's difficult for me to assess --

MR. HARRISON: Sure.

THE COMMISSIONER: -- the objection. I don't know if it's necessarily an objection; it's really a question of whether or not the parties have had notice that you're going to pursue this specific line of questioning and, if not, if they did they might have had questions, themselves, pertaining to this. So I'm not exactly sure where you're going with it.

MR. HARRISON: In response, I'd say two things. First of all, nobody gives anybody notice of lines of questioning that they're going to give --

THE COMMISSIONER: I didn't meant --

MR. HARRISON: -- except we do have documents.

THE COMMISSIONER: Yes.

MR. HARRISON: And I apologize if that... What I was

going to -- is about the regulatory approval of specific pesticides that are used widely in B.C. and have impact on Fraser sockeye. So the approval process is all I'm sticking to.

THE COMMISSIONER: All right, well, I think if you want to go with the approval process, that's fine. It may or may not include this particular chemical that you've just spoken about, but if that's where you're going, I think, in a general sense, that would be appropriate.

MR. HARRISON: Okay, thank you. I'll keep it very general.

MR. HOPKINS-UTTER: Mr. Commissioner, just for the record, I will object if he asks about SLICE, which is not used in freshwater. Thank you.

MS. GAERTNER: Mr. Commissioner, if I may, it's Brenda Gaertner for the First Nation Coalition. We've heard quite a bit from this panel about the marine environment and not very much information about the marine environment. If he has some information about the marine environment, as general as it may be, I think it might be useful for us to hear it.

THE COMMISSIONER: I don't disagree, Ms. Gaertner, I just don't know where this line of questioning is going to go and whether these witnesses were prepared to answer such questions and whether all of the participants have had notice that it may be going in that particular direction. So I leave it with Ms. Baker, because this evidence has now been in introduced, and in terms of the scope of the evidence, I think it should fall within the parameters of the documents we have before us for these witnesses and the range of question should stick to those documents.

So I'm not sure where Mr. Harrison's going or whether Ms. Baker has any concern about that.

MS. BAKER: Well, no, you've made your ruling that he can ask general questions, and so I'm content for that to continue. I mean, it depends how far he gets into it, I suppose.

MR. HARRISON: Okay, I will proceed very carefully and I will look up and stay general.

Q This question's for you, Dr. Talbot. It's my understanding that Environment Canada regulates toxics generally; is that correct?

DR. TALBOT: Yeah, generally, through the ***Canadian***

Environmental Protection Act.
Q And does Environment Canada regulate chemicals, including pesticides, that are used on marine finfish farms?
DR. TALBOT: No, we don't regulate pesticides. We don't have the authority over pesticides. So it would be the Pesticides Management Regulatory Agency.
Q Thank you. And does Environment Canada regulate any chemicals that are used on marine fish farms?
DR. TALBOT: It's difficult to answer that specifically, because it's an open-ended question. It would depend on which chemicals might be used under circumstances. You know, it could be as benign as salt, you know, or as complex as some other products that might be used that would be covered under the ***CEPA***. So the potential is there, if it's a substance that's declared toxic under ***CEPA***, but to my knowledge there are none at this point.
Q Is there any part of Environment Canada that sees oversight of the aquaculture industry and chemicals they use that specifically sees that as their mandate?
DR. TALBOT: No, there is not.
Q And Dr. Macdonald, do you know if there's any in DFO that sees that as their mandate?
DR. MACDONALD: No, I don't.
MR. HARRISON: Okay. Those are my questions. Thank you very much.
MS. REEVES: Good afternoon, Commissioner, Crystal Reeves for the First Nations Coalition, and with me, Brenda Gaertner. The First Nations Coalition, for the witnesses, is a group of First Nations, including the First Nations Fisheries Council, tribes up and down the Fraser River up to Prince George, as well as some Douglas Treaty Nations, and as well as the Haida Nation.

CROSS-EXAMINATION BY MS. REEVES:

Q So my first set of questions is for -- directed towards you, Dr. Macdonald. And this morning you talked about the loss and rollback of funding that was part of the ESSRF program; is that right?
DR. MACDONALD: That's correct.
Q And then you said that under the new regime

scientists were expected to go out and find funding from other sources as part of going into toxic research?

DR. MACDONALD: That's correct.

Q And so since that time, then, how successful would you say, in your opinion, have DFO scientists been in finding those other funds in other programs?

DR. MACDONALD: Not too bad. We have found people interested in the question of toxic chemicals, from collaborations with Korea to the ***SARA***, so there have been funds that we've gotten.

Q And would some of those funds have been directed towards Fraser River sockeye, or would they have been more general?

DR. MACDONALD: They would have been more general.

Q Right. And in terms of comparison, I'm not sure if you'll know this, but what would you say, generally, would be the amount of funding you had under the old regime versus what people are gathering through various funding sources now, comparatively, in terms of amounts?

DR. MACDONALD: I don't really have a figure for that to give you. I could find such out, but I don't have it here.

Q Okay, perhaps we could have Commission Counsel find something like that.

Okay, moving on, I'd like to take you to Commission Tab 16. And this was a presentation done in 2005, and it was a DFO Toxic Chemical Review Follow-Up. Are you aware of this workshop review that was done?

DR. MACDONALD: Yes, I am.

Q Okay. And I'd like to take you to page 19, now, of the document. And on page 19 it just talks about the state of knowledge, and this was one of the core areas that needed to be worked on going forward, after 2005, according to the earlier parts of the review documents, which I won't take you into, and it outlines a number of areas, I guess, of studies that were either currently being done or needed to be done, impacts of classes of toxics on fisheries resources, trace elements, pesticides, impacts of mixtures on fisheries resources, sentinel species for impact studies, and the like.

Since 2005, what studies have been done on these various areas, to your knowledge?

DR. MACDONALD: There have been some. Most of the studies that have been done are listed under publications by Peter Ross and colleagues. I'm involved in some of those. He is our main toxicological scientist in my section.

Q And are any of the studies related to Fraser River sockeye specifically?

DR. MACDONALD: I have been involved in looking at the sockeye as a transport pathway, bringing contaminants into lakes. That was more looking at how they focused these contaminants into their life cycle and not on the toxicity itself.

Q And what year was that research done, or is this an ongoing --

DR. MACDONALD: It started in about 1999 or 2000 and continued on for a few years, partly under ESSRF funds and partly under university-sequestered funds and students

Q Right. Okay, but since then you haven't done anything further since the rollback of the funding?

DR. MACDONALD: Personally, I have done nothing. I'm not a toxicologist, so I don't do that kind of work. But Peter Ross has done some work related to toxic chemicals. Some of it to do with killer whales, and not so much on sockeye, though, I don't think. He's got some sockeye papers.

Q Okay. Thank you. According to the PPR, and I won't take you there, just sort of in the interests of time, but of course it talks about that DFO was responsible for providing various forms of technical advice to Environment Canada, such as providing fisheries, resource and fish habitat experience, recommending and receiving water quality criteria, the effects of toxicology and the effects of pollutants on specific biological process.

So I guess if the science program related to toxic chemicals has been cut back from 2004 and there's, other than Peter Ross, not much research being done, and there's even a question of whether he's been doing research on Fraser River sockeye, I guess my question is: What is the level of advice that DFO science can give to Environment Canada if there's been such cutbacks and no such science is being done?

DR. MACDONALD: Well, it would be minimal. It would be

based on our opinion on these fish and on where we know them to be and what the risks are. There was a paper written, and I believe it's been entered in here somewhere, between Peter Ross and myself, talking about contaminants and fish specifically, but a lot of it is based on analogy, really, and not on direct research on the fish.

Q So if Environment Canada is getting advice from DFO, then the advice they're getting is analogous advice, and that's what they're depending on to move forward with their processes on regulation and such?

DR. MACDONALD: I think that would be true.

Q Okay. Dr. Talbot, do you have anything that you wanted to add to that question of DFO science advice going to Environment Canada and how that lack of science, I guess, in a term, impacts on your decision-making?

DR. TALBOT: Perhaps the only thing to add is that we, Environment Canada, the risk assessors generally look at the body of knowledge comprehensively and worldwide on substances that it's studying for determination as toxic under ***CEPA*** and it will look at all the information available and it doesn't necessarily exclude or include information that would be generated on a specific fish, such as Pacific salmon. So the information that's generated that's in a broad context on contaminants is used by Environment Canada.

Q Right. But not specific to Fraser River sockeye?

DR. TALBOT: No. It does not have to be, no.

Q Back to you, Dr. Macdonald. You've been talking about research that's done on pathways and then research on toxicity to fish, and those sort of being the two different, I guess, envelopes of study or ways of study. And would you agree with that, that's the two sort of envelopes of study, or --

DR. MACDONALD: You could categorize it that way.

Q Okay. And we've heard that DFO is taking an ecosystem-based approach to the management of Fraser River sockeye; would you agree with that?

DR. MACDONALD: It's partly true, maybe partly not true.

Q I guess my question is: If DFO is going to take ecosystem-based management seriously, and we've sort of heard at the Commission here, prior to

this, that they moving in that direction, or wanting to move in that direction, I guess my question is, wouldn't science advice, if you're going to take an ecosystem-based approach, want to include all variables within the ecosystem, including pathways and including toxicity to fish?

DR. MACDONALD: I would agree with that.

Q And so then, perhaps, pathway research needs to be included, going forward, if we're going to understand sustainability of Fraser River sockeye in the long term?

DR. MACDONALD: I would agree with that.

MS. REEVES: I guess I need to mark Tab 16 as the next exhibit.

THE REGISTRAR: Exhibit 982.

EXHIBIT 982: DFO Toxic Chemical Review Follow-Up, March 2005, Ottawa

MS. REEVES: Thank you.

Q This morning, Canada took you to a document, and that's now Exhibit 981, and if we could just pull that up, Registrar. And I'd like to go to page 10 of that document. Can you just scroll down, or perhaps it's just the next page there. Sorry, page 9. Sorry. Yes, sorry, it's page 9. And the third bullet down, it says:

> New Directions
> Focus on solving practical problems that are essential to DFO's mandate/obligations and the needs of clients.

Dr. Macdonald, in your opinion, who are DFO's clients as it relates to toxicity research of Fraser River sockeye, in particular?

DR. MACDONALD: Well, historically, we, DFO, has had a history, or at least I've been in the system where I've asked that question, myself. And the answer I've gotten is, it's people like fishing industry, it's special interest groups, I suppose, would be a client, of anybody who needs this advice. One of our clients would be the science community.

One client that appeared not to be our client, and I asked this question very pointedly for the reason, was the fish, themselves. Now, anybody who gave us funding, in other words, if we

got funding from some group or some other group, they *de facto* became a client as well, because, of course, they funded us to do some research and we did that research.

Q Right. And would you consider First Nations, then, a client of DFO in terms of toxicity research?

DR. MACDONALD: I would consider them a client, yes.

Q And why would you consider them a client?

DR. MACDONALD: Because amongst the peoples of Canada, First Nations have the highest exposure, generally, to aquatic resources. They have traditionally come, coastal peoples, from eating a lot of fish - and I use "fish" generically; clams; fish, seals in the Arctic; beluga - so they tend to be very high in their diet in aquatic items. By virtue of where they eat in the food web they place themselves at a fairly high trophic level; that is, they're not unlike bears, if you think about their diet, because they're eating fish and they're eating whales and seals.

So when we worry about bioaccumulating, biomagnified contaminants, through the food web is the major path of exposure, and that means native peoples would be the target of that exposure. Furthermore, they're always interested in maintaining an ecosystem that allows them to continue their traditional hunting and gathering, and if these chemicals are harming those systems, then they can't do that.

Q Okay, thank you. Perhaps I'd like to pull up Exhibit 836 of our -- which is a document that's been entered previously in the Commission by us, and this is known as the Siska Society Report, Siska Salmon and Indigenous People's Life Work. Are you familiar with this document, Dr. Macdonald?

DR. MACDONALD: No, I'm not.

Q Okay. Well, just for a brief overview, the Siska Society worked with a variety of First Nations to look at contaminants in the Fraser River and the Thompson River in Fraser River sockeye. And perhaps we can just go to page 47 of this document, and if you just want to blow up the -- yes, the top part there.

And this part here, they discuss an increase in the application of creosote in the Fraser River

and Thompson River Watersheds. And are you aware of any current or, say, studies in the past five or six years that have been done either by DFO or Environment Canada on creosote?

DR. MACDONALD: In the past five or six years, not specifically, not.

Q And Dr. Talbot, are you aware of any?

DR. TALBOT: No, I'm not. Only through general reading, but not through our mandate.

Q Right. And then if we could go to page 53 of this document and just blow up the top part again. And here they are talking about the use of Release TM in the Fraser Basin, which, from the report, they talk about how it's used in the forest industry to kill broadleaf trees, and are either of you aware of studies done on the impacts or levels of Release TM either by Environment Canada or DFO?

DR. MACDONALD: Could you clarify what "TM" is?

Q Release TM. If you just want to blow that up a little bit more.

MR. LUNN: Which portion?

MS. REEVES: Just the top there.

Q Okay, well, apparently, that's the like commercialized name of the chemical that they talk about in the report and they don't have the listing, so that's all I know it by.

But anyways, regardless of which, I guess you don't know what "Release TM" refers to?

DR. MACDONALD: I don't.

Q Do you, Dr. Talbot?

DR. TALBOT: No, I don't. Are you talking about a defoliant? Is that the --

Q Yeah, from my understanding, is it removes the leaves off broadleaf trees, which I guess is sort of considered a tree that impacts upon the growth of the forest. That's my understanding from the report.

DR. TALBOT: Yeah, I don't know it's my purpose to ask questions, but --

Q Okay. Well, I'll just -- yeah.

DR. TALBOT: -- there's 2,4-D that was used.

Q Right. I guess what I'm trying to get at is throughout this report they go through a variety of chemicals that are of concern to them as First Nations, and given what you've said, Dr. Macdonald, about, I guess, the bioaccumulative effects for First Nations in eating a lot of

Fraser River sockeye and other forms of salmon, I guess the point of this is that in terms of science isn't just a -- you'd agree that science isn't just an abstract but we're talking about human health and impacts on systems and communities?

DR. MACDONALD: Yes, I would like it not to be an abstract study. It would be -- it would have an effect of informing us and allowing us to make decisions.

Q And I guess if First Nations are identifying particular chemicals or particular toxic chemicals that they view or that they're seeing, in particular, the study where they did testing appearing in their environment and appearing in the fish, then if they're a client of DFO, should that generate some movement in the science that's generated?

DR. MACDONALD: Yes, I think it would, or should. I should add that an issue like that, we have governmental mandates, and DFO has a mandate for the fish, but it's not the same mandate as Health Canada, so it's not our mandate to worry about the human health aspects, although we might partner with Health Canada people.

Q Right. And is such partnering done right now?

DR. MACDONALD: It is.

Q Okay. Thank you. Again to you, Dr. Macdonald, according to your CV, you conducted core sampling of Shuswap Lake in 2002; is that correct?

DR. MACDONALD: That's correct.

Q And can you just briefly describe what you found in those core samples?

DR. MACDONALD: Well, you're going back a ways and I've collected a lot of core samples. What we look --

Q Just generally.

DR. MACDONALD: What we look for in those are records of contaminants, and certainly we found them, as we find in almost all inventories in the environment these days, and there are modern components in there. As I recall, we saw PCBs in those lakes, specifically, and we probably saw DDT as well, and we would have seen that as a peak around the early 1960s, when we were using it as an aerial forest spray.

Q Right. And did your core sampling look at some of the new and emerging chemicals, I guess, that

we've been talking about here at the Commission, the PBDEs and the like?

DR. MACDONALD: No, we did not look at PBDEs, because they hadn't really emerged with great excitement. There are some other new age chemicals that we are trying to look at, now. We didn't look at them then for a couple of reasons. One, is that we didn't have the techniques to do it, and the other is that some of these chemicals don't leave much of a trace or don't leave a records in sediments.

Q And do you know if this research has been, you know, made widely available to others that you did in the Shuswap Lake?

DR. MACDONALD: We've published this work in two or three journal articles, peer-reviewed journal articles. Certainly my manager, Robin Brown, asks to have these papers and I give them to him, so they have gotten into management in one way, shape or form.

Q Okay, thank you. I guess the reason I'm asking that question is that at Commission's Tab 25, and maybe we can just briefly go there, and at page 48, and if you just go to the third paragraph from the bottom. And this paper was done for the Fraser Basin Council and it was the -- well, done by consultants and it's looking a the water quality in the Shuswap Lakes, and it's a monitoring plan. And in this paragraph there it says:

> The degree to which emerging contaminants are present, Shuswap Lake and Mara Lake is unknown due to limited monitoring budgets and the traditional scope of regional water quality monitoring programs. Based on surveys from other large lakes in Western Europe...it is likely that some emerging contaminants are already present in Shuswap and Mara Lakes, although the concentrations are quite low and ecological implications uncertain.

And I was just was wondering whether your study that you would have done would have addressed any of -- perhaps some of the issues they're talking about here, at all?

DR. MACDONALD: It would have, I think, set a

comparative record for some contaminants, like PCBs and DDTs, because we've done those in quite a few lakes, including the B.C. Fraser Basin and including Alaska. So we would be able to do a comparison and say whether Shuswap was worse or better. But as asked in the previous question, we certainly haven't done all the contaminants, and I don't think we could say a thing about PBDEs.

I could give you an example. In one of our lakes, Nicola Lake, we found a very large hit of DDT coming in, in the 1980s, well after DDT had been banned for use in Canada. It also, following that study, Environment Canada had a look at the fish and they found high DDT in them as well. And we discovered an illicit use of DDT in that lake at that time. So the sediment cores often tell us if something's array.

I don't recall Shuswap Lake being particularly different from other lakes in that context.

MS. REEVES: All right. Okay, maybe we'll move on. I guess I'd like to mark that paper, Tab 25, as the next exhibit.

THE REGISTRAR: Exhibit 983.

EXHIBIT 983: Integrated Water Quality Monitoring Plan for the Shuswap Lake, BC, Final Report, November 7, 2010, Prepared for the Fraser Basin Council, Kamloops, BC

MS. REEVES: Thank you.

Q Moving onto Commission Tab 20, and this was a memo to Claire Dansereau, and what it is, is it's outlining enforcement and administration of pollution prevention provisions under the ***Fisheries Act***, and its opinion. And if you just go to the next page of the document, and within the summary there, the second bullet point. And it's talking, I guess, about the pollution prevention provisions have historically been administered and enforced by Environment Canada and it's talking about this whole lack of, I guess, there's gaps and the lack of understanding. And one of the options, at bullet point two, it says:

A number of emerging s. 36 issues have

> highlighted the need to address this situation, including a report from the Commissioner of Environment and Sustainable Development...
>
> And then, on bullet point three:
>
> Options have been examined and it is recommended that the Department -
>
> -- here they're talking about DFO --
>
> - pursue a position of having [Environment Canada] fully administering and accountable for s. 36 of the ***Fisheries Act***, including new regulations related to aquaculture, aquatic invasive species (AIS) and other emerging issues.

MR. EAST: Mr. Commissioner, it's Mark East, from Government of Canada. I would suggest, perhaps, that counsel ask Dr. Macdonald if he has any familiarity with this briefing note and the material within it.

MS. REEVES: Actually, my questions were actually towards Dr. Talbot.

Q Are you aware of this change -- proposed change?

MR. EAST: And I think the objection would still apply if it was a question directed to Dr. Talbot.

MS. REEVES: Sure.

Q Are you familiar?

DR. TALBOT: I'm not familiar with the memo, specifically, no.

Q But are you familiar with the proposal?

DR. TALBOT: If I may, the issue with the ***Fisheries Act*** is Environment Canada is responsible for enforcement in ***Freshwater Fisheries Act*** of the deposition of deleterious substances in fish-bearing water. But we're not responsible to do research to investigate if there are potential deleterious substances. We support enforcement and the compliance in this area if there is an issue. So if there is an investigation in relation to the ***Fisheries Act***, then we would participate in the investigation.

Q Right. But I guess my question is: Are you aware of this proposal by DFO of putting EC for "fully

administering and accountable for s. 36 of the ***Fisheries Act***," are you aware of that?
DR. TALBOT: I'm aware in the broad lines that there's discussions between DFO and EC, but I'm not part of the discussions at all.
Q Okay. Well, I guess my follow-up question to you would be, I guess from a science perspective, do you think Environment Canada, if this were to occur, has the capacity, science-wise, to take on s. 36 issues, I guess particularly with respect to science research, if this did go ahead?
DR. TALBOT: Yeah, Environment Canada does have the capacity to do water quality research in support of the ***Fisheries Act***, should there be an enforcement issue.
Q Right. But I guess I'm asking if they have the capacity, if this proposal went ahead, for a scientific standpoint?
DR. TALBOT: Yeah, I'm sorry, I'm not familiar with the specifics of the proposal.
MS. REEVES: Okay. If we could have that marked as an exhibit, however.
MR. EAST: Mr. Commissioner --
THE REGISTRAR: Exhibit 984.
MR. EAST: I was just going to file another objection. As I understand it, neither of the witnesses are familiar with this document. The lines of questions are valid; however, not being familiar with the document, and I believe it's a document directed toward a briefing note for Deputy Minister Claire Dansereau, who is going to be a witness later on in these hearings, I would suggest that, perhaps, the document, and putting the document into evidence would be better served at that time, as neither of these witnesses are familiar with the document.
MS. REEVES: Perhaps we could have it marked for identification purposes? I mean, it was put in by the Commission as a listed document.
THE COMMISSIONER: The next letter exhibit, please?
THE REGISTRAR: Letter?
THE COMMISSIONER: Yes, please.
THE REGISTRAR: It will be marked for identification double B, BB.

MARKED BB FOR IDENTIFICATION: Memorandum from Mitch Bloom to Claire Dansereau, dated December 23, 2010, Object: Administration and Enforcement of the Pollution Prevention Provisions of the ***Fisheries Act*** (Section 36)

MS. REEVES:

Q Okay, perhaps moving on, within the PPR, and we're specifically going to pages 56 and 57, and starting at paragraph 128, and this is referring to DFO's 1986 habitat policy. It says:

> a number of water quality roles and responsibilities are assigned to DFO:
>
> a. Cooperate with [Environment Canada] in the establishment of federal priorities for the protection of fish and their habitats...;
> b. Cooperate with [Environment Canada] in the use of powers to control the release of deleterious substances into fish habitats...;

The next page over, on page 57, says:

> d. Collaborate with [Environment Canada] and others to provide advice and specific requirements to control adverse effects;

And there's a number of other listings there to work closely with Environment Canada and collaborate with them. My question is for you, Dr. Talbot. As someone working within Environment Canada, how effective would you say that DFO has been in meeting these, I guess, priorities or policies in working with Environment Canada in the last 10 years?

DR. TALBOT: I don't think it's a question that I can really answer in terms of DFO's effectiveness. We do not have a formal process with DFO to work in these areas.

Q So the policy on collaboration you would say is a more informal thing, then?

DR. TALBOT: Yes, as I mentioned earlier, there's more informal collaboration at manager to manager level or scientist to scientist level, and it depends on

the issue.
Q Right. And so would you say that given this policy that's been in existence since 1986, that perhaps a collaboration and a cooperation on a science to science or manager to manager level could be improved between Environment Canada and DFO?
DR. TALBOT: I guess I would have to say that there's always room for improvement, yeah.
Q And do you have any specific improvements that you would suggest to the Commissioner?
DR. TALBOT: No, I would not.
Q I think I'll move onto my last set of questions. This goes to you, Dr. Macdonald. This morning you spoke about multiple and contaminants and communal -- cumulative, sorry, impacts as being very difficult and being at the heart of the impacts on Fraser River sockeye; is that correct?
DR. MACDONALD: I don't think I specifically said "Fraser River sockeye", but it's at the heart of working out how these effects occur for these contaminants to expose populations and aquatic systems, which include sockeye salmon.
Q Okay. Thank you. And you also spoke, and it's been mentioned again since you first said it, that you also spoke about the sub-lethal impacts on endocrine, immune and olfactory systems from contaminants, and you spoke of them as being every bit as risky as when contaminants cause, I guess, belly-upness was the term you used?
DR. MACDONALD: Yes.
Q Okay. And do you agree that contaminant research, perhaps along with genetic research, could provide cutting edge information about causes of decline of Fraser River sockeye?
DR. MACDONALD: I think the answer is absolutely, yes. The role of contaminants is not at all clear, and as you've put it, genetic research together with contaminant exposure research would put us a long way towards that.
Q And so would that be perhaps a recommendation that you would make, is that more funding or a program that would combine those two would be useful for understanding the long term sustainability of Fraser River sockeye?
DR. MACDONALD: Definitely so.
Q Okay. And would you agree that without such

research our understanding of the causes of decline of Fraser River sockeye and their long term sustainability will, in fact, be limited?

DR. MACDONALD: We will be missing something.

MS. REEVES: Okay. Thank you. That's all my questions.

MS. BAKER: Mr. Commissioner, I think Mr. Hopkins-Utter has something he wants to raise with me over the break, otherwise we would have been able to say goodbye to these witnesses, so if I could talk to him over the break and come back and either finish with these people or we'll move to a new panel?

THE COMMISSIONER: Thank you.

MS. BAKER: If we could come back at, what, five after 3:00?

THE REGISTRAR: The hearing will now recess for 10 minutes.

(PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: The hearing is now resumed.

MS. BAKER: Thank you, Mr. Commissioner. Mr. Hopkins-Utter indicated that he wanted to ask a re-examination question of these witnesses. There is no right of re-examination for Mr. Hopkins-Utter, given that these are not his witnesses. He's talked to me about what the question is, and I am not agreeing that he should be asking this question in re-examination. It's not appropriate, in my view. So I have told him that he needs to make a submission to you on that point.

THE COMMISSIONER: Yes.

MR. HOPKINS-UTTER: Mr. Commissioner, this afternoon on questions from the Conservation Coalition, I objected to a questioning on specifically SLICE, as it was used in the aquaculture industry and the marine environment. You allowed some questions on regulation of the aquaculture industry, and the witnesses answered that they did not in fact know of whether or not pesticide use in the aquaculture industry was regulated by Environment Canada or DFO, and I just seek to clarify that, that answer.

THE COMMISSIONER: Can you tell me what your question is.

MR. HOPKINS-UTTER: The question is are they unaware of the fact that Health Canada in fact regulates

pesticide use in the aquaculture industry, or are they just generally unaware of that regulation.

MS. BAKER: My position on this is that the re-examination is available to clear up something that's been left unclear. The questions were clear, they were posed with respect to DFO and Environment Canada. There was no answer given that Health Canada did or did not, it was just not asked at all. It just is not appropriate re-examination. This client group will have two weeks this summer to get into all the issues they want to get into on aquaculture and, in my submission, it's not appropriate to get into that today.

MR. HOPKINS-UTTER: With all due respect, Mr. Commissioner, we did not in fact seek to raise this issue today at all.

THE COMMISSIONER: I will allow you that one question, Mr. Hopkins-Utter.

MR. HOPKINS-UTTER: Thank you, Mr. Commissioner.

THE COMMISSIONER: Could you pose it again for these two witnesses, please.

MR. HOPKINS-UTTER: Absolutely.

CROSS-EXAMINATION BY MR. HOPKINS-UTTER, continuing:

Q Our question is: Are you also in fact unaware of the regulation of pesticide use by the aquaculture industry by Health Canada, or are you generally unaware of those regulations?

DR. TALBOT: If I understand your question correctly, I believe I had stated that pesticide use in aquaculture was regulated by the PMRA, the Pesticide Management Regulatory Agency, which is an agency associated with Health Canada.

MR. HOPKINS-UTTER: Thank you very much. I apologize if I missed your answer. And thank you very much, Mr. Commissioner, for your discretion.

MS. BAKER: Mr. Commissioner, unless you have anything to ask these witnesses, I am finished asking my questions of them.

THE COMMISSIONER: I have just one -- I am sorry, Ms. Baker, I have just one quick question.

QUESTIONS BY THE COMMISSIONER:

Q I just wanted to ask Dr. Macdonald and Dr. Talbot,

you have mentioned throughout your testimony obviously Environment Canada and DFO, and at times Health Canada. Is there any overarching body that you're aware of within Ottawa, in any Ministry that we've just spoken about here today, that has an oversight or has some role to play in the collaborative nature of some of the topics that you discussed today?

DR. TALBOT: Not that I am aware of, Mr. Commissioner.

DR. MACDONALD: And I'm not aware of it, either.

THE COMMISSIONER: Thank you very much. I want to thank you both for appearing here today and for giving your answers to the questions asked by counsel, and for taking the time to bring your knowledge and information to the Commission. Thank you very much.

MS. BAKER: Thank you very much. And our next panel will now come to the witness stand.

Thank you. Mr. Commissioner, our three witnesses we have this afternoon are Dr. Carey, closest to you, Ms. Walls in the centre, and Dr. Paradis on the end closest to counsel's table. If they could be sworn in, please.

SYLVAIN PARADIS, affirmed.

LISA WALLS, affirmed.

JOHN CAREY, affirmed.

THE REGISTRAR: State your name, please.

DR. CAREY: My name is John Carey.

MS. WALLS: My name is Lisa Walls.

THE REGISTRAR: Thank you.

DR. PARADIS: Sylvain Paradis.

THE REGISTRAR: Thank you. Counsel.

MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER:

Q I will start with Dr. Paradis, closest to me. If we could put his biography on the screen, it's Tab 1, it's your *c.v.* If you can just identify that as your *c.v.*

DR. PARADIS: Yes.

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

THE REGISTRAR: Exhibit 984.

EXHIBIT 984: *Curriculum vitae* of Sylvain Paradis

MS. BAKER:
Q Dr. Paradis, you are currently with Health Canada, but from March 2006 to December 2010 you were the Director General of DFO Science Sector's Ecosystem Science Directorate?
DR. PARADIS: Yes.
Q And from May 2003 until you took that position, you were the Director of DFO Sector's Environment and Biodiversity Directorate?
DR. PARADIS: Yes.
Q And as your *c.v.* indicates, you have a Ph.D. in Sociology.
DR. PARADIS: Yes.
Q You have worked in Environment Canada or Health Canada since 1992 in various positions?
DR. PARADIS: Yes.
Q And we'll get into quite a bit of what you did in your time at Fisheries and Oceans when we go through your evidence, so I'll leave that for there.

If I could then move to Lisa Walls. Her *c.v.* is at Tab 18. Ms. Walls, you're presently with Canadian Environmental Assessment Agency, but prior to that you were the Associate Regional Director of -- I'm sorry, you were the Acting Director of Environmental Protection Operations and you were Manager of Sector Support Section in Environment Canada, Pacific and Yukon Region; is that right?
MS. WALLS: That's correct.
Q And you were there from -- either as Acting Director or, I take it within a similar section, going back to the beginning of your career with Environment Canada, which began in 1991, you were the Acting Director of Environmental Protection from November '08 to March '09?
MS. WALLS: That's correct.
Q And prior to that you were in various departments within Environment Canada, going back to 1991?
MS. WALLS: That's correct.
Q Okay.
MS. WALLS: Actually going back to 1986.

Q Oh, 1986, thank you. And while you were with Environment Canada, towards the end you were involved in interactions with Department of Fisheries and Oceans on various water quality issues?
MS. WALLS: Yes, through the 1990s and towards the end I was involved with DFO on various water quality issues.
MS. BAKER: Thank you. And Dr. Carey -- oh, sorry, could I have that marked, please, as the next exhibit.
THE REGISTRAR: Exhibit 985.

EXHIBIT 985: *Curriculum vitae* of Lisa Walls

MS. BAKER:
Q Thank you. Dr. Carey's biography is in Tab 17. And, Dr. Carey, you have a Ph.D. in inorganic Phytochemistry?
DR. CAREY: Photochemistry, yes.
Q Photochemistry, sorry. You were a Special Advisor to the Assistant Deputy Minister of Science and Technology Branch from January to July 2010, right?
DR. CAREY: That's correct.
Q And prior to that you were the Director General, Water Science and Technology Directorate, in fact, going back to 2005, with a brief hiatus when you were Acting ADM; is that right?
DR. CAREY: Yes. I became Director General of NWRI in 2003.
MS. BAKER: 2003, thank you. All right. Could I have that marked, please as the next exhibit.

EXHIBIT 986: *Curriculum vitae* of John Hugh Carey

MS. BAKER:
Q I'm going to begin my questions with you, Ms. Walls. We've heard a bit today about Environment Canada's responsibility and it's been often described as end of the pipe. We've also heard people talk about point and non-point source pollution. Can you tell us what the "end of the pipe" term refers to within the world of Environment Canada, as you understand it?
MS. WALLS: Sure. "End of pipe" is sort of a

colloquial term that's used to describe the last point of control over a pollutant. So it's really could be the end of the pipe, the end of the ditch, the end of the culvert, the end of the leachate, but it's the last point of control before it enters the receiving environment. And so in terms of Environment Canada and DFO's mandate, with respect to s. 36 of the ***Fisheries Act***, Environment Canada would focus our efforts on the pollutant discharge, controlling the pollutant discharger, instruments to control the pollutant or prevent the deposit of the pollutant up until the last point of control, or the end of the pipe where it entered the receiving environment. And then DFO's responsibility was generally to look at the effect of the pollutant on the fish. That's very much in a ***Fisheries Act*** context.

If you look at the ***Canadian Environmental Protection Act***, it provides for a lifecycle approach to toxic chemicals mandate, which includes both the controlling of the pollutant at the source, as well as development of environmental quality in the receiving environment, but on a toxic chemical-specific basis.

Q Right. Is it fair to say that the primary focus for Environment Canada has been point source type discharges, like mining and pulp, and also specific toxics regulated under ***CEPA***, as you've just described?

MS. WALLS: Well, all my response is within the context of my responsibilities in a regional office for compliance promotion related to the ***Fisheries Act***, s. 36 responsibilities, and in that context I'd say that the focus was on regulated sectors, both under regulation pursuant to the ***Fisheries Act***, as well as ***Canadian Environmental Protection Act***, and those tended to be point sources of pollution, such as mining, pulp and paper, and associated environmental effects monitoring programs for those regulated sectors.

Work related to non-point sources was more in where there were specific programs such as the Georgia Basin Action Plan, which had an area of work related to non-point source pollution, specifically agricultural runoff and urban runoff.

And the other area of focus for Environment

Canada has and continues to be contaminated sites, and more specifically federal contaminated sites.

Q Thank you. You mentioned that you had done work on compliance and promotion in your time with Environment Canada; is that right?

MS. WALLS: Yes.

Q If you could put up Exhibit 693, this is a Compliance and Enforcement Policy for Habitat Protection. This document is dated November 2001. At page 3 of this document, there's a description. I wonder if this is of assistance in understanding what is meant when you describe compliance promotion, and I'm looking the third paragraph, which has four numbered bullets. Can you use that to explain what you were talking about when you talk about the compliance and promotion work that was done by Environment Canada.

MS. WALLS: Yes, I think that accurately describes in very broad terms the types of activities that are included in compliance promotion. The other area would be, I guess, you know, as part of related to technical assistance and public education, as well, the development of guidance materials and codes of practice, and providing input, both by Environment Canada or by other parties, such as the provincial government, and compliance promotion activities would include providing advice and input to those guidance materials. So it's the development of the guidance materials, as well as communicating and promoting them in a public education sense.

Q And was there a focus as to where that work was targeted, for example, was this compliance promotion also focused on the point source and regulated sectors, or did it have a different focus?

MS. WALLS: Mm-hmm. It was, I mean, we had compliance promotion related to all of the programs that we administered that we were responsible for administering in the region, and enforcing, and we like to refer to, you know, the compliance promotion, the compliance and enforcement continuum. So compliance promotion is the frontend work to try to encourage, promote, advise potential polluters to avoid the creation or deposit of a waste in the first place. And so for any programs that the region administered, and

specifically the ones I described earlier, compliance promotion was an important piece of to avoid the deposit of the pollution in the first place. And then you would move to compliance verification, which is doing inspections to audit and assess whether or not those controls are effective. And then finally investigation and enforcement, where there's a suspected violation of an applicable regulation.

And I think it would be worth pointing out that with respect to s. 36 of the ***Fisheries Act***, compliance promotion is a very important activity because of the fact that that is a general prohibition. There are not specific -- it's not like a specific regulation. ***CEPA*** is an enabling legislation, and so any regulatory instruments have to be introduced through regulations. There is no general prohibition component to it.

The ***Fisheries Act*** has s. 36, which is a general prohibition against the deposit of a deleterious substance, unless authorized by regulation. So in the absence of a regulation, it just says you can't deposit something that's deleterious to fish. So that requires a considerable amount of compliance promotion to enable understanding of what a deposit of a deleterious substance is and how to avoid it, unlike where there's a specific regulation will say, you know, this substance must be controlled in this way to this level, and you must report it in a certain way. It's very prescriptive typically. Whereas 36, because s. 36, because it's a general prohibition, there is a fair bit of education and interpretation that's involved in enabling the public or industries or whomever to ensure that they comply.

Q So it is broader than simply the regulated sectors that would be the -- compliance promotion would be much more broadly based than that, is that what you're saying?

MS. WALLS: It was so to answer your specific question, the compliance promotion efforts dealt with both the regulated sectors, as well as under -- general compliance promotion related to activities that could fall under the general rubric of s. 36 of the ***Fisheries Act***.

Q So a much broader spectrum. You weren't just

looking at pulp mills, for example, you were looking at anybody who could be a polluter into the environment?

MS. WALLS: Well, it depends what point in time you're talking about. As, you know, through, you know, from around 2004 through to, you know, until I left the Department actually, the efforts became much more targeted on the regulated sectors --

Q All right.

MS. WALLS: -- and point source discharges. But earlier on we had programs that dealt with non-point source pollution.

Q Okay. That's what I'm asking, is prior to 2004 it was a broad-base program?

MS. WALLS: Yes.

Q Okay. And doing that work, beginning before 2004, did Environment Canada work with DFO in the Pacific Region to do the compliance and promotion work?

MS. WALLS: Yes, we collaborated and, I guess, worked in a coordinated fashion as set out in the principles of the 1985 MOU, and the 1987 Regional Working Agreement.

Q All right. Did you work with the Department of Fisheries and Oceans Water Quality Unit?

MS. WALLS: Yes, I did, my group did.

Q And was that work with the Water Quality Unit in relation to compliance and promotion?

MS. WALLS: Yes, it was. Yes. Yes, we worked together, and so our Environment Canada's role was basically to look at controlling the pollutant at source, recommending and advising on ways to control pollution at the source up until the point of deposit into the receiving environment. And then we would seek advice from DFO on appropriate or safe water quality -- or the Water Quality Unit on presence and absence of fish species and type of fish species, as well as they would provide us advice on safe water quality thresholds for fish in a relevant sector or site-specific application.

Q Okay, thank you, and that's very helpful. How would you describe the Water Quality Unit within DFO in the Pacific Region in terms of working relationship with Environment Canada? Was it an important unit, and how was it used?

MS. WALLS: Well, it was a small unit, but it was a very effective means for us to coordinate, and it

really served as a window into -- it had a number of purposes. It served as a window into DFO for Environment Canada's environmental protection programs. So where we were dealing with compliance promotion on a site-specific or a sector-specific basis, we would work in collaboration with DFO through that group to get their advice and input on receiving water quality elements, and aspects of whatever compliance promotion we were trying to do.

And we would also have -- generally we would have annual work planning meetings where we would share work plans, and we would identify priorities and issues that we were respectively planning to work on, and that was a further opportunity to align and coordinate our activities so that we could support each other.

And I guess the third area would be, you know, the ***Fisheries Act***, s. 35 deals with harmful alteration, disruption, and destruction of fish habitat, and s. 36 deals with the deposit of deleterious substances, or water quality. Quite often if you're dealing with a site-specific development proposal, a contaminated site, or some kind of industrial sector, it has impacts in both areas. So we would work together to make sure that the advice we were providing was consistent, it made sense in a practical -- from a practical implementation point of view that you're protecting both water quality, as well as habitat for fish. And so they were -- the Water Quality Unit helped to provide that advice on the habitat impacts that was supportive with the work that we were doing on controlling pollution at the source.

Q Did you work with DFO -- did Environment and DFO work together addressing pollution limits, advising on pollution limits or establishing best practices? Were those collaborative activities, as well?

MS. WALLS: I would say they were coordinated activities. We're speaking very generally here. There was a number of different activities at the time. We were receiving a lot of referrals from the Province of B.C. on development of limits and conditions for provincial permits. So we would work together on our responses and provide recommendations on appropriate effluent discharge

limits, operating conditions, and then DFO through the Water Quality Unit would provide recommendations on safe water quality thresholds for fish or monitoring requirements, and dealing with the receiving environment.

If we were providing developing things like codes of practice or best management practice, then we would collaborate with the Water Quality Unit and they would provide advice on the fish habitat and water quality, and we would develop the aspect dealing with controlling the pollution at the source. So we worked in a coordinated fashion.

Q Do you know, was the DFO Water Quality Unit and its relationship to Environment Canada unique to the Pacific Region?

MS. WALLS: I wasn't aware of a Water Quality Unit existing in another region of DFO. But I can't say -- just I wasn't aware of it, but I can't say for sure that it was unique.

Q And I think you've already touched on this, but is the DFO Water Quality Unit still in existence?

MS. WALLS: No, it's not.

Q And it was in 2004 it was disbanded?

MS. WALLS: Yes.

Q Was Environment Canada, to your knowledge, consulted before the DFO Water Quality Unit was disbanded?

MS. WALLS: No, I would not -- I would say we were not consulted. We had a bit of a heads-up and we kind of heard that it might happen, but we were not consulted.

Q If I could ask you to look at Tab 15, if that could be put up. This is a letter from Paul Macgillivray to Don Fast, Paul Macgillivray being with DFO and Don Fast being the Regional Director General for Environment Canada. This letter is dated July 9, 2004. Do you remember seeing this letter?

MS. WALLS: Yes, I do.

Q And this is the letter where Paul Macgillivray advises Environment Canada that the Water Quality Unit is being disbanded, and that responsibility for various s. 36 activities will be done by Environment Canada in the future. What was -- was that your, a very brief summary, your understanding of this letter?

MS. WALLS: Yes. I mean, it was basically informing us that -- well, I won't read the letter, but, yeah. I mean, the letter is basically saying that they were curtailing their activity in this area, and that they wanted to meet with us and talk about how we could continue, you know, to fulfil, I guess, the overall objectives of 36 without the existence of that unit.

Q Were you involved in preparing a response to that letter?

MS. WALLS: Yes, I was.

MS. BAKER: Oh, I should mark that first letter as an exhibit, this is July 9.

THE REGISTRAR: Exhibit 987.

EXHIBIT 987: Letter from P. Macgillivray to D. Fast re Habitat Management's Role in s. 36 of the ***Fisheries Act***, July 9, 2004

MS. BAKER:

Q Right. And is that response that you prepared found at Tab 12, it's a letter August 3, 2004, back to Paul Macgillivray from Don Fast.

MS. WALLS: Yes, I was involved in drafting this letter.

Q Okay. Well, just generally before we get to the letter in any detail, what was the response within Environment Canada regional to the news, or to the letter from Paul Macgillivray?

MS. WALLS: We were surprised and we, you know, immediately started thinking about all the implications of this, and wondering how we were going to adapt, and kind of surprised that they would do this, given that we did have a longstanding history of working together effectively through the Water Quality Unit. And we also saw it as, you know, something that DFO had a responsibility under the Regional Working Agreement and the MOU of 1985 to continue to fulfil this role.

So our response was we actually got together and internally and brainstormed a list of issues where we thought this could impact our work, and that led to this list of EC-DFO s. 36 issues that you see on page 2 of the letter.

Q Mm-hmm.

MS. WALLS: And it was really, you can see it's kind of

an assortment of high level and very specific things, and it really was just us sitting together and brainstorming all of the areas that we worked together, and what we would need to talk about in response to this letter with DFO, and then a meeting was organized to talk about it.

Q At that time was Environment Canada relying on the Fisheries and Oceans Water Quality Unit to provide it with science advice that it needed to do its work?

MS. WALLS: It was very much a coordinating unit, so they were, like I said, it was a small unit. I don't know, maybe six or -- five or six or eight people. And so they weren't doing the science research themselves, but like I said, they were a window into the Department, and they knew where to get the science. So if we had a specific question, and we had, you know, regular things that we worked together on, such as contaminated sites, permit referrals, comments on development of code of practice and, you know, various inquiries that we would get related to general ***Fisheries Act*** 36 activities that could be in potential non-compliance with s. 36 of the ***Fisheries Act***, we would work together on those things. And so, sorry, what was the question?

Q Whether Environment Canada relied on science advice from DFO --

MS. WALLS: Yes. Yes.

Q -- to address some of the issues that it was...

MS. WALLS: Yes. So we worked with that group on the things that we received comment, questions about all the time we had, that unit themselves would provide the information. But they also, like I said, were a coordinating function and a window into DFO so that they would know where to get the expertise and direct that to help respond, to enable Environment Canada to respond in a fully, in a comprehensive manner to a s. 36 question.

Q And then bullet number 13 has a number of different files set out.

MS. WALLS: Mm-hmm.

Q Contaminated sites, aquaculture, municipal wastewater, et cetera. Did Environment Canada at that time have the capacity in the region to take on the science advice previously provided by DFO to support those areas?

MS. WALLS: At the time, not the science advice that DFO provided. Like I said, previously Environment Canada's focus was on the regulated sectors and we did have expertise in those sectors, pulp and paper, metal mining, both the effluent control, as well as the receiving environment impacts. So we were able to pick up in those areas. But in these other areas at the time, we did rely on DFO to provide the water quality advice.

Q Okay. And was Environment Canada funded to do research and science work in water quality and receiving environments in those areas that are set out under bullet 13?

MS. WALLS: No.

Q All right. After the letter from Don Fast was written and delivered to the Department of Fisheries and Oceans, was there a meeting between the two agencies to discuss those issues and what the implications were of the decision by DFO?

MS. WALLS: Yes, there was.

MS. BAKER: And you've provided me with some minutes of some meetings. If I could ask you to turn to Tab 21. The first of these actually chronologically is Tab 23, which is an email.

Oh, sorry, yes, I do want to mark it. Yes, sorry, the letter from Don Fast should be marked as the next exhibit.

THE REGISTRAR: That will be 988.

EXHIBIT 988: Letter from D. Fast to P. Macgillivray, August 3, 2004, response to letter of July 9, 2004

MS. BAKER: Thank you.

Q Back to Tab 23, which is an email from you to a variety of people. Do you have that?

MS. WALLS: Sorry, which tab?

Q It's no the screen there.

MS. WALLS: Oh, okay.

Q It's from you to various people.

MS. WALLS: Tab 23?

Q Yes. All right. So this outlines action points from a February meeting.

MS. WALLS: Mm-hmm.

Q Was that, was February the first meeting that you had with Environment Canada and DFO together?

MS. WALLS: The February 16th meeting was the first

meeting that we had to discuss this matter, yes.
Q Sorry, these are a bit out of order. If we turn to Tab 28, that has the agenda from that meeting.
MS. WALLS: Yes.
Q Maybe I'll just start with that agenda, then.
MS. WALLS: Mm-hmm.
Q All right. And who was at this meeting?
MS. WALLS: The directors of the responsible units in Environment Canada and DFO, which is Mike Nassichuk, who was the Regional Director for Environmental Protection Operations, and Sue Farlinger, who was the Director of the Habitat Division, I don't have the correct title, but Director of Habitat at DFO in the Region. As well as their managers that were responsible for this area of work, which was myself, Lisa Walls, and Bonnie Antcliffe, and some key staff, as well.
Q All right. And what was discussed at that meeting? What was the plan?
MS. WALLS: Well, really, it was our first opportunity to talk about this change in DFO. So it was an initial sharing of information on changes that were going on in our respective Departments that were affecting how we were organized to deliver our responsibilities with respect to s. 36 of the ***Fisheries Act***. DFO explained the changes that they were undergoing with respect to their Environmental Process Modernization Initiative, which were part of the drivers for their decision to wind down the Water Quality Unit. Environment Canada talked about some of the governance changes that we were embarking on through something called the Transformation Initiative, and a CESF, Competitiveness and Environmental Sustainability Framework.

So it was an initial meeting to kind of explain, update each other on the changes that were going on in our Departments, and so, you know, for DFO it was an explanation of why they were winding down this unit, and for Environment Canada it was saying, well, you know, we've got some changes going on that are affecting our ability to continue to work in the same way in our Department.

And from there we identified again some of the implications that would fall out of this. And there was an agreement to set up a group, a

working group, or a steering committee to have further discussion on the specific areas that we were impacted and that we would need to find new ways of working together.

Q All right. And this meeting was in February, but the letter from Fisheries and Oceans was the previous July, so --

MS. WALLS: Mm-hmm.

Q -- what happened in that long period of time between when you got the notice from DFO and when the first meeting happened?

MS. WALLS: Well, I think, you know, they -- it wasn't like they completely just stopped immediately. The people were still there, they were winding down. There was a smaller group that we could continue to work with. So in that interim period we did continue to work similar to what we had previously, because they had a Water Quality Coordinator that continued on for about a year, I think, after that letter was issued. And some of the people were still there. So in that interim period we sort of carried on.

MS. BAKER: Okay. Could I have that agenda marked, please, as the next exhibit.

THE REGISTRAR: Exhibit 989.

EXHIBIT 989: Agenda, DFO Habitat Management-EC meeting, February 16, 2005

MS. BAKER:

Q And then going back to Tab 21, I think this is the next set of minutes, this is April 14, 2005.

MS. WALLS: Mm-hmm.

Q This was the follow-up meeting to the February one?

MS. WALLS: Mm-hmm

Q Is that right?

MS. WALLS: Yes.

Q And what was the outcome of that meeting?

MS. WALLS: Well, one of the outcomes was that Environment Canada regionally set up something called the ***Fisheries Act*** Working Group, and the purpose of that was to better plan, coordinate and identify priorities for our s. 36 ***Fisheries Act*** compliance promotion activities within Environment Canada. And we agreed that we would, you know, share information of activities of that group with

DFO and try to get their input.

There was an agreement that we would continue to track information that came in -- we received, we both received, a lot of inquiries and requests for advice and information related to activities that might affect fish. And so we both agreed to track that work and to share information, to try and get a sense on sort of what was the problem, what was -- there was a fear that with DFO closing down the Water Quality Unit that people that had previously gone to that group - besides Environment Canada - for advice, would then all of a sudden start coming to Environment Canada and we wouldn't have the capacity to respond. So we started tracking those inquiries and tried to get a better handle on exactly the nature, the type, the number of inquiries and how they were coming in.

And there was also an agreement to have some follow-up discussions with respect to contaminated sediment issues related to contaminated sites, and what Environment Canada and DFO's respective roles and responsibilities would be with regard to that issue.

Q And if we look at page --

MS. WALLS: Yeah, I mean, the action items are tracked. I'm just -- I'm going through them.

Q Yes.

MS. WALLS: But, I mean, those were the key ones. The other one was to develop a two-page document that would describe in general terms what ***Fisheries Act*** 36(3) obligations are, so that we could use that document in kind of just a generic template way to respond to requests for advice and information. So we agreed to develop that, Environment Canada agreed to develop that and to get DFO's input on that sheet.

Q Right. And if you see the heading "Action Items", if you move two paragraphs ahead of that, higher up the page.

MS. WALLS: Yes.

Q It says:

> DFO will continue to do contaminant science as it affects fish, but will move away from human health aspects. [Environment Canada] request for research priorities should be

directed to the Water Quality Manager...

That's a person within the Water Quality Unit, is that right?

MS. WALLS: No, it was -- yeah, it was a person within the Water Quality Unit, although the Water Quality Unit was being wound down. So there was a Water Quality Manager position that continued on a short-term basis. And so that person was identified as the point of contact.

Q All right. But this describes, this paragraph that I was reading describes the process that was set up to keep lines of communication going on --

MS. WALLS: Yes.

Q -- science, yes. The lines of communication between Environment Canada and DFO on science requests was going to be handled in the manner set out in that paragraph. Requests would go from Environment Canada to the Water Quality Manager?

MS. WALLS: Yeah, and this is very much in a regional context.

Q Right.

MS. WALLS: So this, this is in Pacific and Yukon Region.

Q Right.

MS. WALLS: And as I said, the Water Quality Unit served as our - "our" being Environment Canada - Environmental Protection in Pacific and Yukon Region, that was our window into DFO to get, to share information on emerging issues, priorities, research requests, and water quality advice. So what this was saying is that there was one individual, that the unit was wound down, but there was one individual identified to be the Water Quality Manger, and they would continue to be our contact for this type of information. So it was shrinking from a unit to a person, and that person only existed for another six months or so. It was funding that disappeared and that person was reassigned to other activities. So that was the plan, but it didn't last for very long.

MS. BAKER: Thank you. Could I have those minutes marked as the next exhibit.

THE REGISTRAR: Exhibit 990.

EXHIBIT 990: DFO-EC Meeting Minutes, April 14, 2005

MS. BAKER:
Q And the last set of minutes are dated in October and they're at Tab 22. Is this the last -- well, first of all, was DFO at this meeting?
MS. WALLS: Yes.
Q Okay. And was this the last meeting that was held between Environment Canada and DFO to try and work through these issues?
MS. WALLS: Yes. It was the last, I guess. last of the steering committee meetings.
Q Mm-hmm. And was the outcome from this the development of a new relationship between, and an understanding of who had responsibility for what aspects in the Pacific Region?
MS. WALLS: Well, in a number of these areas I would say that the working relationship shifted from being coordinated through the Water Quality Unit to program-specific context, contact. So for instance, the contaminated site issue, there was a Federal Contaminated Site Action Plan that started up, and Environment Canada and DFO and Health Canada continued to work cooperatively under the Fisheries -- or, sorry, under the FCSAP, or Federal Contaminated Sites Action Program. Dioxin monitoring, there were, you know, people working in that area continued to work together. Permit referrals, that actually the frequency of permit referrals actually wound down because the province moved away from permitting individual discharges. There was work that continued on enforcement, so the enforcement people spoke to each other, and the ***Fisheries Act*** 36(3) fact sheet was developed. And the ***Fisheries Act*** Working Group continued until about 2006, and then that sort of -- that activity ended. So I would say that for the most part that work continued, but not -- it was more program-to-program, scientist-to-scientist kind of contact.
Q Were there any of the gaps that were identified in the letter which has now been marked - I don't have the exhibit reference now - 988, the gaps that were identified in that exhibit, have they been -- or are all of those gaps now addressed, or are there some that remain unresolved?
MS. WALLS: Can you refer me to the Tab number again, please?
Q 12.

MS. WALLS: 12.
Q 12.
MS. WALLS: I would say that -- and this is at the time, so 2005/2006, some of the items in bullet number 13, there was a bit of a gap in receiving water quality advice as well as on Environment Canada's part. We were lacking a lead on ***Fisheries Act*** s. 36 issues, so that contributed to kind of a lack of focus on a number of these items listed in bullet number 1, with some exceptions. For instance, municipal wastewater continued to be a high level of activity, both on the science side as well as the compliance promotion, and regulatory development side led by Environment Canada. Environmental assessment, to the extent that the development proposals related to areas that Environment Canada had expertise, such as mining, that work, I think, continued effectively, because there was another program, contaminated sites, like I said, Federal Contaminated Site Action Program. And I'd say emergency response and investigations continued to be dealt with. The one that I would -- the couple that I think where there was a gap at the time was on the aquaculture file, on what I would call miscellaneous industries, or what's referred to here as miscellaneous industries. I think that that's the unregulated sectors, or they tended to be the small and medium-size industries, SMEs. Fish processing was another area that there was reduced attention to and reduced coordination.
Q And what about coastal dioxin monitoring?
MS. WALLS: That was a very small program, and that was one where the DFO and Environment Canada scientists that were involved in the program continued to work one-on-one. And that program was actually in the process of winding down because this was looking at monitoring dioxins and furans in shellfish, and to monitor the response to the implementation of the dioxin/furan regulations and the levels were coming down considerably as a result of changes in the pulp and paper industry. And they eventually, that eliminated the need for that program to continue because the levels came down to safe levels.
Q For an environmental assessment, you touched on this a little bit, but would you say that the

expertise for water quality and fish habitat is now properly coordinated between DFO and Environment Canada, or is that still a bit of a grey area?

MS. WALLS: Well, there's good coordination now because of changes under the ***Canadian Environmental Assessment Act***, so it's clarified the coordination. Where there can be a bit of a gap is with respect to water quality advice. So DFO is very involved in environmental assessments, providing advice on fish habitat matters and fish species and populations presence and what's required for protection of fish habitat. And Environment Canada provides advice on water quality, and again that depends on having an expert that has experience and works with the relevant sector that the development pertains to, and again, you know, mining is an example where we have an environment -- where Environment Canada has an Environmental Effects Monitoring Program, so they have expertise to provide. If it's a sector that Environment Canada doesn't have a program in, then it can be harder to find the water quality expertise.

Q And the programs that Environment Canada does have in those different sectors would include, what, pulp, mining, and anything else?

MS. WALLS: Pulp, mining, contaminated sites, shellfish under the Canadian Shellfish Protection Program - I'm not sure if I have the right terminology - Canadian Shellfish Sanitation Program, and environmental emergencies, Environment Canada has expertise. So Environment Canada has with the Environmental Protection Program has become much more focused on certain program areas.

Q Okay.

MS. WALLS: The oil and gas sector, as well, is another one.

Q And any sectors that where there's not a specific Environment Canada program, who's dealing with water quality, which agency?

MS. WALLS: It would depend on, you know, exactly what the development proposal is, and basically people would look and try and find somebody that had the expertise.

Q Which agency?

MS. WALLS: So it could be the provincial government,

for instance.
Q What about pesticides? Who has responsibility for water quality impacts on pesticides?
MS. WALLS: That's the PMRA.
MS. BAKER: We were looking at the October minutes and I haven't marked them yet as an exhibit, which I should do, Tab 22.
THE REGISTRAR: Tab 22, did you say?
MS. BAKER: Yes. That's right.
THE REGISTRAR: Yes. Exhibit 991.

EXHIBIT 991: DFO-EC s. 36 Steering Committee Meeting, Draft Agenda and Minutes, Meeting Minutes and Queries Tracking Charts, October 27, 2005

MS. BAKER:
Q At the end of this meeting in October, the issues that you have identified here, that we were just talking about, about the gaps.
MS. WALLS: Mm-hmm.
Q Was a plan put in place to identify those gaps, or do those gaps still remain?
MS. WALLS: Well, Environment Canada's response was to set up the ***Fisheries Act*** Working Group, and the working group set up basically a risk management framework using a set of criteria to evaluate all potential ***Fisheries Act*** s. 36 compliance issues that we dealt with in the region, and to prioritize them according to risk, and to try and focus our limited resources and expertise on the highest priority activities. So that was our effort to deal with those gaps. And then we tried to secure funding to address the highest priority issues.
Q So the gaps that we have been talking about that you just identified, have they been resolved now, or are they still -- are those gaps still there?
MS. WALLS: Okay. So I have been -- I haven't been with Environment Canada since March 2009, so I can't --
Q As of that time.
MS. WALLS: But as of that time, I would say that -- we haven't gotten into it here, but that because of organizational changes in Environment Canada, there was a lack of -- there was no departmental lead on ***Fisheries Act*** s. 36 compliance promotion

specifically. So there was enforcement activity that under -- there was a program for enforcement and investigations relating to ***Fisheries Act*** s. 36, but there was no departmental lead or accountability or coordination on s. 36 of the ***Fisheries Act*** compliance promotion efforts, and as a result there was still a bit of a -- I would say, you know, it wasn't a gap in that people weren't aware of the issues and people are sort of keeping a file on some of these issues, but there wasn't a concerted strategic effort to advance them. So some of the files are moving extremely slowly. And there was a lack of resourcing in the region for ***Fisheries Act*** s. 36 compliance promotion because of the organizational and governance changes.

THE COMMISSIONER: Ms. Baker, we'll take the break. Thank you.

MS. BAKER: Thank you.

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

(PROCEEDINGS ADJOURNED TO JUNE 7, 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.

_____

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.

_____

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.

_____

Karen Hefferland