

**February 9, 2011**  
**Cohen Hearings**  
**Testimony of**  
**UBC Professor Carl Walters and Dr. Jim Woodey**

Starting at page 50 of the hearing transcripts

**Q** *And Mr. Wilson, where does your information come from?*

**MR. WILSON:** Well, I'm looking at a reconstructed run. The source cited here was Pacific Salmon Commission. I'd have to sort it out exactly, but it's the same reconstructed database, I believe, that goes back to 1893. It's true that --

**DR. WALTERS:** That's Gilhousen database basically.

**MR. WILSON:** Yes. It's true that the stocks were strongly cyclic, but every four years we saw an escapement that was comparable with the 2010 returns. So going back to eighteen ninety --

**DR. WALTERS:** That's because all the stocks were on the same cycle line. If you --

**MR. WILSON:** Fair enough.

**DR. WALTERS:** -- remove the recent Adams stock and Horsefly and so on all to the same cycle line, you'll find that the peak is very similar.

**MR. WILSON:** I'm just making the point that with these very large escapements occurring every four years, you might have expected to see some stock collapse, but there doesn't appear to be any evidence of that on the data prior to Hell's Gate.

**DR. WALTERS:** You don't expect to see what?

**MR. WILSON:** You would expect to see some stocks collapsing when you're seeing escapements of, you know, very large escapements and runs on the 40 million range.

**DR. WALTERS:** You don't think that having three out of four years having very low returns represents anything like collapse?

**MR. WILSON:** No.

**DR. WALTERS:** Consistently three out of four being low?

**MR. WILSON:** Well, it may be that cyclic dominance is the natural state of affairs in Fraser sockeye. I'm simply making the point that very large escapements occurred every four years. Now, it may be a problem for fishermen and it may be a problem from the standpoint of taking yield, but it's unlikely to be a problem for the fish themselves.

I don't see the stock collapse as a biological problem. I don't think that's what we're talking about here. We're talking about an arrangement that may not suit even commercial fisheries on an annual basis, but we saw strong, healthy runs, cyclic or not, and there's no evidence that those runs are in any sort of decline.

The dominant cycle seems to be strong and returning at between 16 and 39 million, based on Gilhousen's data. So it seems to me that if these large escapements were causing such difficulty, that some of those difficulties should have been evident during that time period and should be shown in the data.

**DR. WALTERS:** They were evident in the three out of four years when poor returns occurred.

*Q All right. I think we've got that point. The question I would like to ask now about this paper, the 2004 paper, is we've heard about how it was -- how the work was done and why it was done.*

*Is it -- does it remain today a valid tool for managers to use in assessing impacts of over-escapement on stocks?*

*Is it valid today to use the results of that work to assess whether a stock collapse may result from an over-escapement?*

*And I'll start -- I'll ask Dr. Riddell that question.*

**DR. RIDDELL:** Well, is the paper still valid? I'm not sure that it's the correct comparison, I guess, in the sense that I would still draw the same conclusion about stock collapse, but we are going to add different cautionary notes as Carl alluded to earlier, because we have more data, we've seen larger escapements and we do now think that there are different models, much stronger inferences about the interaction between lines, certainly increased information about rate of loss of productivity and high spawning escapement goals, but as we've said in the beginning, that's largely expected to some extent.

Are we seeing collapse where we're not getting recoveries of the stocks?

No. We're still not seeing that unless the notion of the delayed density dependence really continues to escalate. There is clearly a concern in terms of the trends in return in Chilko sockeye are perplexing, although they did much better last year in 2010 again, so it remains to be seen what happens after that.

You know, in reading through it again carefully in terms of preparation for today, at the time I don't think I would have really changed anything. It needs to be read for the specific question that was asked. As I say, it's not about fishing policy. But I think we would add more assessment -- we probably wouldn't even do as very -- what I said as sort of a simple presentation now because the Larkin analysis obviously requires more consideration of the interlying interactions.

**Q** *Dr. Walters, do you have anything to add?*

**DR. WALTERS:** Yeah. What Brian really said is what -- and I'd agree, is we'd be a lot more careful today --

**Q** Okay.

**DR. WALTERS:** -- about our conclusions. We wouldn't be quite -- we wouldn't be near as strong in saying what we said.

**Q** Okay. Thanks. I'd like to move to another variation on this theme. [Since management of Fraser River sockeye moved from the prior strategy that was used by the IPFFC to the focus on rebuilding and conservation under the rebuilding strategy in 1987 and then through FRSSI, has that change in management strategy resulted in any negative impacts to Fraser River sockeye stocks?](#)

And I'll start with you, Mr. Wilson.

**MR. WILSON:** Well, by negative impacts, are we talking about negative biological impacts on the -- you know, the ecology and -- of Fraser River sockeye or are we talking about changing yield, the number of fish available for human use?

**Q** Well, why don't you answer both of those questions for me?

**MR. WILSON:** I think there's likely to be an impact of higher escapements on the number of fish available for harvest, particularly in mixed stock fisheries. I'm far from convinced that there's any long-term negative impacts on the populations themselves that result from high escapement. In fact, I've seen no evidence of it at all.

**Q** *All right. Dr. Woodey?*

**DR. WOODEY:** Could you rephrase the question?

**Q** Yes. What I asked was whether there's been -- we talked about this a little bit earlier too, that [there was a change in management escapement policy and management strategies from the old Salmon Commission](#) to the rebuilding strategy that was implemented by DFO in '87 and through to FRSSI today and since mid-2000s. [Has that](#)

change in management strategy had any negative impact to Fraser River sockeye stocks?

**DR. WOODEY:** The change from the IPSFC to the early years of DFO management was relatively -- management patterns relatively similar, so we're not talking about differences immediately based on the 1987 stock rebuilding.

But the harvest rates in some of those years were still fairly high and it was because there was essentially a desire to keep the large stocks at approximately maximum sustained yield point. There was concern with the rebuilding of some of the other either smaller stocks or off-cycles of large stocks, but we're not talking about the change to what is called for in the FRSSI model, which would be a much lower maximum harvest rate.

**Q** *Okay. Did either of those strategies have a negative impact on the stocks in your view?*

**DR. WOODEY:** In some cases there had been a positive response. I think the response of the Quesnel runs in the late '80s, early '90s and so on would have occurred regardless of any change in the pattern of management. The subdominant runs were building up and built up further in that time period. Some of the issues if you look at the data and don't question them on Chilko, those large runs that started occurring in the early '90s or large escapements were the result of some fertilization in some of those years. There were good responses to fertilization in some of the early '90s.

**Q** *Dr. Riddell?*

**DR. RIDDELL:** Well, I think if you look at the basic question in terms of what's happened over time, you would have seen a build-up, so there would have been a positive response through the initial escapement rebuilding program following, I guess that was the late '80s, that discussion, and then on through the '90s.

When you've got to some of the very large escapements in recent years, as we've talked about several times already, there is evidence now of these interlying interactions that could be seen as being negative. They will reduce the production that we're getting back and so there may have well been a cost in terms of potential production of Fraser sockeye.

Have they done damage to the stock? See, I don't think that you can say that in the sense that you've had lots of spawning capacity. We obviously have had good years, return when we've got good marine survival, but you may through some periods have certainly been able to produce more fish if the density dependence starts to compound after the escapement goals. But I think any talk about negative impact on the stocks is probably not true.

**Q** Dr. Walters?

**DR. WALTERS:** I'd agree with what Brian said. I don't think we can identify any serious negative impact on the stocks, unless it turns out that the system is reorganizing itself on a large scale across multiple stocks to go back into a more violently cyclic regime like the late 1800s.

**Q** And --

**DR. WALTERS:** If that's occurring, there could be deleterious effects on a number of stocks.

**Q** And how would we know if that's actually happening, if that hypothesis is valid?

**DR. WALTERS:** Well, if it -- the worst fear is if next year is a real bust, and then we see two more years of real bust after that and then a real big run back, if we see the pattern of from 2007 to 2010 repeated again.

**Q** *All right. Next question is again on a different subtopic here. Do we -- we've talked a lot about carrying capacity of lakes and I would like to ask the panel if we know enough now about the carrying capacity of lake systems to fully understand the impacts of large escapements on these stocks.*

*Like, do we have enough information now to do the work needed to better understand some of these impacts? I'll start with Mr. Wilson.*

**MR. WILSON:** I don't believe so.

**Q** Okay. Mr. Woodey -- Dr. Woodey?

**DR. WOODEY:** We know a lot about certain of the lake systems, certain Quesnel and Shuswap in particular. We need much more information on some of the other lake systems in the watershed to ensure that the decisions that are made in regard to escapement policy are taken with a good, clear understanding of what we're dealing with in terms of the productive capacity of lakes and the interactions between cycle lines, delayed density dependence issue.

We have systems, lake systems, that are likely undergoing fairly major changes as a result of the way the escapement has occurred or escapement levels have changed in the sense of the food capacity to rear fish. And I really think that the lake survey program is -- needs to be revitalized and it's been reduced by their financial capacity to cover more lakes, so it's -- right now the only lakes in the system that are consistently done are Quesnel and Shuswap and we do need more information on some of the other systems.

**Q** Thank you. Dr. Riddell?

**DR. RIDDELL:** Well, I think I agree with Ken, but I wouldn't be quite as emphatic in terms -- we know enough now to ask better questions. We know to focus on -- we really can't address this freshwater issue without looking at the fish health - some of the comments Carl's made about parasites, for example. We do need to look at some of the other lakes in terms of their dynamics. I think in previous sessions we've talked about what's going on in the Stuart Lakes.

Well, we're not doing any work up there any more. So clearly to restore that lake - and Carl referred to it this morning - the statistic it looks like we should fish them harder. I expect you'd have a hard time convincing many people that that's where we should go in Stuart Lakes right now. So to justify that, you clearly want to do some work in the fresh water.

And I think the big question is maybe we know enough to be a bit dangerous to think we know too much, but we really need to do the ecosystem studies in each year. Again, we talked about this in previous sessions. Right now we tend to sample in only one or two years when the dominant escapements have been there. To really look at the interactions you need to actually do the study each year and that has not been done for a number of years. So I think I agree with Ken that we don't know enough. We have learned a lot by what we're doing but we still need to do more work, I think, to tie this down.

**Q** Thank you. And Dr. Walters?

**DR. WALTERS:** I'd agree with what everyone else has said.

**Q** Thank you. Given time is precious here, if you think you've already answered this question, please just tell me so, but do the TAM rules that are created using the FRSSI model, which has a 60 percent harvest rate ceiling, does that create a risk of over-escapement?

*And if you've already answered this when I asked the question about whether the policy, the harvest policies of rebuilding and FRSSI had any impact, then just let me know. But if there's a different complexion to this question which gives rise to a different answer, please answer it. So do the TAM rules with the 60 percent harvest rate ceiling that come out of the FRSSI model present a risk of over escapement? Mr. Wilson?*

**MR. WILSON:** Well, from the yield perspective, I guess the biggest concern I have is that we put a cap of 60 percent on this aggregate with a buffer to protect diversity in smaller stocks. But what we don't allow ourselves the luxury of doing is harvesting fish in large numbers in terminal areas. So if you're convinced that a particular escapement is hazardous to the health of a particular salmon stock or CU, then certainly you might want to harvest it down in terminal areas. But part of the issue that's

been driving this whole process is the health of smaller stocks and the protection of stocks that aren't producing as well.

So the price we're paying for protecting weak stocks is, if you like, under-fishing on the strong ones. By changing the structure of our fisheries, we could certainly address that problem, gain benefits in terminal areas and still custom tailor the harvest strategy for an individual stock. That's not going to be easy and it's going to require some changes in our fisheries, but at least many of the concerns that have been expressed here could be addressed to some degree through that style of management.

**Q** *Thank you. And Dr. Woodey?*

**DR. WOODEY:** I don't have any comment.

**Q** *Dr. Riddell?*

**DR. RIDDELL:** I think Ken has addressed it quite well. I mean, obviously 60 percent sounds modest compared to past history, but it's substantially more on average than you've seen in the past probably five or six years anyhow. The question in my mind though is you really need to look at what are the triggers that would allow you to get to 60 percent. Because there could be triggers that very infrequently allow you to get there. So I think you have to look at the whole agreement before I could really comment on whether it's going to contribute to over-spawning.

I just don't know unless you really look at how the 60 percent would be triggered.

**Q** *All right. Dr. Walters?*

**DR. WALTERS:** Well, as I mentioned earlier, the most recent Larkin model analyses suggests we might ought to be fishing harder if we don't get continued poor marine survival rate like we've had. I think Ken's bang on in saying that the 60 percent is kind of a compromise and intended to protect weak stocks and allow reasonable harvests and so on. Like, that -- it's a poor man's compromise compared to a more fundamental change in fisheries management that permitted more selective harvesting of a stock, wherever that might take place, up in the river or wherever. As long as we're going to be operating our fisheries primarily as large offshore mid-stock fisheries, we're going to always be facing this nasty trade off.

We're always going to be facing whether it's worth saving a stock that produces 50,000 fish like the Cultus, if letting it go we could catch 300,000 fish from the Weaver.

Those are hopeless decisions. It's a hopeless trade-off. It's not surprising that the management system has come out with a kind of a compromise, it's lose/lose for everyone.

**Q** *Well, that answer leads me into my next question, which is whether protection of weak stocks like Cultus should -- so how do you balance the protection needs for weak stocks like Cultus against risks of over-escapement or productivity impacts on stocks that may have that risk where there's a high level of spawners released onto the spawning grounds? So how do we do that balancing?*

And maybe go to you, Mr. Wilson, to start.

**MR. WILSON:** Well, the whole issue of the value of biodiversity comes into this answer. I guess our observation over the last few years has been that some stocks that we felt were potentially quite minor stocks, such as the Harrison, have become very large and now produce substantial yield and benefits to commercial fisheries. It's my understanding that the world is in a state of rapid change and always will be and salmon populations are in the business of adapting to that change and trying to survive.

Biodiversity is the raw material that salmon populations use to adapt to change.

Conditions change to favour one stock and to the disadvantage of another and the stocks that produce the yield will change from time to time. But it requires a knowledge of the future that we don't have in order to make a decision a priority about which biodiversity we can afford to sacrifice in the interests of yield and which needs to be protected. So our approach has always been to try to maintain and even improve on what we have. If we can do that, then we're going to be able to win on both counts.

**Q** *Dr. Woodey? And if you can respond to the issue raised by Mr. Wilson, as well, that would be helpful.*

**DR. WOODEY:** From our perspective in harvesting strong stocks and protecting weak stocks, there's trade certainly and one cannot expect that you can optimize escapement levels on all stocks at the same time and there needs to be an understanding that you don't manage the whole fishery for Cultus Lake sockeye and in fact, Cultus Lake was doing reasonably well in the '90s prior to the early -- the onset of early upstream migration of late run sockeye and that has thrown a whole -- the whole thing out of whack, a monkey wrench.

And all of these low exploitation rates are -- not all, excuse me, Brian, but low exploitation rates in the '90s are largely -- well, a combination of poor marine survival, but then even when there are full numbers of fish, the DFO's policy on late run sockeye management has constrained harvest and led to some of these over-escapements that we've talked about.

**Q** *Do you have a response to Mr. Wilson's point that we need to maintain all of the biodiversity we see in this system, that that is kind of protection for the future in a changing world?*

**DR. WOODEY:** In terms of biodiversity as it pertains to sockeye stocks, the -- maintaining all of the cycle, the four cycle lines at high levels or -- is not a high priority from my point of view, because naturally I think the evidence shows that there's been years or periods of time when off cycle lines have not produced well, but there's a biological reason for that if we're going to maintain cyclic -- cycle line interactions exist and the cyclic dominance pattern is maintained.

Where your biodiversity comes in is the fact that you've got major stocks or major returns on at least one, if not two, two lines. You're not going to lose those stocks if one of the off-lines is over-exploited by the fact that a different stock has a dominant run on that line and is harvested at a high rate.

**Q** *So you're saying where you have a mixed stock happening at the same time, and one of those is on an off-cycle, one of them is on an on-cycle, if you harvest at the on-cycle rate, you're not going to impact that off-cycle on the weaker stock? Is that what you're saying?*

**DR. WOODEY:** I'm just saying that, yes, you would impact that line escapement but if it is dominant on a different line, you've still got a major stock and, you know, good health in the system.

The sockeye we say are primarily four-year-old fish at maturity, but a portion of their recruitment is at age five, and those five-year olds get sloughed off from the dominant line to the subdominant and comprise in, say, for Quesnel have comprised over 50 percent of the escapement on a subdominant line and then their offspring come back as a high proportion of fives.

So there's a direct relationship between the proportion of fives in the escapement and the proportion of fives in the recruitment. So fives tend to produce more fives and so you -- if you get a hole in one line due to over-harvest, there will be a rebuilding of that from five-year-olds that are coming from other lines.

**Q** *Dr. Riddell?*

**DR. RIDDELL:** Well, as Ken pointed out in the beginning of this, it really is a matter of trade-offs and how we set the objectives. And we've also talked about inland fisheries, where you have opportunities in some of these larger stocks, but, you know, fundamentally I suppose this gets back to the *Wild Salmon Policy* discussion again, and it should be pointed out, I think, that the *Wild Salmon Policy* does not require every conservation unit to be at the same level of status. And so you really can, through Strategy 4, that I guess we'll talk about later, this really is a matter where the people affected should be involved in the assessment and discussion and come to a best solution. You are going to have trade-offs in these values. Just the way Carl says, if it's out in the open and you have less certainty in your information, the trade-off is going to be even bigger. But this is the sort of thing that we anticipated under *Wild Salmon Policy*

and how you actually meet your objectives for biodiversity as well as sustain fisheries and add to that increasing request for inland fishing.

So this is really a matter of finding a way to get a process in place that can actually undertake these trade-offs and make the best decision within an open environment.

**Q** *And do we have a process now that allows that to be done?*

**DR. RIDDELL:** Well, I mean, this is the discussion about Strategy 4 of the *Wild Salmon Policy*. We have processes involved. Do we have analytical processes where people can really work with some of the data? I mean, Carl's the expert in doing trade-off assessments and he's done some nice work with -- in the Skeena drainage for what we called the Independent Science Panel. We did do a structured decision analysis for how you can serve Cultus Lake Coho, but that's an example of the process but it was really a slightly different question in terms of what's the best combination of recovery tools at hand - enhancement versus predator removal and that sort of thing.

You can do the same type of analyses looking at the contrast between the productivities of the different conservation units. But the other thing -- I mean, as Jim has just said, there are opportunities between lines. When you're talking about conservation of genetic material you're looking at a multi-year thing because you're talking about the genetically affected population, not just the census number in a year, so there is a little cross-year mixing that does go on.

**Q** *Dr. Walters?*

**DR. WALTERS:** Yeah, I guess -- I have to wear two hats in answering that question. As a biologist, I abhor the idea of losing these unique evolved genomes, like Cultus Lake. It's a very unique creature. But on the other hand, if I tried to empathize with or put myself in the place of a commercial fisherman and over the last few years he has to worry that he's lost something like half of his income, which is a very large price to ask anyone to pay to ensure the future of the Cultus Lake, it would be very much like you're going to your stockbroker and having your stockbroker tell you that you had to keep every stock you've ever owned. I think you'd get rid of your stockbroker, wouldn't you?

There is a very fundamental conflict of interest here between those of us who prize diversity for its own sake versus those who are having to foot the bill for the things we prize.

We cannot objectively say that maintenance of biological diversity is necessary for sustained fishery.

We can very likely sustain fisheries forever on the Fraser just on the basis of its large stocks, and the (indiscernible) stocks that, like the Cultus, never will have the potential to replace the loss if any of those large stocks collapse.

**Q** *What about this -- what about the notion that we have had described or this theory that we need to maintain all the small stocks in order to create insurance for stock collapse, to preserve biodiversity for future changing environments? We don't know now which small stocks could be the future of the system. Isn't it too risky to --*

**DR. WALTERS:** Nonsense.

**Q** -- say, preserve the big stocks?

**DR. WALTERS:** In the first place, let me ask you if you would be willing to pay half of your income for an insurance policy? Because that's what we're asking our commercial fishermen to do today.

On the second hand -- and the second thing, most of those small stocks could never be large.

You heard testimony in the Fall from two biologists, Holt and Hyatt who spoke about the Cultus having the potential to be as large as the large stocks of today. Well, that's absolute nonsense.

Cultus Lake at a little over six square kilometres could never produce the kind of numbers of sockeye that a big lake like Shuswap or Quesnel at 400 square kilometres is capable of producing.

Our fishery and our economic future depends on those large stocks and their health, not on the little cute stocks that biologists like me love to look at.

**Q** What about the idea --

**DR. WALTERS:** We should not lie by pretending that they have some future economic value.

**Q** *Is Harrison an example of a small stock that has become big and economically viable?*

**DR. WALTERS:** Which has?

**Q** Harrison?

**DR. WALTERS:** It's become big. That doesn't mean it's become economically viable. It's been able to become big because harvest rates were low. It has not produced large catches. It's an example of a large unproductive stock. And you talked about small productive and small unproductive, well, there's also large productive and large unproductive. It's not capable, as far as we can tell from its productivity, of sustaining high yields out into the future. It did not sustain them in the past.

**Q** *What about the idea that Mr. Wilson put forward of fishing in the river and then being able to conserve stock like *Cultus* that's at the entrance of the river almost, but you could then harvest further upriver?*

**DR. WALTERS:** Yeah, if only our commercial fisheries had developed just above Chilliwack, it would have made a huge difference.

**Q** But would --

**DR. WALTERS:** Commercial fishermen would argue, too, that they have no right to fish there, that that would mean a complete reallocation to the native fisheries. They would also argue that the product quality declines considerably and prices and economic value decline considerably as you move up into the river.

**Q** *But leaving those economic arguments to one side, as a -- in terms of the biology, would fishing further up the river be one way of allowing the preservation or conservation constraint on a stock like *Cultus* while at the same time fishing harder on those runs that you would say need to be fished harder?*

**DR. WALTERS:** Sure. We could put in a couple of really large fish wheels just up -- fish traps and wheel systems just upstream of Chilliwack and take all of our catch for the Fraser while being very, very selective with stock ID methods and so on like that and hand the fish out to people up in the basin or sell them on behalf of the public or whatever. There's -- we could certainly reorganize the fisheries in major ways like you've said.

I think the issue here is one of basic rights to the fish.

Have the commercial fishermen established basic property rights to those fish?

Should the public take away those rights, transfer them to the First Nations fisheries that operate up in the river?

To whom should the benefits go?

**Q** *But those --*

**DR. WALTERS:** We have a --

**Q** *Those stocks -- Dr. Walters --*

**DR. WALTERS:** -- pile of biologists -- we are not the people to be asking these questions.

**Q** *Well, I was just going to make that point with you. We were asking you on the biology side today and some of those issues you just raised are more of a policy type of discussion, I suggest. Before we leave -- I'm just about -- the last question I wanted to leave with the panel is whether there are any recommendations that you would like to leave with the commissioner to consider in the inquiry. So I'll just -- I'll start with Mr. Wilson?*

**MR. WILSON:** Well, Mr. Commissioner, I don't think we're going to get to a place where compromise and balance aren't important components of the management of Fraser sockeye. I don't expect that the world will be managed to maximize biodiversity and I don't believe that we'll preserve every stock. But I think we need to take a balanced view of both the stock structure, the genetic differences between stocks, the importance of specific often small stocks to First Nations and their rights and their harvest, and the interests of people that may consider salmon to be valuable for reasons other than their food value. So we're not going to get past compromise.

I guess my concern here is that we seem to be trying to answer what is clearly a complex sociological problem that has to do with balancing all our various values. We're trying to reduce that down to a technical question that scientists can give us an answer to, so that we can go away and make our decision without dealing with very complex problem of balancing everyone's interests.

And I think that's what we're struggling with here. Thank you.

**Q** *Thank you. Dr. Woodey?*

**DR. WOODEY:** Mr. Commissioner, my view is that in some ways very much like Ken's, there's got to be trade-offs in the way the management of the fishery balances the biodiversity issues and harvest.

But I guess I'll harp again on the issue of why we're sitting here in some degree and that is that the issue of early migration of Late Run sockeye is the biggest problem that we're facing and is -- has in some cases direct relation to the over-escapement that we've seen that has led to a substantial reduction of the Quesnel stocks and possibly other stocks.

And at the same time, harvestable -- there's been -- some of that has been just as a result of the policy that DFO adopted in 2001 and somewhere along the line I expect that you'll have heard that I made a recommendation about how to address the issue of the early upstream migration and harvesting Summer Run stocks, et cetera.

That recommendation was for, I gather, a number of reasons not adopted, but there needs to be a clearer understanding that until we answer and work around that whole issue, much of what we could optimize here, you know, on paper isn't going to be practical because we've got a policy that restrains harvest rate when -- on Late Run

sockeye to some much lower level, 30 percent I believe was the target, maybe 35 percent in 2010 on catch of Adams sockeye and [so very major numbers of Adams sockeye went upstream unharvested](#) and other stocks had equally large escapements and we will be asking the question four years from now whether the 2010 run over-escapements were, you know, what the consequences of that were.

We need more research on getting to the basic reason for Late Run behaviour and [we need more investigation into options other than what the Department of Fisheries and Oceans has adopted as its policy because of the impacts it's been having on the escapements on Summer Run stocks.](#)

So this early migration is the elephant in the room, as I said, and it's not going to go away when the inquiry is through with its report.

*Q Now, Dr. Woodey, I'm not sure if we were clear with you on that issue that you've just described. We did raise this with Mike Lapointe when he was here, but I wonder if I could just summarize and you can correct me if I have it wrong. But the issue was that there was a higher harvest rate available on Summer Run stocks in that year than there was available for the Late Run stocks, correct? Is that right?*

**DR. WOODEY:** That's correct.

*Q Okay. And that because the Late Run stocks migrated at a different time, they were – there was an overlap; is that the issue?*

**DR. WOODEY:** Yes. They had been coming into the river early and having high mortality rate that then led to the Department of Fisheries and Oceans developing a policy of lowering the overall harvest rate on Late Run sockeye to compensate for anticipated early upstream migration and mortality.

*Q So that your issue isn't -- that was the – you agree that that was a good decision, I take it, to reduce the harvest on the Late Runs because of the anticipated en route mortality?*

**DR. WOODEY:** The decision, in my opinion, was not correct in that we can predict that the early upstream migrants, Late Run migrants are going to suffer very high rates of mortality and therefore, to allow them to go upstream and allow the Summer Runs that were mixed with them to go upstream is a loss of yield and an over-escapement on the Summer Runs and at the same time, not doing much in the way of solving the problem on Late Runs.

*Q And why didn't it solve the problem on Late Runs?*

**DR. WOODEY:** Well, because those early migrants, which were protecting, are going to die en route or on the spawning grounds.

And so we spent a pretty substantial amount of money on that whole problem, \$3 million or something of that nature in research.

We still don't have the answer of why they're doing that, but we can say that fish that enter the river, Late Run sockeye that enter the river prior to about the end of August are going to have an elevated mortality rate and therefore, policies that protect those fish are wrongheaded.

If you wanted to do the best job of protecting the Late Run fish that are misbehaving you would shut down fisheries in the marine areas and get as many into the river as you can and then harvest those early upstream migrants because they're going to have this very high mortality rate and you could then harvest the Summer Run excesses.

That doesn't mean, Brian, that we're going to harvest -- we would harvest every Late Run fish migrating in the river in August, but the evolution, in my opinion, the evolution of behaviour in the fish in different stocks in the watershed has been driven by the parasite that's killing them and allowing them to go upstream is not really going to solve the problem.

Q Now, I --

**DR. WOODEY:** It's not an adaptive thing.

Q I understood from Mr. Lapointe's evidence that there was an opposing view which was that although many of those early migratory Late Run stocks would die, there may be some that wouldn't and they would be very valuable from an ecological point of view, those few that did survive and came in early, they may be very, very important from a long-term biodiversity point of view. What's your response to that argument?

**DR. WOODEY:** My response basically is that in 2001 when we first had the workshop to try to develop a research program identifying the causes of the early upstream migration, I presented a chart that showed Fraser sockeye with one exception spend 50 days or less in fresh water between entering and spawning and for stocks in the southern B.C., Washington, including Columbia River stocks, coastal stocks, spend 100 days to 190 days in fresh water without dying.

So why do the Fraser fish have very low -- short times in fresh water?

Well, to my way of thinking, it's logical to expect that that has been driven by the parasite that has infected virtually every fish when they come into the river and thus, the -- trying to protect early migrants is really wrongheaded in the sense that there is going to be a major loss of those fish where -- so you're not getting yield out of those stocks nor are you getting yield out of the summer run stocks that are passing through unfished at the same time. So it's a -- it's the big problem as far as I'm concerned, and I looked at that, this whole issue, kind of through that lens.

**Q** Thank you. Dr. Riddell?

**DR. RIDDELL:** Well, I mean, I hate to come back to science as a past scientist, 'cause that seems to be what we always recommend, but I just don't think that we can afford not to address improved monitoring and continuing the science work because just simply not putting the money in is transferring those costs to other people, whether it's First Nations in-river that are not allowed to fish or whether it's the commercial fisheries outside that have been substantially curtailed.

Other people are bearing some very substantial costs by us not doing sufficient monitoring and science.

I would say that while we don't have a direct answer for the Late Run sockeye, we've made some significant inroads in understanding the physiology of the animal and what's causing some of the mortality. That's not to say that we necessarily are going to be able to fix this thing. What I'm concerned about really is looking at the whole picture and a full context of in management.

We've had problems with sustaining test fisheries. We're getting less information there.

The runs are more variable, so if they're variable, you need more information from test fisheries, not less. Right? So the whole information system is going in the wrong direction.

We need to do continued work on the mortality in-river. It's got to be extraordinarily difficult for managers to sit in pressure-packed discussions in the peak of the season and you have some estimate that might be that you're going to lose 50 to 80 percent of the fish moving up the river. Right? And we've seen years where that's been true and we've seen years where that simply hasn't even happened. Right? So it's an extraordinarily difficult question to address in season.

We probably can improve some of our forecasting for short timeframes like that, but you're always going to have errors. And so that really, after spending – or really looking at what's a good investment of funds and how much, I think the next part has really got to be getting people involved and a better sort of planning process.

The exercises that I was involved with before leaving are yes, you have multiple stakeholders and you're going to have discussions about expected returns, but they become so protracted that you really don't have discussions about what's an appropriate response when things don't happen the way you plan them to?

Because that's what really happens.

We make lots and lots of plans about what will happen as the fish come in and then they don't do it the same way. And so you're immediately in a very uncertain environment.

You've got to make really hasty corrections. And to be perfectly honest, my opinion is that in season, they do a phenomenal job. I mean, you really only have to look at 2009/2010. Two totally different responses and I don't think anybody would say that they were incorrectly assessed. Yes, you probably could have fished harder in the return in 2010, but again, you were looking at in-season mortality projections.

So, I mean, we talk about W.E. Ricker before. One of the last papers he wrote, his advice was that fisheries managers should expect to be surprised. Expect the unexpected, basically. And so it's a tough environment and I think we are passing costs on to other people if we're not going to do the fundamental work to really examine things like Carl's now finding evidence out for delayed density dependence. Well, we don't know the mechanism. But I would say that the scientists involved now with the tools that they have are narrowing down what those mechanisms might be and maybe we can do a better job in a fairly short period.

But the serious concern I hear is constantly less funds, less funds, less funds. So you're more dependent on external funds and that's highly insecure, as well.

**Q** *Thank you. Dr. Walters?*

**DR. WALTERS:** I just want to reinforce what Brian's saying, that we are entering a period of the next five years it is literally anyone's guess what will happen.

We could be entering a Coho world where the declining trends in marine survival and survival rates in all life stages turn out to be not associated with delayed density dependence, but something more like has happened with Coho and we may end up with our fisheries shut down, as we have with Coho for the last more than a decade. Or we could end up seeing a dramatic rebound.

We could see strong release and a lot of strong delay density effects because of low stock sizes in the last few years. Things could turn really good.

The critical thing is not to have a management system that is -- has become **incapable of responding** to those alternatives and not to have a management system where the **decision-making is dominated by any particular narrow concern, like saving this stock or saving that stock, as it has in recent years.**

And I think one more thing, a point I would make, is that if the commission is going to have anything to say about where the critical research needs are on sockeye salmon, I hope we've convinced you that probably the most critical needs and the biggest investment needs to be in the fresh water, not out in the ocean. Where the ocean is -- these variations in ocean mortality seem to be symptomatic of problems that arise in fresh water.

**DR. RIDDELL:** Can I disagree?

**Q** *I guess.*

**DR. RIDDELL:** Partly. Really quickly. I don't disagree with the fresh water and ocean, but I really caution -- we keep taking this jump from the river to the open ocean and there's a little body of water called the Strait of Georgia that is very workable and I think has much more to contain in terms of understanding what's going on. So I really caution against jumping from river to ocean. I think river, yes, let's progress out from near shore to offshore and a lot of this story, I think, is going to be in the lower river and estuary Strait of Georgia.

**Q** Thank you.

**DR. RIDDELL:** Carl is smiling, so he probably disagrees again.

**Q** *Maybe he's agreeing.*

**DR. WALTERS:** This is totally self-serving, what you just heard.

**DR. RIDDELL:** They already know that.

**MS. BAKER:** Mr. Commissioner, those are my questions for this panel, so if we're taking an afternoon break, this would probably be a good time to do it, and then we'll start with Mr. Leadem.

**THE COMMISSIONER:** Okay.

**THE REGISTRAR:** Hearing will now recess for ten minutes.

(PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)  
(PROCEEDINGS RECONVENED)

**THE REGISTRAR:** Order. The hearing is now resumed.

**MR. LEADEM:** For the record, Mr. Commissioner, Leadem, initial T., appearing as counsel for the Conservation Coalition.