

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



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

Public Hearings

Audience publique

Commissioner

L'Honorable juge /
The Honourable Justice
Bruce Cohen

Commissaire

Held at:

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

Thursday, February 10, 2011

Tenue à :

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

le jeudi 10 février 2011

APPEARANCES / COMPARUTIONS

Wendy Baker, Q.C. Maia Tsurumi	Associate Commission Counsel Junior Commission Counsel
Mitch Taylor, Q.C. Hugh MacAulay	Government of Canada
Boris Tyzuk, Q.C.	Province of British Columbia
No appearance	Pacific Salmon Commission
No appearance	B.C. Public Service Alliance of Canada Union of Environment Workers B.C. ("BCPSAC")
No appearance	Rio Tinto Alcan Inc. ("RTAI")
No appearance	B.C. Salmon Farmers Association ("BCSFA")
No appearance	Seafood Producers Association of B.C. ("SPABC")
No appearance	Aquaculture Coalition: Alexandra Morton; Raincoast Research Society; Pacific Coast Wild Salmon Society ("AQUA")
Tim Leadem, Q.C.	Conservation Coalition: Coastal Alliance for Aquaculture Reform Fraser Riverkeeper Society; Georgia Strait Alliance; Raincoast Conservation Foundation; Watershed Watch Salmon Society; Mr. Otto Langer; David Suzuki Foundation ("CONSERV")
Don Rosenbloom	Area D Salmon Gillnet Association; Area B Harvest Committee (Seine) ("GILLFSC")

APPEARANCES / COMPARUTIONS, cont'd.

Phil Eidsvik	Southern Area E Gillnetters Assn. B.C. Fisheries Survival Coalition ("SGAHC")
Chris Watson	West Coast Trollers Area G Association; United Fishermen and Allied Workers' Union ("TWCTUFA")
Keith Lowes	B.C. Wildlife Federation; B.C. Federation of Drift Fishers ("WFFDF")
No appearance	Maa-nulth Treaty Society; Tsawwassen First Nation; Musqueam First Nation ("MTM")
No appearance	Western Central Coast Salish First Nations: Cowichan Tribes and Chemainus First Nation Hwlitsum First Nation and Penelakut Tribe Te'mexw Treaty Association ("WCCSFN")
Brenda Gaertner	First Nations Coalition: First Nations Fisheries Council; Aboriginal Caucus of the Fraser River; Aboriginal Fisheries Secretariat; Fraser Valley Aboriginal Fisheries Society; Northern Shuswap Tribal Council; Chehalis Indian Band; Secwepemc Fisheries Commission of the Shuswap Nation Tribal Council; Upper Fraser Fisheries Conservation Alliance; Other Douglas Treaty First Nations who applied together (the Snuneymuxw, Tsartlip and Tsawout); Adams Lake Indian Band; Carrier Sekani Tribal Council; Council of Haida Nation ("FNC")
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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5

6 THE REGISTRAR: The hearing is now resumed.

7 MS. BAKER: Thank you, Mr. Commissioner. Just one
8 thing outstanding from yesterday. A number of the
9 witnesses referred to a paper by Gilhousen in
10 their evidence, and that document wasn't on our
11 list of proposed exhibits. However, it had been
12 obviously provided to everybody earlier. I just
13 think for the record we should have a copy of that
14 report given that it was referred to numerous
15 times. I don't know if it's able to come up on
16 the screen yet, but I can hand you a hard copy of
17 it. It's dated "1992 Examination of Fraser River
18 Sockeye Escapements from Commercial Harvest Data,
19 1892-1944." I'll just pass it up.
20

21 KEN WILSON, recalled.

22 JIM WOODEY, recalled.

23 BRIAN RIDDELL, recalled.

24 CARL WALTERS, recalled.
25
26
27
28

29 MS. BAKER: While that's going up to you, I'll just
30 identify it. Dr. Woodey, you have had a look at
31 that document that's just been handed up to the
32 Commissioner?

33 DR. WOODEY: Yes, I have, Mr. Commissioner.

34 MS. BAKER: And is that the report that was referred to
35 in evidence yesterday?

36 DR. WOODEY: Yes, it is.

37 MS. BAKER: I'll just ask you to clarify one thing
38 again for the record. The report is dated in
39 1992, but it appears to be styled under the
40 Fisheries Commission. Why is that? 'Cause it was
41 in 1992, it would have been the Pacific Salmon
42 Commission.

43 DR. WOODEY: There was an agreement that several
44 reports would be completed during the PSC time as
45 a carryover of information from the IPSFC. So
46 that's the essential reason for it. So I think
47 there were three reports in total of which this is

1 one.

2 MS. BAKER: All right. Thank you. And, Mr. Wilson,
3 you are somebody who had referred to this report,
4 and is this the report that you were referring to?

5 MR. WILSON: Yes.

6 MS. BAKER: Okay, thank you. Could I have that marked,
7 please, as an exhibit in the hearings and I
8 believe Ms. Gaertner would like to speak to this
9 as well.

10 THE REGISTRAR: That will be Exhibit number 418.

11
12 EXHIBIT 418: 1992 Examination of Fraser River
13 Sockeye Escapements from Commercial Harvest
14 Data, 1892-1944
15

16 MS. GAERTNER: Good morning, Mr. Commissioner. This is
17 a "yes" and "no" response. I'm very happy to have
18 this exhibit marked as an exhibit, but I just want
19 to raise with you an observation I have about the
20 process and the documents. Again, it's not a
21 complaint or a criticism in any way, but there's a
22 lot of new information that arrives on the day of
23 the witnesses. In this part of the hearing, we've
24 been getting outlines of these expert reports, not
25 details, not reports, anything.

26 So yesterday I heard from these four
27 gentlemen, who are very esteemed in their field
28 and very expert at what they say. I spent a lot
29 of time thinking about their evidence last night,
30 just from what I'd heard in the day, and then
31 today I have a report that is clearly an older
32 report - I'm not suggesting it's new information -
33 clearly a report that was in ringtail and wasn't
34 on the most recent list of documents that counsel
35 had intended to rely upon.

36 I don't mind it going in, I think it's very
37 useful. But I'm not in any way able to ask
38 questions about it today. I don't think I
39 necessarily, if I have any questions, need to ask
40 this panel so I hope they won't be worried that
41 I'll be asking that they hold on, but we'll see.
42 You can appreciate that my clients will need to
43 instruct me on this document, and I haven't yet
44 had an opportunity to be instructed.

45 MS. BAKER: Thank you, Mr. Commissioner. The next
46 examiner is for Canada, Mr. Taylor.

47 MR. TAYLOR: Mr. Leadem advised me that he has

1 concluded his questions, Mr. Commissioner.
2 Mitchell Taylor, for the record, and with me is
3 Hugh MacAulay. For the benefit of the panellist,
4 we act for the participant Government of Canada in
5 this commission.
6

7 CROSS-EXAMINATION BY MR. TAYLOR:
8

9 Q I've listened with interest to your evidence,
10 panel members, and found it very interesting. If
11 I might tally, there's over 100 years, well over
12 100 years worth of fish science expertise and
13 knowledge on the panel. It's quite inspiring to
14 listen to you.

15 In dealing with over-escapement, there seems
16 to be three questions as I hear the panel members
17 and read some of the material. The first is what
18 is over-escapement as a biological concept, and
19 Ms. Baker has asked each of you about that and
20 you've given evidence and definitions speaking to
21 that point.

22 Then secondly, as a question, there is the
23 matter of what is over-escapement as a number in
24 concrete terms? I'll come back to that. Dr.
25 Riddell and Dr. Woodey spoke to that in
26 particular. Or, in other words, in terms of a
27 number, what is an escapement number that's too
28 high a number.

29 Then the third matter that seems to arise is
30 what are the consequences, if any, of over-
31 escapement? So I want to focus for a moment or so
32 on the number, what is too high a level of
33 escapement? As I mentioned, I heard in evidence
34 Dr. Woodey and Dr. Riddell speak to that yesterday
35 and put what's too high as being two times MSY, or
36 Maximum Sustained Yield.

37 Is there - and I put this to the panel
38 members - is there a place that we can turn to in
39 order to see what is commonly accepted as being
40 the MSY for the 19 or so Fraser sockeye stocks,
41 because in order to find out what's two times MSY,
42 one has to know what MSY is, of course. Or is it
43 a case where MSY is quite variable depending on
44 who you talk to, what model you use to come up
45 with numbers, what year or time period you're
46 speaking of or some other factor or some
47 combination of factors. So I put that to the

1 panel, any one of you who wants to speak first.
2 DR. RIDDELL: Maybe I can start, Mr. Commissioner. To
3 start with, there is not an unlimited number of
4 values that people could use. The Fraser sockeye,
5 in particular, the common use is the set of data
6 that people refer to as the Pacific Salmon
7 Commission production database. In many of the
8 papers you've looked at, particularly from
9 forecasting and in the benchmark paper that Sue
10 Grant and others wrote in the fall. In there,
11 you'll talk about the 19 production stocks, and
12 these are the stocks that have the best sets of
13 data through time.

14 I think probably the best source of the
15 current estimates of the MSY values are likely
16 from that database and should be essentially the
17 same numbers in the Grant et al paper in November
18 2010. I think it was November, the last PSARC.

19 Q And I believe the --

20 DR. RIDDELL: And also the FRSSI should be using the
21 very same values.

22 Q All right. Thank you. That's helpful. Does any
23 other panel member want to add anything to that?
24 That's a clear answer as I hear it. Dr. Woodey?

25 DR. WOODEY: Mr. Commissioner, just to be clear, every
26 year we gain another datapoint because we have an
27 escapement and a return, and when those
28 incremental datapoints are put into the dataset,
29 there's going to be some changes to the parameter
30 estimates of stock/recruit relationship so that
31 MSY point is going to shift a little bit each
32 year, and when you have a very small return, as in
33 2009, it would tend to create a shift one
34 direction, and then the next year you have a
35 massive return, it's going to shift the datapoint
36 the other direction.

37 Until we have 1000 datapoints -- and I don't
38 think anybody's going to be here. Right now we
39 have perhaps 55 datapoints, 57 perhaps. I don't
40 know. But that's the maximum that we have because
41 that's the length of time that data are available.

42 Q All right. Thank you. Is that, Dr. Riddell, what
43 Dr. Woodey just said, what you were alluding to
44 when you said "a range"?

45 DR. RIDDELL: No, not quite. Jim, of course, is right,
46 that every year you add a piece of information to
47 the 55. But, really, the other aspect is how you

1 use that data. If we were to look at production
2 by cycles, then of course in every population you
3 have four cycle years. We tend not to do that.
4 We tend to look at the productivity through all
5 the cycles, but now we can look at the interaction
6 between the lines within one common recruitment
7 function.

8 So if you've got good data, unless you have a
9 very abnormal point, it's not been my experience
10 that these values change by very much due to one
11 datapoint.

12 Q All right.

13 DR. RIDDELL: It may be true after a 2010 value is put
14 in though. But, right now, we're still dealing
15 with about 2005 would be the last complete brood
16 year that would be included in that dataset.

17 Q Dr. Walters?

18 DR. WALTERS: I believe that on ringtail you have a
19 paper by Martell, myself and Ray Hilborn. That
20 has a figure in it that reviews how the stock
21 recruitment parameter estimates changed over time,
22 starting about 1960 and running up to the late
23 '80s -- no, to the late '90s. Two comments:

24 One of them, there has been a fairly distinct
25 change in using the last decade's data, the 2000s
26 data. The thing we call the Ricker B parameter
27 has increased. That is, there is stronger
28 apparent density dependence, but we're not sure if
29 that's due to actual density effects, or to
30 something confounding with environmental factors.

31 The other thing is that if you look at the
32 Wild Salmon Policy paper, you'll see two quite
33 distinct estimates from any of the stocks of the
34 optimum spawning stock, one from the Ricker model.
35 And then, for most stocks, a much lower optimum
36 for the Larkin model. In other words, we have
37 strongly divergent predictions about the best
38 spawning stock for harvest and production from the
39 two models.

40 Q Okay. Thank you. Does the panel accept that high
41 escapement, or a high escapement number is not
42 necessarily the same as over-escapement, as that
43 term is being used in a biological sense. Does
44 anyone want to take that first?

45 MR. WILSON: Yeah, I'd agree that large escapements are
46 not necessarily over-escapements.

47 Q And it seems to me this ties to the evidence that

1 Dr. Riddell and Dr. Woodey spoke of yesterday
2 about two times MSY. You can still have a high
3 numbers that's not over-escapement because it's
4 less than that two times figure that you spoke of.

5 DR. WALTERS: Excuse me, can I interject here? I don't
6 know what you're talking about, two times MSY.

7 Q Well, yesterday --

8 DR. WALTERS: The spawning stock that produces MSY is
9 typically at about one-third to one-half of the
10 spawning stock that would occur on average
11 naturally if there were no harvesting. So
12 somebody said two times MSY, I don't know what
13 they would mean by that.

14 Q Well, Dr. Woodey, in evidence yesterday, said that
15 from a management point of view, over-escapement
16 is the level of actual escapement that reaches
17 spawning grounds. That's, in my context, more
18 than double the MSY point. So it would be a
19 larger than what we call the p-max or the maximum
20 escapement level that produces maximum returns on
21 average.

22 Then Dr. Riddell, following on that evidence,
23 said, now, Jim has just made a very important
24 point in all of this, I think, is that many times
25 escapement that subsequently occur in a year will
26 be on a particular point that might be called MSY,
27 but it's only the very large escapements that
28 should be probably at least twice the target
29 escapement that I think people would readily
30 become concerned about the so-called over-
31 escapement --

32 DR. WALTERS: Oh, I see, okay, yeah, yeah. Become
33 concerned about in terms of possibly resulting in
34 a big decrease in escapement, yes, that would be
35 right.

36 Q Yes. For reference --

37 DR. WALTERS: (Indiscernible - audio cutting out) base
38 in recruitment, rather.

39 Q Okay. For reference, Mr. Commissioner, that's at
40 pages 24 and 25 of yesterday's transcript.

41 Really, my question in this part of my
42 questioning comes down to: Can a high escapement
43 number be a large number, but nonetheless be
44 neutral as to impact on productivity, or have a
45 minimal impact. I think that's what I was hearing
46 in evidence yesterday. Am I right in that?

47 DR. WALTERS: No.

1 DR. RIDDELL: No. Then maybe I can start --

2 DR. WALTERS: We (indiscernible - overlapping speakers)
3 escapements higher than the one that produces MSY
4 to result in substantial decreases in
5 productivity, not necessarily substantial
6 decreases in recruitment, but certainly decreases
7 in productivity.

8 Q Right. And you're speaking now of the over two
9 times MSY, are you?

10 DR. WALTERS: No. I'm talking as soon as any spawning
11 stock larger than the one -- well, even up to and
12 beyond the one that produces maximum average yield
13 involves declining productivity as the spawning
14 stock increases.

15 Maybe I could explain a point here about this
16 idea of MSY spawning stock. What we do in
17 analyzing the data, is we fit a curve relating the
18 recruitment to the spawning stocks that produced
19 it, called stock recruitment curve. It's a line
20 that tries to locate the average recruitment
21 associated with each spawning stock.

22 What we then do is move up in spawning stock
23 size incrementally. In economics, we say we look
24 on the margin as spawning stock increases. And as
25 we increase spawning stock, a spawning stock size
26 looking at management options for it, the
27 productivity drops. So we're getting a positive
28 effect on recruitment from having more spawners,
29 but a negative effect from declining productivity
30 of those spawners. So we look for that point in
31 the spawning stock of diminishing returns where
32 adding additional spawners produces less
33 additional recruits than that added number of
34 spawners would require to replace itself.

35 Q All right. Thank you. Dr. Walters, has page 19
36 of yours and Dr. Riddell's 204 report come up on
37 your screen now?

38 DR. WALTERS: Not on mine, but I know which one you
39 mean. It's Figure 1-A, the Ricker stock
40 recruitment curve.

41 Q Yeah, that --

42 DR. WALTERS: Is that the one you're referring to?

43 Q That's correct. And what you are just saying in
44 evidence is in reference to that, is it?

45 DR. WALTERS: Or the same thing with the Beverton-Holt
46 curve below it, but yes, what we do is we
47 basically move along the axis called salmon

1 spawning, the "x" axis, the horizontal bottom line
2 increasing the size of the spawning stock, and
3 then looking up to the curve above it, the dome-
4 shaped curve, to predict the average recruitment.
5 At the point marked "C" in spawning stock in that
6 example, about .3 million fish, at that point, in
7 order to stay at that point, we have to allow the
8 point B, .3 million spawners, to spawn, and still
9 -- so we'll have that .3 million spawners the next
10 cycle.

11 Then we can take on average the difference
12 between that "B" and "A". That's the yield. If
13 you look marginally, if you just move that blue
14 line to the right, you'll see that when you move
15 beyond the point "C", you're getting higher
16 recruitment until you pass the dome, but you're
17 having to add more spawners to get that
18 recruitment, then you're getting back in the way
19 of a difference or a sustainable yield.

20 Q So you're speaking of diminishing returns at this
21 point.

22 DR. WALTERS: Absolutely, yeah. So the Alaska
23 definition of over-escapement is when the spawning
24 stock is above level "C", i.e. when it has passed
25 the point of diminishing returns with respect to
26 producing yield on a sustainable basis.

27 If I could add a comment here, we hear this
28 business about higher spawning stocks producing
29 other benefits, ecosystem benefits and so on.
30 Precisely this same marginal analysis should be
31 used to look at the addition of those other
32 benefits, and that has not been done. So, for
33 example, at point "C", it may well be that most
34 ecosystem benefits, like feeding the bears and the
35 eagles and so on are perfectly well satisfied, and
36 that moving past point "C" will not add anything
37 to those benefits.

38 That's also true in terms of benefits
39 associated with ecosystem fertilization. I think
40 anyone who's ever raised a garden or looked at a
41 forest or anything else knows that there's such a
42 thing as too much of a good thing, too much
43 fertilizer. So I find that when people make
44 arguments about those additional spawners having
45 additional benefits beyond yield benefits, my
46 immediate question to them is show me the marginal
47 values.

1 Q Okay. Dr. Riddell, you had something you wanted
2 to add, I think.

3 DR. RIDDELL: Well, I just want to caution that this
4 stylized diagram obviously is to make the sort of
5 description that Carl was able to provide you
6 verbally. When you actually apply this to real
7 data -- and this is another document that I read
8 through the submissions -- you get a much less
9 well-defined optimal spawning value. For example,
10 I think Carl had presented a current analysis of
11 Chilko Lake, and on that, you would find that
12 their MSY is not a very well-defined peak in that
13 there's a very broad dome, not a well-defined
14 dome.

15 So this leads into another comment made about
16 the Alaskan sockeye paper looking at over-
17 escapement. In there, something that's
18 interesting to consider is that they acknowledge
19 the uncertainty of a particular point, but they
20 use a range around that point as their escapement
21 goal. They define over-spawning as any spawning
22 level beyond the range. But the paper does also
23 support the concept of you need about twice the
24 MSY value to see the contrast and to detect over-
25 spawning. They actually use that as how they
26 define which populations they do the analysis on.

27 So, I mean, I think people, just for more
28 convenience, in terms of how big the difference
29 has to be and sort of fixed a -- if it's twice
30 that, we should see some effect. I don't think it
31 has any strong basis like Carl's implying in any
32 sort of technical analysis.

33 But even the plot you're talking about there,
34 which is one that came from sort of a normal
35 salmon set of data it's just -- it's been smooth
36 and it's been indexed, so it's all relative to
37 one. So what you get, then, is something that's
38 approaching the intersection point that we talked
39 about yesterday where the recruitment function
40 intersects the replacement line, which is that
41 straight line at about a 45-degree angle here.
42 Anything below that implies that there are fewer
43 recruits than spawners. So clearly that
44 population is in a sort of over-spawning sense
45 'cause it's got to decline, even in the absence of
46 fishing.

47 So biologically, you would expect that

1 population to decline. So the idea that you have
2 large, but not excessive into over-spawning is
3 really a very subjective sort of question. I
4 think that's why we're having trouble answering
5 it.

6 You can definitely have escapements beyond a
7 point estimate MSY that is likely to still give
8 you very good returns until you get quite a bit
9 out on the margin where you're really starting to
10 see density dependence become much more of a
11 factor in the recruitment function.

12 Q Okay. Is there a difference in the seriousness of
13 over-escapement once you get to the high levels
14 that you've been speaking of as between small
15 stocks versus large stocks, or are they both -- do
16 they both get affected in the same proportional
17 way? Dr. Woodey?

18 DR. WOODEY: The basic philosophy in regard to over-
19 escapement would hold that is -- but at a much
20 proportional level (sic). In other words, if your
21 MSY in a small stock was 10,000, an over-
22 escapement of roughly double that, 20,000, would
23 be deemed over-escapement for that stock, whereas
24 a stock with an MSY of a million, the two million
25 would be considered the over-escapement; in other
26 words, doubling regardless.

27 But as long as I'm speaking, I might as well
28 throw in what -- reiterate what Carl's talking
29 about in regard to cyclic dominant stocks and the
30 application of the Larkin model which is
31 distinctly different. It has some of the same
32 components as Ricker, but because of that delayed
33 density dependence, the issue becomes one of how
34 do you estimate what the MSY is for a cyclic
35 dominant stock?

36 I was mentioning yesterday that we, that is,
37 the IPSFC and the PSC in some situations, have
38 looked at just the dominant line of cyclic
39 dominant stocks to estimate what the dominant line
40 MSY is and the subdominant line is going to be
41 different, and the offlines different yet. So
42 it's another issue there.

43 Q Other panel members agree with Dr. Woodey, do you,
44 that the impact of over-escapement on small versus
45 large stocks is proportionately the same in all
46 cases, or roughly the same?

47 DR. RIDDELL: Well, again --

1 DR. WALTERS: We can draw these stock recruit plots
2 with -- if I drew you one for the Kvichak stock in
3 Alaska, the "x" axis would go out to 25,000,000
4 fish. If I drew the same curve for Cultus stock,
5 it would go out to just over 100,000. There's a
6 couple of little stocks for which it would go up
7 to just a few thousand. We have no reason to
8 believe that the fundamental structure depends on
9 whether it's a small or a large stock. The
10 density dependence pattern that causes this curve
11 to bend over has to be there in any viable natural
12 population.

13 Q Okay. Dr. Riddell, you wanted to add something?

14 DR. RIDDELL: Well, I just wanted to come back to what
15 we talked about for a bit yesterday, in that you
16 have to really assess why a population is small.
17 If it's been small because of an environmental
18 event in the past, or historical over-fishing
19 that's driven it down there a long time ago
20 possibly, and the lake still has significant
21 production capacity, then you may find that as you
22 put more fish on the ground so you won't see over-
23 spawning, you'll see growth. So you could see
24 recovery in that case.

25 If, on the other hand, as we said yesterday,
26 it might be small because it's actually got a
27 fairly unproductive lake. We have literally
28 maybe hundreds of lakes like that in the small
29 central coast islands of British Columbia. But,
30 in the Fraser, I'm not too aware of too many of
31 those, in which case, you could significantly
32 compound the problem if you put a wad of fish on
33 the grounds and you have no productive capacity in
34 the lake.

35 So you really have to look at the particular
36 system and its environment.

37 Q Okay. If we turn this around and leave for a
38 moment over-escapement and talk about under-
39 escapement which comes from too much harvest, is
40 it correct that under-escapement will have a
41 disproportionately more serious impact on a small
42 stock than a large stock because you might be
43 taking away a similar percentage, but you're
44 starting from a smaller number so you're driving
45 it down to a greater harm or greater degree than
46 with a large stock. Dr. Woodey?

47 DR. WOODEY: I was kind of actually pointing to Brian

1 to answer that because Brian is a geneticist, and
2 you start getting into these genetic issues, Mr.
3 Commissioner. The small stocks, for example, one
4 stock in the Thompson called Fennell Creek has an
5 MSY of something like 5000 fish because the stream
6 is small and the lake-rearing area is small. We
7 have seen that stock build up over time, but it
8 still is -- some of the escapements are so small,
9 that is, on some years getting down in the 100 or
10 200 fish range, that you start getting concerns
11 about genetic effects, that is, reduced gene pool
12 and possible consequences of that.

13 But, for the most part, the answer to your
14 question is under-escapement on small stocks has
15 basically the same consequences as under-
16 escapement on large stocks; that is, yield goes
17 down. So you want to stay up close to your MSY so
18 that your harvestable surpluses each year are
19 there to be able to harvest.

20 Q All right. Dr. Walters?

21 DR. WALTERS: The point I want to add to this is, there
22 is a term we use in fishery science called
23 sustainably over-fished. It's entirely possible
24 for a stock to be held down near the origin of the
25 stock recruitment curve by a harvest rate close to
26 the maximum that the stock can withstand, because
27 relative productivity is highest down at low stock
28 sizes that really low stock can withstand that
29 high harvest rate on an indefinite basis over
30 time. So we can have stock sustained at very low
31 levels, sustainably over -- some of the off-cycle
32 line are large stocks, are down around a couple,
33 three, four thousand fish and were historically
34 fished at very high rates, around 90 percent, and
35 they persisted over time.

36 So when we say that a stock is over-
37 harvested, we do not mean that it is driven
38 towards extinction. We mean simply that it will
39 be driven down to an average size over time, lower
40 than that size that produces the maximum average
41 yield. Cultus, over much of its history, has been
42 like that. It has been sustainably over-fished.

43 Q Now, in that regard, though, some of what you're
44 speaking of there is premised on there being an
45 ideal world, isn't it? We don't really have
46 certainty as to what is the level that is the one
47 you're speaking of.

1 DR. WALTERS: Oh, we have lots of stocks, though, where
2 we have observed empirically in the Fraser that
3 they remained at relatively stable but relatively
4 low levels. In the recent period of reduced
5 harvest, they've responded fairly dramatically,
6 indicating that they were, for a very long period
7 of time, sustainably over-fished, but still
8 relatively stable.

9 Q Dr. Riddell?

10 DR. RIDDELL: Yeah, I mean, I think what Carl is
11 pointing out, we should keep in mind that where we
12 talk about this production database of being 19
13 stocks that we use for a lot of our assessments,
14 that there are currently, I think the number is 38
15 conservation units in the Fraser. So we have
16 about half of the populations that we currently
17 use in our assessment, and many of the others are
18 small. They continue to exist probably for
19 exactly the same reason that Carl is describing.

20 DR. WALTERS: I went to a body count on DFO's complete
21 database for spawning escapement from 1938
22 forward, and in that database, we can get time
23 series patterns for about 105 stocks which is ten
24 years or more of data. Of those, something like
25 38 have been stable since between 1950 and 1990
26 under high harvest rates, and 56 were increasing,
27 actually over that 1950 to 1995 period, and only
28 11 of them were decreasing. So we had a large
29 number of stable stocks and, for sure, at least
30 some of those were at far below the abundances
31 sustainable by their habitat.

32 Q Dr. Riddell?

33 DR. RIDDELL: Well, just to complete, what I was going
34 to come back to there is -- the discussion you're
35 having now is exactly why I wanted to clarify this
36 notion of "weak" yesterday. Because now we're
37 talking about small populations that are not weak
38 in productivity. They only exist because the
39 habitat still exists. They have been fished down
40 below what their full capacity is, and because
41 they're at the lower of their production range,
42 they're quite productive. They have a high rate
43 of production, so they are sustaining that current
44 harvest rate.

45 It doesn't mean that that's where we want to
46 keep them. It does mean that if you could restore
47 some of those, you're going to get pretty good

1 return. But some of these returns are small
2 exactly because of what Jim said. Some of these
3 populations are indeed small. So you can look at
4 -- this is the debate that Carl was introducing
5 yesterday about the value of recovering all the
6 biodiversity. If you want to sustain these
7 populations through time, there's absolutely no
8 question in sockeye that if you lose a population,
9 you have lost that genetic lineage. We know this
10 from a number of practical applications or trying
11 to restore fish in systems by transplanting other
12 sockeye, and they do not take. So you even lose
13 the production if you lose the line.

14 But this is a case where you do have the
15 opportunity to restore. If you have a fairly
16 modest harvest rate, these populations will
17 probably continue to build through time.

18 Now, we're kind of a long way from your first
19 question in the sense, can you -- is the risk at
20 the very low end high -- you have to get down to
21 pretty small population before you really put the
22 stock at risk because of population dynamics in
23 genetics. The animals do have a finite number of
24 eggs, so they can only recover so quickly. But
25 you'd have to drive them down very low.

26 They become much more at risk as a very small
27 population because of random events, or when we
28 had higher fishing pressures, just due to the
29 accident of fishing occurring in a limited period
30 of time when a certain stock was going by. But
31 these are all "if" type things. I mean, small is
32 at the higher risk, but small is not unproductive.

33 Q All right. Now, some of you have already spoken
34 to aspects of this next question that I have,
35 particularly as regards the evidence on the 2004
36 paper. But my question of the panel now is does
37 the panel agree that there is no historic evidence
38 of catastrophic recruitment failure coming about
39 as a result of extremely high escapement. I think
40 that's in large measure what the 2004 paper is
41 speaking to. But am I right in what I say, that
42 no historic evidence of catastrophic recruitment
43 failure from high escapement levels?

44 DR. WALTERS: No. As we indicated yesterday, there are
45 data more recent than we had that do hint at that
46 possibility for a couple of the stocks, Quesnel,
47 most spectacularly, and Chilko.

1 Q You say "hint at", but we haven't seen it, have
2 we?

3 MR. WALTERS: No, we see radical drop in recruitment.

4 Q Okay.

5 MR. WALTERS: Following a period of high spawning
6 stock.

7 Q But have you seen it to the level of it being
8 catastrophic to the stock?

9 DR. WALTERS: Well, I'd say in the Quesnel case, a drop
10 from in the millions down to in the hundred
11 thousand or so is pretty catastrophic, yes.

12 Q The 2004 paper, as I read it, says that there's no
13 evidence that over-escapement will cause a stock
14 collapse. Are you changing your view on that?

15 DR. WALTERS: Yes. As we explained yesterday, for two
16 reasons: newer information and the failure in
17 that 2008 paper to have looked at both the
18 Gilhousen work, showing strong cycles back
19 historically, and also the newer data.

20 Q Okay. Now --

21 DR. WALTERS: (Indiscernible - audio cuts out).

22 Q Now, Dr. Riddell, I know has something he wants to
23 say, and I saw Dr. Woodey. I'll leave it to you
24 two to sort out who goes first.

25 DR. RIDDELL: Well, I can finish. I think I said
26 yesterday that at that time I would still support
27 what we wrote. So we're kind of mixing two
28 elements here. If your question was is the paper
29 still sound, well, then I agree with Carl, that we
30 have seen an even greater range in escapements
31 now. We have done more analyses, so I think
32 people now would have a different conclusion to be
33 drawn.

34 Would I personally say that we're still
35 seeing a high risk of catastrophic loss? I don't
36 think so. But Carl is more familiar with the
37 interline interactions than I am at this point,
38 and so it's --

39 DR. WALTERS: No, it's not a high risk, but we have
40 seen it.

41 DR. RIDDELL: We have seen it. There isn't any
42 question that there's a time trend in poor marine
43 survival as well in Chilko Lake that we have to be
44 careful that we're not confounding density
45 dependent freshwater effects with marine effects.
46 But there isn't any question that there's a trend
47 in the production from Chilko Lake that we need to

1 be concerned about. And 2010, again, is going to
2 change our outlook on that one.

3 So, now, in terms of we didn't do the
4 analysis, I think probably a more fair way to
5 express that at this point, if we go back to 2003
6 when we're doing the work, people are always
7 looking at recruitment analyses in these. Every
8 year, DFO, and in particular Al Cass, at that
9 time, was going through the recruitment analyses
10 looking at how to improve forecasts, or looking at
11 what changes in production were going on. FRSSI
12 was developing at that time, so there was
13 extensive examination of recruitment functions.

14 I think really it's in the very much more
15 recent years where the Larkin model was starting
16 to show a better fit. So as I said yesterday, I
17 think it's a matter that we've evolved in the more
18 recent years in terms of looking at things more
19 critically with the Larkin model. At the time, I
20 think we would have drawn the same conclusions,
21 but things have changed.

22 Q I haven't forgotten, I'll come to you Dr. Woody.
23 In the 2004 paper at page 16, Exhibit 417, which I
24 think is going to come up on the screen, yes,
25 thank you. It says there at the top:

26
27 Our ability to test for effects of over-
28 escapement remains limited, but the examples
29 compiled in the technical paper do not
30 indicate any evidence of stock collapse after
31 large spawning escapements.
32

33 Now, I'll start with you, Dr. Riddell, and then
34 Dr. Walters and the move to Dr. Woodey.

35 Are you in a position now to say - firstly,
36 that's what I understand to be your core
37 conclusion on no evidence of stock collapse after
38 large spawning as put in this paper - are you in a
39 position to now say what your conclusion today
40 would be with the new information that each of you
41 have seen? I'm not asking you to rewrite your
42 paper as such, or redraft it in today's terms, but
43 are you able to come to a conclusion in a sentence
44 or so as you have in that paper?

45 DR. RIDDELL: And I think Carl answered that. The
46 examples where we have seen concern building about
47 stock collapse would be the -- is it 2002 brood

1 you're referring to in Quesnel?

2 DR. WALTERS: Yeah, I think, or -- which one? Jim can
3 answer.

4 DR. RIDDELL: So what's happened since then? Well,
5 this year, we've had a very good recovery. The
6 other part was Chilko. As I say, Chilko has got a
7 very serious trend in marine survival and
8 production. That is a concern. But there are a
9 number of others. There are 17 other populations
10 that we need to be including as well, and they
11 don't show as much of a change.

12 So I don't think there's any question that
13 we've seen more evidence that there are interline
14 interactions and because of that, then you would
15 have more concern about stock collapse. But I
16 don't think the evidence strongly supports that
17 stock collapse is a major concern at this point.

18 MR. WILSON: Mr. Commissioner, I feel I need to jump in
19 here. This issue is quite an important one.
20 We're being asked to entertain the idea that
21 escapements, large escapements on the Fraser bring
22 with them a risk of catastrophic collapse. I
23 noted on my computer yesterday the escapements for
24 the 2010 return are now in. Just over 13 million
25 fish spawned in the Fraser River. It's the
26 highest since we've been keeping adequate records.

27 I suppose if large escapements are a danger
28 to us, then we have accepted some risk by putting
29 these fish on the spawning grounds. But again, I
30 go back to try and put this in some kind of
31 broader, longer-term perspective, Mr.
32 Commissioner, I'll go back to the Gilhousen data.
33 I recognize that all the runs cycled on the same
34 cycle line in that time prior to the Hell's Gate
35 slide, and I recognize that there are some
36 uncertainties in these data.

37 Nevertheless, the data that we have in front
38 of us show that every four years, the Fraser River
39 saw returns between 20 and 40 million on the
40 dominant cycle. It's not too much of a stretch,
41 in my view, to imagine periods of time when
42 exploitation of these fish was limited. But the
43 majority of these fish arrived on the spawning
44 grounds unfished.

45 I find it very difficult to believe, with my
46 experience with the aboriginal fishery in the
47 Fraser, that a run of 40 million would be heavily

1 harvested by First Nations. They simply would be
2 unlikely to have the capacity to use that many
3 fish.

4 So it seems reasonable to me that prior to
5 Hell's Gate, we not only saw all the stocks
6 cycling together, but we also saw, every four
7 years, escapements that must reasonably have been
8 on the order of 15, 20, 25, 30 million, 40 million
9 would not be unreasonable. This doesn't require
10 us to speculate about how large the runs might
11 have been historically.

12 There's strong cyclic dominance in this
13 pattern. There's no suggestion of stock collapse
14 at all. To me, the idea that what was an entirely
15 natural, normal and common state of affairs in the
16 Fraser prior to the Hell's Gate slide is somehow
17 detrimental to the biology of Fraser sockeye
18 defies logic.

19 Q Again, I apologize, Dr. Woodey. I remember that
20 you wanted to say something. If you'll just bear
21 with me for a few more minutes.

22 It might help the Commissioner, Mr. Wilson,
23 if you were to -- firstly, let me be clear. I'm
24 not inviting anyone to suggest that high
25 escapement gives risk. I'm simply asking the
26 panel to say what they think, and that's what
27 you're doing. But, with that, it might be helpful
28 to the Commissioner if you were to speak, Mr.
29 Wilson, to the work that Dr. Riddell and Dr.
30 Walters have spoke of where since 2004, they've
31 seen some new information. Have you seen or are
32 you familiar with that new information that
33 they're speaking of?

34 MR. WILSON: I am unaware of what actually underpins
35 the argument that these cycle line interactions
36 are potentially associated with catastrophic stock
37 failure.

38 Q All right.

39 MR. WILSON: But I think part of the uncertainty --

40 DR. WALTERS: You are completely aware of it, Ken. You
41 just spoke of it.

42 MR. WILSON: Well, fair enough.

43 DR. WALTERS: (Indiscernible - audio cuts out) fact
44 that three out four years, things are low. That's
45 the counterside --

46 MR. WILSON: Sure.

47 DR. WALTERS: -- of saying that one out of every four

1 is high.

2 MR. WILSON: I accept that --

3 DR. WALTERS: Three out of four that are low that
4 represent the delayed density dependent or cyclic
5 dominance effect.

6 MR. WILSON: Well, fair enough. Now, I am --

7 DR. WALTERS: Those are the --

8 MR. WILSON: -- not arguing that we should manage
9 Fraser sockeye to allow these sorts of large
10 escapements on a routine basis. I am not
11 suggesting that human yield is not an important
12 component of our deliberations here in any way.

13 I am simply suggesting that the data that we
14 have in hand show that the Fraser cycled with what
15 Dr. Walters called violent cyclicity in the time
16 period prior to Hell's Gate. Perhaps what we're
17 seeing now is a return to that pattern of
18 production. But it's pretty clear to me that very
19 large escapements, much larger than we saw this
20 year, which is the largest we've seen since Hell's
21 Gate, were absolutely routine in the Fraser and
22 were part of the normal biology of these fish. I
23 just think we need to get on with the business of
24 talking about how we divide the baby, the Fraser
25 River sockeye returns, into catch and escapement,
26 and what line of argument we want to make to do
27 that work.

28 The idea that these escapements, even on the
29 order of the escapement seen this year in 2010 are
30 somehow associated with catastrophic stock loss I
31 say is illogical, based on our historical data.
32 There may be increases in cyclicity that affect
33 the way we manage our fisheries and work to the
34 detriment of our harvests. That's not my point.
35 My point is that very large escapements were once
36 completely normal in the Fraser. We need to leave
37 the idea that there's a bogeyman here that's
38 associated with high escapements that make it a
39 bad thing, and get on with the business of trying
40 to decide how many Fraser sockeye to kill.

41 Q Dr. Woodey, I should let you have a few words now.
42 You've been wanting to get in. I think you
43 initially wanted to get in on whether, still
44 today, the idea that there's no evidence of over-
45 escapement leading to stock collapse, but I'll
46 turn it over to you now.

47 DR. WOODEY: Thank you. Mr. Commissioner, the reason

1 that there was very little evidence of over-
2 escapement in the years up until 2000 or so was
3 that the annual runs were managed for harvest, and
4 so the dataset that we have to analyze our
5 situations that we had relatively few individual
6 year situations where individual stocks had
7 escapements that were over about double the
8 escapement; that is, it was intentionally managed
9 to take the yield in the fisheries.

10 Since that time, because of the Late run
11 sockeye issues that I harp on, we've ended up with
12 seeing large escapements, much larger escapements
13 than some of these more recent years, so
14 escapements are exceeding the escapement level
15 during that 60-year period of fisheries management
16 where all of the stocks were behaving normally.

17 In a sense, we're conducting big experiment
18 by seeing these large escapements, and as we are
19 seeing these large escapements fail to produce,
20 we're learning more as to what the optimal
21 escapements are. But, at the same time, we're
22 seeing these failures starting to show up, because
23 it's been only in the last eight or ten years that
24 we've experienced these very large escapements.

25 The 2010 escapements total - I'm not 100
26 percent sure that it is the largest - but I accept
27 what Ken says because I think he's right. The
28 2010 escapement for the watershed is the largest
29 since -- in recorded history.

30 But I'll turn to what Ken was talking about
31 as far as escapement levels and productivity. In
32 the late 1880s and early 1990s until the Hell's
33 Gate slide in 1913, those large runs of up to 40
34 million were harvested heavily. We had up to 5000
35 gillnet vessels fishing in the Fraser River and
36 lower Strait of Georgia. We had a large number of
37 traps in the U.S. which are set nets that are
38 corralling the fish and so on. The harvest rates
39 were high, so escapement levels at 40 million
40 total run may not have exceeded, say, 10 million.
41 I was looking in Gilhousen's. Somewhere in there
42 he's got the numbers, the estimates.

43 Escapement levels were not high in those
44 early 1900s either. But what had happened is that
45 if you look back at the information -- and I doubt
46 that it's in the files here, and Carl can answer
47 that -- Sandy Argue and Mike Shephard's report on

1 that earlier historical data indicate that you had
2 the same dominant year cycle going through, but
3 the off years were larger, and the dominant years
4 lower. Those would have been at lower harvest
5 rates, so I don't know, but I suspect that the
6 escapement levels in those time periods were not
7 excessive.

8 MR. WILSON: I agree with Dr. Woodey's point. I was
9 referring to the data from 1893 to 1913 that are
10 provided in Gilhousen as perhaps representative of
11 a pattern of production that went back prior to
12 the onset of commercial fishing. Salmon have
13 entered the Fraser for thousands of years, and I'm
14 simply making the argument that prior to the onset
15 of commercial fishing, if the pattern that we've
16 observed prior to Hell's Gate were to have held,
17 that very large escapements would have been
18 absolutely routine and expected on the Fraser
19 River, and the 20 to 40 million fish is probably
20 not an outrageous estimate of the spawning
21 escapement on the Fraser River prior to the onset
22 of commercial harvest on the dominant year.
23 That's all I was trying to point out.

24 Q All right. Just to see if the panel is -- oh, I'm
25 sorry. Dr. Walters.

26 DR. WALTERS: Yeah, it just occurred to me in this last
27 little discussion that there's something that
28 those of us who work on the system know about and
29 others wouldn't. That is that we speak about the
30 Hell's Gate disaster as something really bad when
31 the stocks were severely knocked down, but in a
32 way, it was a lucky thing because it broke up the
33 synchrony in the cycles so that as the stocks
34 recovered after 1913 through the 20th century,
35 instead of having only one good year out of four
36 for returns, we, coming up into the '90s, had two
37 good years out of four, for fishing.

38 One fear is that if stocks become
39 synchronized again, we'll be back to just one out
40 of four good years, which is not a good situation
41 economically or socially for people who depend on
42 the fish.

43 So in the sense that our high escapements may
44 trigger that resynchronization or trigger the
45 periods of low stocks regularly in between the
46 dominant runs, I don't think we want to see that
47 kind of over-escapement.

1 Q All right. I think I'm hearing all of the panel
2 members say that the work on the effects or
3 consequences of over-escapement remains a work in
4 progress. Am I right, Dr. Woodey? Is that a fair
5 summary of what I think I heard you and others
6 saying?

7 DR. WOODEY: Yes, Mr. Commissioner. We're now
8 experiencing these over-escapements, and because
9 of that, I think our view of the world will change
10 over the next ten years. But I personally don't
11 expect that the MSY levels that we're currently
12 seeing in the datasets we have to analyze, I don't
13 see those as changing. The optimal escapement I
14 don't see changing.

15 We do have generally now datapoints beyond
16 them as why they've shown decreased productivity
17 principally because of juvenile survival and
18 growth in the lakes that are causing the survival
19 rates in the ocean to go down in those individual
20 years.

21 But we are in the period of having a large
22 experiment being conducted as a result of the
23 current policy, which is to limit the harvest
24 rates on Late run sockeye and thus allow large
25 escapements of Summer runs.

26 MR. TAYLOR: All right, thank you. Those are my
27 questions.

28 MS. BAKER: Thank you, Mr. Commissioner. The next
29 participant is represented by Don Rosenbloom for
30 Area D, Salmon Gillnet, and Area B, Harvest
31 Committee.

32 MR. ROSENBLOOM: Thank you very much. My name is Don
33 Rosenbloom and I appear on behalf of Area B Seiner
34 and Area D Gillnet. It's not often that the
35 Government of Canada counsel pre-empts me on
36 questions that I intend to raise in cross-
37 examination, but that has been very useful in
38 allowing me to proceed with my questions.
39

40 CROSS-EXAMINATION BY MR. ROSENBLOOM:

41
42 Q If I can just follow up on the very issue of the
43 2004 paper, and we have heard yesterday and today
44 from you, Dr. Riddell, and from you, Dr. Walters,
45 of your new thinking, which is totally
46 understandable subsequent to the publication of
47 the 2004 paper.

1 What arises from the evidence that both of
2 you have given at this Commission in respect to
3 what I'll call your rethinking of some of the
4 issues relating to the threat collapse from over-
5 escapement, my question is this: Appreciating
6 what is your current thinking in respect to that
7 critical question, as focused in that paper, what
8 advice would you be giving to the managers at DFO
9 if respect to harvest management in the context of
10 your new thinking?

11 DR. WALTERS: Brian? Shall I start?

12 MR. RIDDELL: Do you want to start?

13 DR. WALTERS: Yeah, okay. I strongly recommend that
14 DFO consider a return to the relevantly high
15 harvest rates that produced good returns and
16 increasing biodiversity and increasing spawning
17 abundance through the '50s through '80s. And that
18 they consider attempting to deliberately re-
19 establish the cyclic dominance patterns for stocks
20 like Quesnel and Late Stuart.

21 Now, there's a caveat on that, that yesterday
22 Jim Woodey mentioned. He talked of the most
23 serious problem in the Fraser today is pre-
24 spawning mortality of Late run fish. I don't
25 think that's correct at all. There is widespread
26 decline in productivity of Fraser River sockeye,
27 particularly in the upper part of the Basin that
28 may be partly due to delayed density dependence
29 effects, but there also appear to be some severe
30 environmental effects. Those environmental
31 effects go beyond just pre-spawning mortality and
32 warm temperature. Something's going wrong up in
33 that part of the system.

34 So the caveat would be that we should only
35 return to the higher harvest rates if those
36 survival declines reverse themselves.

37 Q Dr. Riddell?

38 DR. RIDDELL: Well, I don't think I would be as
39 emphatic about increasing the harvest rates back
40 to historic levels. The reality is that we have
41 multiple management objectives now. But to the
42 context that you could increase harvest
43 opportunities, there's no question that I think
44 the new data is indicating that there is a
45 significant loss of productivity and production at
46 those higher levels of spawning. I think you'll
47 see that in the Quesnel, in Chilko and in the

1 Adams. So those are your main producers.

2 The real task for the managers is how you can
3 increase the harvest on those major stocks and
4 meet the other objectives. Really, that was part
5 of the intention of developing the FRSSI sort of
6 modelling. Can you get back to historic levels?
7 I doubt that, to be honest. But would I recommend
8 that you increase harvest where possible to meet
9 the other objectives? Yes, I see no technical
10 reason why you wouldn't try to come back to more
11 of what we consider to be the sort of MSY
12 paradigm.

13 I think that you have to recognize the wide
14 uncertainty of some of the MSY estimates. I
15 actually quite like the notion in Alaska of
16 defining an MSY range. I think that recognizes
17 that there's a range of acceptable values.

18 t I don't think I could recommend going back
19 to historical levels. Could we increase the
20 harvest in some of the large stocks? I think that
21 is consistent with what we're seeing in the
22 productivity of the stocks now with some increased
23 spawning, but within the constraints of the other
24 objectives.

25 Q Thank you. We hear from Dr. Woodey and from
26 others, but from Dr. Woodey this morning that our
27 recent direction in terms of increasing escapement
28 into the spawning grounds is "a big experiment".
29 My question to any of you and all of you is this:
30 Obviously more research has to be done. We have
31 the 2004 paper. There is then the revisiting or
32 the rethinking of the 2004 material by the two of
33 you who are authors of the paper. Obviously more
34 work has to be done.

35 I assume that you would be recommending to
36 the Commission that part of the recommendations of
37 this inquiry be that sufficient money be put into
38 further analysis to satisfy the current thinking
39 as both of you, as authors, have been speaking
40 about for the last day or two.

41 DR. WALTERS: I think you have to be careful there. We
42 certainly would recommend lots of research on the
43 mechanisms that cause delay density dependence and
44 so on. But in the matter of determining whether
45 or not we can reverse negative impacts of cyclic
46 dominance, or whether those impacts are in fact
47 due to environmental factors rather than cyclic

1 dominance, you're not talking about investment in
2 research. You're talking about what's called an
3 adaptive management experiment.

4 The possibility of a deliberate change in
5 harvest management policy aimed at causing
6 informative variation about productivity in the
7 spawning stock sizes -- and in fact, that was what
8 when on from 1990 forward was essentially an
9 adaptive management experiment to test to see if
10 off-cycle lines could rebuild. That doesn't
11 require extra research money. It requires a
12 commitment in management to treat the management
13 and the setting of escapement goals as a set of
14 experimental treatments.

15 Q Thank you. Dr. Riddell?

16 DR. RIDDELL: Well, I don't think there's any question
17 that we need to do more targeted research. I
18 think we've done a lot of the adaptive management.
19 It has been as structured as the sort of adaptive
20 management design would actually like, so we could
21 probably improve on that. But I think that we've
22 let the escapements build, and now I suppose what
23 Carl is referring to is that we need to fish to
24 see if the population dynamics as we now
25 understand it, respond as we predict.

26 I think you still have to acknowledge that
27 you'll need more resources directed to conduct the
28 necessary research. We're spending a lot of time
29 talking about density dependence within fresh
30 water and then linking it to marine. I am not
31 confident that we understand the marine survival
32 enough to sort out these two effects. So, yes,
33 you need to do the work in fresh water.
34 Unfortunately, we also have to spend more effort
35 in the marine survival, particularly, I think, in
36 the early marine survival in the Strait of
37 Georgia.

38 Q I'll be coming back -- it's my last question to
39 this panel about funding issues and budget of DFO
40 and I will be directly questions about the
41 research side of it, so I'll leave that for now.

42 Much has been said about this Alaska paper
43 which is actually a paper that we have brought
44 before the Commission and wish to have filed as an
45 exhibit, and then I have questions to ask of a few
46 of you regarding the significance of the Alaska
47 paper. I don't believe it has, as yet, been

1 filed.

2 MR. ROSENBLOOM: That paper is the biological and
3 fisheries related aspects of over-escapement in
4 Alaska sockeye salmon. I would ask that that
5 paper be filed as an exhibit. I understand
6 Commission counsel had it in hard copy to be
7 filed.

8 THE REGISTRAR: It's been passed to the Commissioner.

9 MR. ROSENBLOOM: Oh, good. Thank you very much. And
10 it has already been marked as an exhibit?

11 THE REGISTRAR: Not yet.

12 MR. ROSENBLOOM: No. In which case, may I suggest that
13 it get marked as an exhibit? Thank you.

14 THE REGISTRAR: Exhibit number 419.

15 MR. ROSENBLOOM: Thank you.

16
17 EXHIBIT 419: Biological and Fishery-Related
18 Aspects of Overescapement in Alaskan Sockeye
19 Salmon dated December 2007
20

21 MR. ROSENBLOOM:

22 Q Could I direct these questions in particular to
23 Dr. Riddell and Dr. Walters, and not to slight the
24 other two panel members, if they do have comments
25 they wish to make about it. My question is this:
26 What is the significance of this paper from your
27 perspective as scientists? Much has been said
28 generally about it. Where has it taken us? Where
29 are we today because of this paper that we weren't
30 otherwise? Dr. Walters, do you wish to proceed
31 first?

32 DR. WALTERS: You mean the Alaskan over-escapement
33 paper?

34 Q That is correct.

35 DR. WALTERS: No, it's just -- there's nothing added in
36 to anything. It's just a reiteration of standard
37 definition of Type 1 over-escapement as Brian and
38 I would have called it. Escapement surplus to
39 that escapement level that will produce the
40 maximum average yield.

41 Q Thank you.

42 DR. WALTERS: As Brian mentioned, there's a couple of
43 little goodies in there about operating with a
44 range, a target range rather than a single
45 statement value, but there's nothing new in that.

46 Q All right. And, Dr. Riddell?

47 DR. RIDDELL: I would agree. I think if it adds

1 anything, it adds a couple of clear examples of
2 the sort of density dependent -- delay density
3 dependent element. Other than that, it's very
4 much an assessment like many other organizations
5 would conduct.

6 Q Thank you very much. Dr. Walters, we were
7 speaking of SR modelling and we had before us from
8 your 2004 paper, a model. I have been in the
9 audience of a lecture that you gave to academics
10 and to students on SR modelling. Do you have
11 anything to add in terms of educating the
12 Commission about SR modelling, meaning spawner-to-
13 recruit modelling, or are you satisfied, as you
14 conclude your evidence today, that you have said
15 your piece.

16 DR. WALTERS: Well, no, I would add two points. One of
17 them is to reiterate that that curve that we draw
18 is not used just for point forecasts. It can be,
19 but it isn't a good point forecaster. There's
20 wide scatter around the curve, meaning there's
21 wide variation in recruitment not explained by the
22 size of the spawning stock. The curve is only
23 there to help us identify the spawning stock level
24 that, on average, produces the highest yields, and
25 beyond which there's diminishing returns to adding
26 additional spawners in terms of potential yield.

27 I would add another thing is that in recent
28 years, for a lot of stocks of fish, we have seen
29 apparent persistent changes in the parameter
30 values of the curve. That is, the curve is
31 actually shifting more or less slowly and
32 progressively, and apparently irreversibly in
33 time. In some cases, towards higher productivity,
34 and in other cases towards declining productivity.
35 In other cases, a simple shift from one position
36 to another position. We have to be alert to those
37 changes and to adjust the spawning stock goals to
38 those changes.

39 We don't treat the spawning stock number even
40 if we could estimate it precisely from historical
41 data, as carved in stone for the future.

42 Q I don't know if anyone -- the other panel members
43 wish any comment. If not, I will proceed with my
44 next question.

45 The panel has -- excuse me, yes, Dr. Riddell.
46 DR. RIDDELL: I'd just add I agree completely with what
47 Carl said. I would point out that there was an

1 analysis done by Dr. John Schnute, and I think Al
2 Cass and Dr. Beamish. What they did is they
3 actually looked at different time periods of the
4 SR modelling in the Fraser sockeye and they did
5 theirs on the basis of changes in marine
6 productivity in the North Pacific. They see the
7 very same thing that Carl's referring to.

8 So if we talked about the long time series in
9 the Fraser sockeye, I think the important thing
10 with Carl's is that we tend to run these analyses
11 through the entire time series and think that
12 that's the more robust way to look at all the
13 data, but you could be missing important changes
14 in the productivity of the stocks, or change in
15 the capacity prime area (sic) that Carl's
16 referring to. So I think just to emphasize that
17 some people are looking at periods within the
18 data, but we probably need to be more vigilant in
19 examining that effect.

20 Q Thank you.

21 DR. RIDDELL: We can do these models with a year
22 dependent parameter to look at change through
23 time, but if it's shifting back and forth, that
24 may not be informative.

25 Q We have discussed over the last two days the
26 issues of what I'll call ecosystem benefits from
27 over-escapement and evidence has been given, but
28 this will be our last opportunity to have you as
29 panellists speaking to the matter.

30 Dr. Walters, you have spoken about it, and
31 today you were speaking about the marginal returns
32 to the fertilization or ecosystem in terms of
33 benefits reaching a certain point. Before I
34 invite the other panel members to this debate,
35 because it is obviously a critical question for
36 the Commission, do you have anything further that
37 you want to add in respect to the argument that
38 over-escapement is beneficial to the ecosystem?

39 DR. WALTERS: Let me just reiterate that if we're going
40 to be honest and scientific about this, we need to
41 look at benefits to the ecosystem on the margin as
42 spawning stocks increase, not make some absurd
43 assumption that they're always going up when
44 there's more spawners, which we've been, I
45 believe, invited to do.

46 A good example of that idea of there not
47 necessarily being a marginal value, if you go to

1 Rivers Inlet today where the stocks are severely
2 depressed, the bears have left. The grizzly bears
3 and the black bears have left Rivers Inlet. So
4 you say, my goodness, Rivers Inlet is not
5 supporting bears anymore and eagles. But if the
6 spawning stocks were to recover to just even half
7 of what we calculated from the long-term data to
8 be the optimum, there would be an abundance of
9 spawning fish and the bears and eagles would come
10 back.

11 Beyond that two or hundred thousand spawners,
12 there wouldn't be any additional benefit to those
13 components of the ecosystem of having extra
14 spawners. A bear standing there on a spawning
15 creek where there's 100,000 fish for him to eat
16 isn't any happier than a bear standing there where
17 there's 10,000 for him to eat. That's what I mean
18 by we need to look at these benefits much more
19 carefully than has been done.

20 Q Before we're likely to take our break, do the
21 other panellists have any contribution to make in
22 respect to this question? Dr. Woodey?

23 DR. WOODEY: Yes, Mr. Commissioner. The thing that has
24 come out in at least one case in the Quesnel
25 system speaks to this over-escapement issue and
26 marine-derived nutrients. In the recent years,
27 the 2001 and 2002, there were approximately 3.5
28 million fish that escaped in 2001, three million
29 roughly in 2002, and the marine-derived nutrients
30 under the theory that you're fertilizing the
31 environment and thus getting better growth, the
32 growth actually went down. We don't know why
33 necessarily that occurred, particularly in the
34 2001 dominant line spawning population offspring.

35 But in the 2002, what's called a colonial
36 algae became the dominant phytoplankton species in
37 the lake for a period of time sucking up a lot of
38 nutrients, but because they're colonial, they're
39 large and unavailable to the zooplankton as food,
40 and therefore the zooplankton presumably didn't
41 increase in proportion to the nutrient input.

42 Because I did my doctoral studies on Lake
43 Washington, that was the issue there, was cultural
44 eutrophication in Lake Washington. When you have
45 a situation where you have too much nutrient, you
46 actually tie up those nutrients and species of
47 phytoplankton or algae that are unavailable to the

1 zooplankton that fish feed on. So there is some
2 known mechanisms here and why -- from a
3 fertilization point of view, not necessarily going
4 to realize the benefit in terms of juvenile
5 sockeye.

6 At 2002, juvenile sockeye were the smallest
7 on record by quite a large amount in terms of
8 percentage decrease in size. We're talking 20, 25
9 percent decrease over the next small of juveniles
10 and was contributing to this decline in the
11 Quesnel stock.

12 Q Any other comments before I invite the
13 Commissioner to adjourn for a break?

14 MR. WILSON: I think Dr. Woodey raises a very good
15 point, and so does Carl. In my earlier comments,
16 I was not implying that all of the benefits of
17 large escapements directly translated into future
18 increases in the productivity or carrying capacity
19 for raising salmon. I was simply suggesting that
20 in a watershed like the Fraser, 100 million pounds
21 of salmon arriving in a particular year is going
22 to be a very significant event, and it will change
23 the productivity of the Fraser River, likely in a
24 very positive way.

25 Whether that's good or bad for salmon, I
26 can't say. It may even be related to the
27 mechanism that drives cyclic dominance. I'm
28 simply suggesting that those very large influxes
29 of nutrients were, in general, important to the
30 productivity of the watershed and there is
31 evidence to suggest that for some lakes that are
32 nutrient limited, it can have a positive influence
33 on even salmon growth.

34 But I totally agree with Carl that we need to
35 have a thorough scientific review of the available
36 evidence. It should certainly be something that's
37 considered in the setting of escapement goals for
38 the Fraser River.

39 Q Dr. Riddell?

40 DR. RIDDELL: Well, I can assure you that when you
41 start talking about ecological values, this is one
42 of the toughest discussions in the Wild Salmon
43 Policy as we went through before.

44 There are very, very strongly felt sentiments
45 about cultural values and aesthetic values and not
46 just economic values. But I do agree with Carl,
47 and the reason that we included the -- we, I'm

1 sorry, when I was with DFO again -- why we
2 included Strategy 3 in the Wild Salmon Policy is
3 that I think that it can be completely consistent
4 with the objectives in that policy because if you
5 accept these management goals, the upper benchmark
6 targets for management, if you were to sustain
7 those, you would have a pretty health ecosystem in
8 our assessment.

9 You can do the assessments and then you'd be
10 looking at these marginal values, but I think if
11 we did have a system where you could achieve these
12 MSY type levels or in that range, which we equate
13 to the upper benchmark in the Wild Salmon Policy,
14 that I think it would, for the vast majority of
15 people, meet their expectation of these ecological
16 values.

17 MR. ROSENBLOOM: Thank you. If there is nothing more
18 from the panel in respect to that question, I will
19 invite the break. Thank you.

20 DR. WALTERS: I'm sorry, Don, could I just make one
21 real quick point?

22 Q I thought that might come. Go ahead.

23 DR. WALTERS: You can have your break and think about
24 this. I want to ask all of you who, in their
25 right mind, would use our most valuable salmon as
26 fertilizer deliberately?

27 MR. ROSENBLOOM: I thank you very much, Dr. Walters.

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

30
31 (PROCEEDINGS ADJOURNED FOR MORNING RECESS)

32 (PROCEEDINGS RECONVENED)

33
34 (PROCEEDINGS RECONVENED)

35
36 MR. ROSENBLOOM: Thank you very much.

37
38 CROSS-EXAMINATION BY MR. ROSENBLOOM, continuing:

39
40 Q To muddy the waters even further, Dr. Walters, am
41 I correct in understanding that Dr. Larkin did
42 assert that the MSY should not be the objective
43 for harvest management, or do I have that wrong?

44 DR. WALTERS: Larkin was my mentor at UBC when I
45 started there and I helped him a bit writing a
46 paper called "An Epitaph for the Maximum Sustained
47 Yield" where he warned fisheries scientists about

1 three things. One of them is he warned about
2 slavish adherence to MSY, as a management goal
3 and, more particularly, a slavish belief in the
4 models used to estimate MSY where those models
5 have a substantial risk of overestimating MSY and
6 leading to over-harvest. He also warned about the
7 erosion in stock structure or biodiversity that
8 can occur in a complex system like the Fraser when
9 MSY goes for what harvest rates are set at the MSY
10 rates for the larger and more productive stocks.

11 And then thirdly, he warned that there are
12 other goals in management besides just yield.
13 There are, in particular, economic goals. For
14 example, if we wanted to maximize the profits from
15 our fisheries, we would fish at lower than MSY
16 rates. The marginal economic gain from taking
17 more fish is exceeded by the costs of taking them
18 at harvest rates below the MSY harvest rates.
19 Larkin did not offer, however, clear
20 recommendations about how to deal with the stock
21 structure and biodiversity issue. He basically
22 sidestepped that. He said we should take care to
23 try not to cause irreversible extinction of small
24 stocks that could become important in the future
25 but didn't offer specific portfolio management
26 recommendations about how to achieve a balance
27 between yield and diversity.

28 Q Well, speaking to that very issue, Dr. Walters, I
29 cross-examined Dr. Holt in these proceedings --
30 and Mr. Lunn will put the transcript before us --
31 on December the 7th of last year, and I'm
32 referring to page 55. If you don't have it on
33 your screen, I'll be reading this passage of my
34 question and her response. And I want to elicit
35 from you your response to Dr. Holt's answer to me.

36 DR. WALTERS: I have that material. What page, please?

37 Q It is page 55 of the transcript of that date.

38 DR. WALTERS: Gotcha.

39 Q And I start my question at line 23. And if you
40 have that in front of you, it reads:

41
42 Q Now, my first question to you relates to the
43 whole substance of the Wild Salmon Policy
44 and, in particular, the assertion that
45 maintenance of high biodiversity also use, in
46 other words, above their lower benchmarks, is
47 necessary to maintain a fully sustainable

1 fishery for the Fraser Sockeye. And I assume
2 you general subscribe to that approach, do
3 you not?
4 DR. HOLT: Yes.
5 Q That being the case, my question to you is
6 this. Isn't that fishery largely dependent
7 on a relatively small number of large stocks?
8 Let me start with that question. Do you
9 agree?
10 DR. HOLT: That is true for the current period.
11 As Dr. Irvine mentioned a few minutes ago, it
12 is possible that the stock ratios may change
13 over time so the ones that are dominant now
14 may be small in the future but other ones
15 that are small now may become dominant in the
16 future.
17 Q Right.
18 DR. HOLT: So maintaining that diversity is
19 important for the long run.
20 Q So you speak of -- I'm sorry, yes. So you
21 speak of Dr. Irvine's comments a few minutes
22 ago about Bristol Bay, do you not?
23 DR. HOLT: Yes, that was one example that he gave.
24
25 And then it goes on from there. I have a couple
26 of questions arising out of that testimony.
27 Firstly, do you agree with Dr. Holt?
28 DR. WALTERS: On which point, that maintaining all
29 stocks is necessary for the future?
30 Q Precisely.
31 DR. WALTERS: No, absolutely not. That's equivalent to
32 your stockbroker telling you that you have to keep
33 every stock you ever owned in your stock
34 portfolio.
35 Q Right. And you made mention of that yesterday.
36 If you have nothing more on that particular
37 matter, about Bristol Bay, can you or Dr.
38 Riddell --
39 MR. TAYLOR: May I just point out in fairness to the
40 witness; I think Mr. Rosenbloom said "maintaining
41 all stocks". I see the evidence to say
42 "maintaining diversity".
43 MR. ROSENBLOOM: Maintaining diversity. I'm sorry.
44 Did I misread the...?
45 MR. TAYLOR: Well, I'm looking at line 43 on page
46 whatever this page is.
47 MR. ROSENBLOOM: Line 43, "Dr. Holt, 'So maintaining

1 that diversity is important for the long run.'" "

2 And I misread that? I'm sorry.

3 MR. TAYLOR: I thought you said "all stocks".

4 MR. ROSENBLoom:

5 Q Oh, no. Having heard that exchange, that doesn't
6 change your testimony, does it, Dr. Walters?

7 DR. WALTERS: No, not at all. There is also an
8 assertion in that testimony about small stocks
9 potentially becoming the large stocks and, in
10 particular, a reference to Cultus Lake being much,
11 much larger, potentially much, much larger than it
12 is today. I don't believe that kind of argument
13 is correct. Most of the stocks that are small
14 today, with a few exceptions like the Harrison
15 River, are small because they live in very limited
16 habitats. They do not have the potential to
17 become very large and to replace our big dominant
18 stocks. You can't grow that many fish in those
19 small lakes.

20 The Bristol Bay reference is to a paper by
21 Ray Hilborn where he pointed out that, in the
22 Bristol Bay system, that has eight major stocks
23 that contribute to it, the dominant pattern of
24 those stocks has shifted. That's not small stocks
25 becoming important. That is shifting patterns of
26 contribution among large stocks. Another study in
27 Bristol Bay by Daniel Schindler pointed out that
28 when you have a large number of stocks
29 contributing to production, you obtain a portfolio
30 of stabilization effect on yields so one's down,
31 the other's up. The situation that Daniel was
32 referring to is one where there's a very large
33 number of small spawning stocks going up and down,
34 not a few large dominants and many small ones that
35 can't become large.

36 The closest we have to the situation that
37 Schindler referred to in the Fraser is in the
38 Early Stuart Complex where there is a large number
39 of small streams that contribute to the production
40 and some of them haven't done well and others have
41 and so on. This whole argument speaks to Dr.
42 Larkin's point. We have not resolved the issue of
43 how to select a portfolio for the long-term. And
44 it is not just a matter of saving every stock.

45 Q Thank you. Again, borrowing Dr. Woodey's comments
46 about this experiment that we're experiencing of
47 late in terms of harvest management since 1995 to

1 the present, Dr. Riddell, can you tell me, has
2 there been a retrospective estimate of the yield
3 loss? So I'm speaking of harvest loss over this
4 period of what I'll call the experiment.

5 DR. RIDDELL: I don't believe there's been any
6 retrospective in assessment of loss, no.

7 Q And you would agree with me, depending on whether
8 you apply the Ricker or Larkin model, that the
9 figures could be very, very significant in terms
10 of financial loss to the harvesters?

11 DR. RIDDELL: Well, I'm sure that you will show a
12 significant number of fish lost to the harvest
13 opportunity. My concern in doing that
14 retrospective is similar to my concern with Carl's
15 response. I don't know. Were you going to come
16 back to the panel with respect --

17 Q I'm sorry. I'm happy to. So let's go back to Dr.
18 Walters' comments and then allow you to carry on
19 about this retrospective estimate of loss.

20 DR. RIDDELL: Mr. Commissioner, I think the answer is
21 very, very similar to both from my perspective in
22 a sense. I have no question or concern with
23 Carl's comment about "many of the small stocks
24 will be small". Their productive capacity is
25 quite limited. But we already noted today that we
26 have these 19 stocks that we are focused on in the
27 production assessment of which there were actually
28 38 conservation units. We're really only looking
29 at production from about half. They are the
30 majority of the production. I think they make up
31 80 to 90 percent in most years but not on the off-
32 cycle years.

33 And so if you were even concerned about
34 potential fishing opportunities, there's certainly
35 a concern about delivery of fish to First Nation
36 communities in the off-cycle years. These small
37 stocks have an aggregate value that can be quite
38 important to local communities. And so I have no
39 problem agreeing that Fraser Sockeye salmon in
40 this portfolio issue is not a very equal
41 comparison with Bristol Bay. They just don't have
42 the same sort of capacity to compensate for the
43 magnitude of loss that occurred in Bristol Bay.
44 But I do think that in doing the retrospective and
45 in considering the value of the biodiversity we're
46 referring to in the Fraser, you must look at the
47 full set of management objectives again, including

1 the local values of the smaller lakes to the First
2 Nation communities and to the local ecosystems.

3 So from a strictly economic perspective, I
4 don't have any concern really with what Carl's
5 saying, that the small stocks in the Fraser simply
6 don't have the productive capacity to compensate
7 like they did in Bristol Bay. But I don't think
8 that that takes away the value of maintaining the
9 diversity just like Dr. Larkin referred to a long
10 time ago. I think that paper was '74? '77?

11 Well, he has another one, "Play It Again Sam," in
12 '74, which is another sort of paper that everybody
13 should read if you're in salmon biology. But it's
14 just a matter of saying that these small
15 populations are acknowledged to have significant
16 values that are not just economic and this was
17 very, very strongly expressed by many people
18 advising on the Wild Salmon Policy.

19 But the real art of this, and I think the
20 concern that we need to get to in resolving this
21 issue with biodiversity versus opportunities for
22 harvest is Carl's analysis recently suggesting
23 some of the small populations are getting
24 increasingly unproductive. That is a critical
25 issue we'd have to investigate because that could
26 be a significant limitation on how we can conserve
27 these populations.

28 Q All right. Before we go back to you, Dr. Riddell,
29 on the issue of estimates of yield lost from
30 making these decisions from this grant experiment,
31 Dr. Walters, do you have anything to respond to
32 Dr. Riddell in respect to the issue of small
33 stock?

34 DR. WALTERS: No, no --

35 Q Thank you.

36 DR. WALTERS: -- certainly DFO recognizes values of the
37 small stocks associated with First Nations use and
38 so on and --

39 Q Thank you.

40 DR. WALTERS: -- that's a public policy issue beyond
41 the scope of my competence as a biologist.

42 Q Thank you. Dr. Riddell, back to you on the
43 question of stock value or, as I put it, yield
44 lost to harvest, you don't believe that work has
45 been done, correct, to the best of your knowledge?

46 DR. RIDDELL: I'm not aware that it has been done, no.

47 Q And does it not strike you that it's critical in

1 the application of the Wild Salmon Policy that
2 socioeconomic analysis is done on a constant basis
3 before decisions are made or would be made under
4 the Wild Salmon Policy?

5 DR. RIDDELL: Well, the policy --

6 Q Isn't that part of the policy?

7 DR. RIDDELL: I was just going to say the policy
8 recognizes the need to do that. Outside of the
9 policy, though, I mean we're referring to the
10 rebuilding objective as an experiment. And it is
11 unfortunate that the experiment hasn't been fully
12 assessed in that perspective. And as Carl's
13 talking about the adaptive management approach and
14 where we go in the future, it's probably a good
15 time to do that before you start designing another
16 approach for the next ten years. But to my
17 knowledge, that retrospective has not been
18 conducted.

19 Q Thank you. Dr. Walters, do you have any comment
20 to make on this very question of retrospective
21 estimate of yield lost to my clients and other
22 harvesters from this so-called experiment?

23 DR. WALTERS: Yes. As the Scientific Advisory
24 Committee was being disbanded for the Cohen
25 Commission, I contacted Dave Levy and recommended
26 very strongly that such a retrospective analysis
27 be carried out as part of the Commission's work.
28 I recommended it be an add-on to Randall
29 Peterman's work or contract with Steve Martell.
30 Martell and I had done a similar analysis on
31 earlier data from the Fraser. I also contacted
32 Jeff Grout from DFO and recommended that they do
33 that. And I sent a spreadsheet with the
34 beginnings of a retrospective analysis to Al Cass
35 with the request that DFO's FRSSI team use the big
36 FRSSI model to carry out such an analysis.
37 There's been no response to the request to the DFO
38 people and I don't know what the Commission
39 decided to do about it. I believe there is a
40 study that is going to attempt something like
41 that.

42 I carried out a retrospective spreadsheet
43 analysis for the 1995 to 2009 period and looking
44 forward for about eight years. And using the
45 model, that retrospective analysis showed that the
46 total loss in value from harvesting, if the
47 Larkin-type models are correct, has been about

1 \$200 million not including the loss from 2010,
2 which would be another probably \$40 million. So
3 it appears to me that the economic losses were
4 very substantial.

5 Q When you referred to the Commission, for example,
6 in reference to phoning or contacting Dr. Levy,
7 you're, of course, referring to this Commission as
8 opposed to the Pacific Salmon Commission?

9 DR. WALTERS: That's right.

10 Q Thank you.

11 DR. WALTERS: Right, right, right.

12 Q Sorry. Did you have something to say, Dr.
13 Walters?

14 DR. WALTERS: Yeah. Now, the way this retrospective
15 analysis is done is we build a multi-stock. I
16 used a ten-stock population model using the Ricker
17 and Larkin equations. And we provide that model
18 with the actual historical recruitment anomalies
19 that occurred over the years. We provide it with
20 the pre-spawning mortality patterns that occurred
21 so that if we give that model the historical
22 harvest rates by timing group, it gives us back
23 exactly the observed historical catches. And then
24 what we do is to vary the harvest rates away from
25 those that actually occurred and then ask, "What
26 if we had harvested higher rates or lower rates?"

27 I explored two options. One of them was a
28 steady 60 percent harvest rate through the 1995 to
29 2009 period; in other words, followed basically
30 the TAM rule that ignore pre-spawning mortality.
31 And a second scenario with a 70 percent harvest
32 rate. And the estimate of \$200 million of fish
33 lost comes from that higher harvest rate of 70
34 percent, which is about what the Larkin model
35 indicates overall is the best for the Fraser. I
36 did not make adjustments, as one should, for the
37 very low returns in 2007, 8 and 9, which would
38 have reduced the losses a little bit, if I did. I
39 just supposedly just ignored all of the
40 complications that occurred and just --

41 Q Excuse me, Dr. Leadem wishes to interject.

42 MR. LEADEM: For the record, Leadem, initial G., for
43 the Conservation Coalition. Dr. Walters is
44 obviously referring to some work that he's done
45 that's not before the Commission. And he's given
46 some oral testimony about it. But I think it
47 would be helpful if we were to see the work of Dr.

1 Walters at some stage and be able to offer some
2 commentary on it and perhaps have him come back to
3 answer some questions about this. It certainly
4 takes me a little bit by surprise.
5 MR. ROSENBLOOM: I'm in the hands of the Commission.
6 DR. WALTERS: It's a pity that it does take you by
7 surprise. It's a pity that there has not been a
8 follow-up on the recommendations to do this and to
9 get it before the Commission, particularly by DFO
10 staff using their more complete datasets and so
11 on. The spreadsheets that I used, or at least an
12 early version of them, I believe you actually do
13 have. But they were listed among the exhibits for
14 this panel. There are a couple of Excel
15 spreadsheets that were early versions of the
16 calculations. The versions that I sent to Jeff
17 Grout I think are listed amongst your exhibits.
18 But you would have to be an expert in population
19 dynamics and spreadsheet techniques in order to
20 make any sense of those. They are not documented.
21 DR. RIDDELL: Don, could I comment?
22 DR. WALTERS: A quick analysis I did to test the
23 feasibility of doing it and so that I could
24 recommend clearly that it be done.
25 Q Thank you. Dr. Riddell wishes to speak.
26 DR. RIDDELL: Just a simple comment pretty much to the
27 comment that Tim just made in the sense that, as
28 Carl's inferring, this will be a very technical
29 assessment. The standard procedure would be to
30 have this go through a technical review, a
31 scientific review, so that when it comes before
32 the Commission you have confidence in the
33 analysis, in its supports, or we all agree on what
34 is presented. There are obviously a number of
35 critical assumptions Carl's would have to make in
36 terms of meeting these multiple objectives. So I
37 mean I think there's a couple of steps here. I
38 had heard of this work in the background but I've
39 not had any opportunity to review this sort of
40 material. Yes, it would have been nice to have
41 the Commission have it as a piece of work for the
42 future. But I think realistically right now, this
43 is going to be highly technical, as Carl has just
44 referred to, and it would be probably of greater
45 service to the Commission if you had people review
46 this with Carl and maybe submit a report to you
47 later on this. It's not something that's easily

1 discussed without seeing the documentation.

2 Q Well, we leave that with the Commission. It's
3 obviously out of our hands as counsel but you have
4 heard Dr. Walters' plea for this work to be done
5 by the Commission and that he'd previously made
6 such a request. Unless there are further comments
7 in that regard, I come to my last area, which,
8 quite frankly --

9 DR. WALTERS: Excuse me, Don. Before you go on, I do
10 have one additional comment.

11 Q Right.

12 DR. WALTERS: I don't particularly see this as
13 something the Commission should be doing. I see
14 it as a fundamental responsibility of the FRSSI
15 team and of DFO to be looking retrospectively at
16 their management performance to be asking how they
17 could inform that performance. And I'm frankly a
18 bit shocked that it was not part of the FRSSI
19 process. That kind of careful retrospective
20 analysis wasn't part of the FRSSI process in
21 general.

22 Q Thank you very much, Dr. Walters. I now come to
23 the last area of my examination, which, frankly, I
24 consider probably the most important in terms of
25 long-term sustainability of the resource. And it
26 relates to the budget issues of DFO. And Dr.
27 Riddell, you have spoken about this during
28 previous appearances before this Commission.
29 Discussion was had briefly yesterday by the panel
30 about research that was necessary. In fact, I
31 believe, Dr. Riddell, if I got your words down
32 correctly -- I don't have it from the transcript
33 -- you spoke about the information system going in
34 the wrong direction right now. You did use the
35 term "wrong direction".

36 I wish to put before you a series of
37 questions and answers that I had with the deputy
38 minister, Ms. Dansereau, before these very
39 proceedings where I raised the whole question of
40 DFO budgeting and raised the question of the 5
41 percent reduction in the upcoming budget, as she's
42 being ordered by Treasury Board to reduce by that
43 5 percent.

44 Dr. Riddell, to put this in context, you did
45 testify a few days ago, and please correct me if I
46 misstate your evidence, that that 5 percent
47 reduction, as you understand it, really is very,

1 very significant and much more than 5 percent
2 because DFO does not apply the 5 percent to the
3 salary portion of DFO's operations, which is
4 around 70 percent of their total budget; the 5
5 percent gets hit from the operating expenses of
6 the remaining 30 percent. Is that your testimony
7 of previous day?

8 DR. RIDDELL: Very similar to it. Frequently when you
9 get a budget reduction, the 5 percent I know and I
10 should qualify, of course, that I am not in the
11 department in the last two years when these 5
12 percents have been applied, but the statement that
13 I've heard about the 5 percent is that it's across
14 total budget. That then includes, as I described,
15 your capital, your salaries and wages, your
16 operating funds. The only salary dollars that
17 could be redacted would be salary dollars that are
18 vacant positions. And typically, we don't leave
19 those salary dollars vacant. They would be used
20 elsewhere. But when I left the stock assessment
21 department, as an example, we had pretty well 75
22 percent of our budget in salaries and so you can
23 do the math very simply. So a 5 percent across
24 total multiplies substantially up by about, well,
25 three full minimum. So that you then have to
26 apply that across your operating budgets.

27 Q And have you not testified that it really
28 represents maybe a 15 to 25 percent reduction?

29 DR. RIDDELL: It can, depending on how it's actually
30 applied to different programs.

31 Q All right. The 5 percent hits the department.
32 How it's transferred to the actual regions could
33 differ. It's possible some areas could have none,
34 some could have ten. That's at the discretion of
35 the Department of Fisheries in Ottawa. When it
36 hits the region, there's another decision process
37 involved of how it's actually assigned to
38 particular programs.

39 Q Thank you. Now, we've heard testimony throughout
40 these many months of a clarion plea for research
41 to be done in various areas that up till now have
42 not been considered or carried out by DFO. I want
43 to put Ms. Dansereau's evidence before you. I
44 want your response. And quite frankly, Ms.
45 Dansereau is coming back at the concluding days of
46 this inquiry and I intend to probably put your
47 responses back to her. She said, and I'm

1 referring to transcript of November the 2nd of
2 last year. I'm referring to page 63. And Dr.
3 Walters, you do not need this to be before you, I
4 don't believe. At page 63, line 12, where we were
5 speaking of this 5 percent reduction as directed
6 from Treasury Board. Line 12:
7

8 Q Well, the fact is, there's going to be a 5
9 percent cut is obviously consequential to all
10 stakeholders in respect to this industry,
11 isn't it?

12 MS. DANSEREAU: I would say, well, to -- it could
13 be. It depends on -- we hope we've done a
14 significantly good enough job to make sure
15 that we -- that there is not that much pain
16 felt.

17 Q Well, this is an awfully general question to
18 you, Ms. Dansereau, but would you agree with
19 me, or let me ask you this, are all science
20 programs, departments, projects, stock
21 assessment, stream enumerations, et cetera,
22 adequately funded up till now, in your
23 opinion, during the time of your tenure?

24 MS. DANSEREAU: I would say yes. But it -- you
25 know, I'm sure if we spoke to others, had a
26 greater, more directly-connected to each of
27 the activities, they would probably prefer to
28 have more money.

29 Q And you'd probably agree with me that within
30 your department there would be controversy
31 and there would be those that didn't agree
32 with you on that question?

33 MS. DANSEREAU: Always.
34 Maybe start with you, Dr. Riddell. This appears
35 to be the thinking of the senior people within DFO
36 in the context of facing down a 5 percent
37 reduction in the upcoming year and obviously
38 having experienced previous reductions, as you
39 spoke about them. What is your response to the
40 mindset of the senior people within DFO that they
41 believe that the budget, as currently before them
42 and currently about to be cut, is adequate to meet
43 the very critical matters that have previously
44 testified to in terms of research?

45 DR. RIDDELL: Well, thank you for that loaded question.
46 Well, I don't think there's any question that I
47 disagree. I am not surprised at all at her reply

1 because, of course, these people are under
2 significant pressure for national priorities and
3 I'm sure there's a very substantial debate in
4 Ottawa where the money goes to the various
5 departments. But I don't think there's any
6 question that you would get a very common response
7 on the west coast with respect to salmon stock
8 assessment, I have said publicly here, I believe,
9 that it's definitely at a marginal responsible
10 level that sort of what we would define as a core
11 stock assessment responsibility is barely being
12 met now. I suppose the irony of this is that I've
13 also told you that there's always a direction to
14 ensure that Fraser Sockeye assessment is met.
15 We've heard that there's a couple of exceptions to
16 that. So the funds that come here --

17 Q Excuse me. At great expense to other stock.

18 DR. RIDDELL: Thank you. I was just about to point out
19 that --

20 Q Thank you.

21 DR. RIDDELL: -- what happens is the money, on a
22 limited budget, goes to the Fraser Sockeye first
23 and there are other salmon species in the Fraser
24 that are not sufficiently funded. And then
25 outside the Fraser in years where money is tight
26 definitely takes a major reduction in order to
27 meet the requirements of the Fraser Sockeye. And
28 as I point out again, we are not even doing
29 assessments of Fraser pink salmon. So to say that
30 we're meeting a minimum core is simply not
31 accurate. But in all honesty, how would you know
32 what sort of advice is getting up to that level?
33 She may well believe that's true because that's
34 what she's told. I think that it would be a
35 matter of record, of simply looking at the history
36 of the stock assessment programs, that they are
37 not being funded adequately.

38 Q Well, you speak of competing interests of all
39 departments at Treasury Board level. You would
40 agree with me the responsibility of the senior
41 managers of DFO is to fight out their cause at
42 Treasury Board to ensure that they get their
43 appropriate portion of the national budget?

44 DR. RIDDELL: I can say in all honesty that the people
45 that I have personally known in Ottawa that are
46 responsible for that try very hard. But you get
47 down to national priorities, fishing on the east

1 coast gets a certain priority, fishing on the west
2 coast may not be as much. Arctic is, of course,
3 now getting a significant priority. So these sort
4 of challenges change over time. And we have
5 significant funding challenges within the
6 department because we now have Coast Guard and
7 ships. And anyone reading the paper knows that
8 there's a significant investment going into ships
9 in the near future.

10 Q Well, when you say from the people that you knew
11 at very senior level, that they tried very hard,
12 would you not agree with me that this deputy
13 minister's testimony before this inquiry, giving
14 this testimony under oath, before a Royal
15 Commission, isn't trying very hard to fight the
16 good fight at Treasury Board to get them necessary
17 money?

18 DR. RIDDELL: Well, I don't think I can comment on
19 that. I mean I think you can draw your own
20 conclusion from her comment. That's not a
21 reflection of necessarily how hard she's trying
22 but if she's been given a budget and she believes
23 that you've allocated within that budget, these
24 budgets are very large at a departmental level.
25 There is discretion about where you send money
26 within that department. So there are many levels
27 of decision involved before it gets down to the
28 Pacific salmon on the west coast.

29 Q Before I stand down, I wonder if any of the other
30 panellists have any response to the testimony that
31 the deputy minister gave in these proceedings.
32 Dr. Walters?

33 DR. WALTERS: No.

34 Q I'm sorry, you don't. Do either of the other two
35 panellists?

36 DR. WOODEY: No.

37 MR. ROSENBLOOM: Hearing nothing, I thank you very
38 much, gentlemen, for answering my questions.

39 MS. BAKER: Thank you, Mr. Commissioner. Mr. Eidsvik
40 is next for the Southern Area E Gillnetters and
41 B.C. Fisheries Survival Coalition.

42 MR. EIDSVIK: Thank you, Mr. Commissioner. Philip
43 Eidsvik on the record for the Area E Gillnetters
44 Association and the B.C. Fisheries Survival
45 Coalition.
46
47

1 CROSS-EXAMINATION BY MR. EIDSVIK:
2

3 Q I want to start off with a couple of general
4 questions. And it kind of goes to the key of
5 science for me. I know doctors have kind of a "do
6 no harm" principle and we've talked a lot about
7 the great experiment. And I'm trying to
8 understand the scientific process because I'm a
9 fisherman; I'm not that smart about this stuff and
10 it's a bit intimidating to be here with the gods
11 of fishery science on the Fraser. With respect to
12 the experiment that we did on the Fraser River,
13 Dr. Woodey, perhaps you can answer, Fraser River
14 is one of the biggest sockeye systems in the
15 world; is that correct?

16 DR. WOODEY: Mr. Commissioner, the Fraser Sockeye, as a
17 composite stock grouping would only be second to
18 the Bristol Bay stock grouping.

19 Q And at the time the experiment was done, you were
20 probably aware that there were tens of thousands
21 of fishermen, large processing plants, Aboriginal
22 groups fishing it for food, a smaller recreational
23 fishery but still a recreation fishery, so the
24 stakes on how the experiment turned out were
25 fairly high. Is that fair to say?

26 DR. WOODEY: Mr. Commissioner, the term "experiment"
27 perhaps was not the best. It's an inadvertent
28 result of a policy that was initiated by the
29 Department of Fisheries and Oceans in order to
30 provide for conservation of Late-Run Sockeye,
31 which were coming upstream at a much earlier time
32 and consequently dying en route. And in order to
33 address that issue, the Department of Fisheries
34 and Oceans reduced the harvest rate, depending
35 upon the year. And those harvest rates on Late-
36 Run Sockeye only, that's where they were applied,
37 were, in some years, as low as 13 to 15 percent;
38 in other years, 30 percent or higher. But
39 considerably lower than historical harvest rates.
40 What was difficult about that application was that
41 the majority of the catch was allowed to be taken
42 in the outside marine area fisheries and at times
43 by the timely regulation to open the Fraser River
44 for fishing at a later date arrived that harvest
45 of late-run fish had been taken and so any fish
46 that then entered the Fraser was allowed to
47 migrate upstream. Both late-run fish, early-

1 migrating late-run fish and the co-migrating
2 summer-run fish. And it's the summer-run fish
3 that became the experiment, under my terminology,
4 that is, the escapement levels of particularly
5 Quesnel Sockeye in 2001 and 2002 were very large
6 and, thus, the "experiment" has shown that the
7 over-escapement, that I term over-escapement as,
8 has resulted in disastrous results for the Quesnel
9 Sockeye run.

10 Q That helps. I was going to get into that a bit
11 later but we're here now. And you call this
12 problem, I think you called it, the "elephant in
13 the room"?

14 DR. WOODEY: Well, the Late-Run Sockeye, yes, is the
15 elephant in the room because not only are we
16 seeing a reduction of the productivity of Quesnel
17 Sockeye, as a result of the management decisions
18 on the basis of Late-Run Sockeye, but also we're
19 seeing, of course, decreased abundance of several
20 of the late-run stocks, which are subject to this
21 pre-spawning mortality: Cultus, Weaver and some of
22 the other stocks. Fortunately, the large late
23 Shuswap stocks, Adams River and lower Shuswap
24 River and associated stocks have been migrating at
25 a later time. A lower fraction of their run has
26 come up during the summer and subsequently have
27 not had excessively high mortalities. So their
28 strength has been maintained, their population
29 sizes and, in fact, in 2010, the late Shuswap
30 stocks have, I believe, come up close to the
31 record level of abundance.

32 Q Now, did you give advice to DFO on how to deal
33 with this problem back when it was being discussed
34 when we were first aware of this early entry
35 issue?

36 DR. WOODEY: I gave advice to the Fraser River Panel in
37 2001 in the planning phase. We had been given the
38 expected, forecasted returns. And then based on
39 the experience of the timing of Late-Run Sockeye
40 in 2000, my recall isn't precise but I believe we
41 essentially assumed that their migration would be
42 early in 2001 again. And in the modelling, and
43 this is a simulation modelling of fisheries that
44 the Pacific Salmon Commission uses to assist the
45 Fraser River Panel in managing the sockeye
46 resource that those simulation models indicated
47 that a large fraction of the summer-run fish would

1 escape to the spawning grounds. That was the
2 dominant year of the Quesnel runs and, therefore,
3 very large excess escapement was forecast to
4 occur. And other summer runs as well.

5 So our approach, that is, Pacific Salmon
6 Commission staff approach, was, because we knew
7 from experience that the late-run fish in the
8 river, migrating in the river in August had very
9 low expectation of survival that fishing should
10 occur in the Fraser River to harvest primarily the
11 surplus summer-run fish that were being allowed to
12 go upstream or would be allowed to go upstream, if
13 the fishery was closed. And there wasn't a
14 targeting of the late-runs, to catch those fish;
15 it was to allow the summer-runs to escape at more
16 MSY levels, as opposed to the expected surpluses
17 that would be anticipated.

18 Q What did you expect the mortality of those early
19 entry fish would be? Are we talking 10 percent
20 you expected to die? Fifty percent? Ninety
21 percent? Can you help us on that?

22 DR. WOODEY: The expectation, I don't recall
23 specifically, but the experience that we had in
24 2000 was that very roughly 95 percent of the late-
25 run fish in that year migrated upstream in August
26 and we made a calculation that the en-route
27 mortality based on the numbers of fish that were
28 estimated to have passed the Mission hydroacoustic
29 site and the numbers that reached the spawning
30 grounds in particularly Weaver Creek that year,
31 less the pre-spawning mortality of the fish that
32 did reach the spawning grounds, the mortality
33 prior to spawning was about 95 percent. In other
34 words, only 5 percent of those fish did survive.
35 And my recommendation was that we could probably
36 fish in the Fraser River until about August 25th
37 without having a major impact on the numbers of
38 late-run fish that would survive to spawn. And
39 that would have allowed fisheries to capture
40 primarily the summer-run fish, which were excess
41 to escapement requirements. That recommendation
42 was not adopted.

43 Some of the things that would have been
44 difficult to work with were that Canada had gear
45 allocation requirements where each gear type,
46 seines and Area B seines, Area D gillnets, G and H
47 Troll and so on, outside marine area fisheries,

1 would not get a share of this catch of surplus
2 fish in the Fraser River unless there was some
3 mechanism developed to attain it, primarily to
4 take those surplus fish. I'm not the one to
5 decide or determine how Canada allocated its catch
6 but the harvest of some of those excess fish would
7 have been very desirable, from my point of view,
8 and would have, if it had been adopted, perhaps
9 mediated the decline in the Quesnel stock and if
10 it had been adopted and used as policy
11 subsequently.

12 Q So I think if I understand you correctly then, the
13 early entry late-run fish were coming in over a
14 period of about 30 days and the fish at the early
15 part of that were more likely to die than the fish
16 at the later part of the run. Have I got that
17 correct?

18 DR. WOODEY: Yes, that's correct. I mentioned
19 yesterday that the Fraser Sockeye, on average,
20 most stocks don't reside in freshwater for more
21 than about six, seven weeks and, in fact, late-run
22 stocks, on average, reside in freshwater more in
23 the order of three to four weeks. And in the year
24 2000, Weaver sockeye migrated upstream seven weeks
25 early. So those that were coming in during
26 August, in my estimation, were those that
27 principally were mortality. The question of
28 mortality versus timing was addressed by radio-
29 tagging on the Adams River sockeye in year 2000,
30 2003 and 2006. And the results of those tagging
31 records and subsequent tracking resulted in
32 essentially showing that a very high proportion of
33 sockeye that migrated into the Fraser River before
34 about August 20th, on average, died en route.

35 What was missing in the radio-tagging was the
36 assessment of pre-spawning mortalities once they
37 got to the spawning grounds. DFO, through Timber
38 Whitehouse, stock assessment biologist for the
39 Fraser River, tagging at Ashcroft with disk tags,
40 showed that, in fact, the earliest component of
41 the run had survival of down in the 1 percent
42 range. So there was a good deal of information
43 that gave evidence that the late-run fish that
44 migrate into the river during August, at least to
45 the 20th or 25 of August, have relatively low
46 success of survival in spawning.

47 Q So if I understand --

1 THE COMMISSIONER: Mr. Eidsvik, I'm sorry. I note the
2 time.

3 MR. EIDSVIK: 12:30.

4 THE COMMISSIONER: So perhaps we will take the break.

5 MR. EIDSVIK: Thank you, Commissioner.

6 THE REGISTRAR: The hearing is now adjourned until two
7 o'clock.

8

9 (PROCEEDINGS ADJOURNED FOR NOON RECESS)

10 (PROCEEDINGS RECONVENED)

11

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

13 MR. EIDSVIK: Good afternoon, Commissioner. Philip
14 Eidsvik still on for the Area Gillnetters and the
15 B.C. Fisheries Survival Coalition.

16

17 CROSS-EXAMINATION BY MR. EIDSVIK, continuing:

18

19 Q Before the break, Mr. Woodey, we were talking
20 about the early entry problem, what you call the
21 elephant in the room, and we got to the point
22 where we were discussing the events in 2001, where
23 there was awareness of a problem and you had
24 proposed a solution, and we were talking about the
25 results. And if I understand correctly, we put a
26 lot of fish up the river in 2001 from the Summer
27 run and from the Late run, an excess on Summer,
28 and 90 or 95, or even higher percent of fish that
29 would have died from the early entry Late run
30 which we could have harvested, and this had
31 deleterious impacts on the following cycles.

32 I'm a little bit interested, now, on just how
33 the advice on that were, because there must have
34 been a debate inside the commission on what to do,
35 and you've said your solution, and you said you
36 advised the Fraser Panel.

37 What was the Fraser Panel's reaction to your
38 advice, do you remember?

39 DR. WOODEY: Mr. Commissioner, the details were in the
40 Fraser River Panel annual report to the PSC, the
41 commission for 1991 -- 2001, excuse me, and the
42 issue was not resolved on the Fraser River Panel
43 level because the U.S. side and the Canadian side
44 could not agree on the strategy that Canada was
45 proposing, and they bumped it up to the
46 commissioners, to the Salmon Commission members
47 themselves, and there was negotiation there, and

1 the Canadian side made an adjustment on the
2 proportion percentage of harvest permitted on Late
3 run stocks, but that was some adjustments - I
4 can't remember the numbers - from 15 percent
5 harvest to 19 percent harvest, and that was
6 accepted by the Pacific Salmon Commission and
7 implemented, then, by the Fraser River Panel.
8 Q That's helpful. On the Fraser River Panel, of
9 course, the chair of the panel is a DFO staff
10 person in recent years; is that correct?
11 DR. WOODEY: I'm sorry, I didn't hear?
12 Q I'm sorry. The chair of the Fraser River Panel,
13 is that usually a DFO official?
14 DR. WOODEY: The chair of the panel rotates between the
15 Canadian side and the U.S. side, and
16 traditionally, when the chair is on the Canadian
17 side it would be a DFO member, a DFO staff member,
18 and the person that was the chair of the panel at
19 that point, I can't -- I have a report I could
20 check, but it wasn't -- it's not in my memory
21 bank.
22 Q That's fine. The position that industry took in
23 2001, do you remember that? When I say "the
24 industry" I refer to the public commercial fishery
25 representatives on the panel. Do you remember
26 their position?
27 DR. WOODEY: No. I was never given anything but a
28 basic rejection of my proposal.
29 Q Okay.
30 DR. WOODEY: And at that time the caucus, the Canadian
31 caucus then developed their policy and presented
32 it to the U.S. side.
33 Q We'll deal with that in, perhaps, one of the many
34 hearings coming up. I have a couple of questions
35 that are a bit off topic. An earlier witness
36 before the commission said that two sockeye stocks
37 had gone extinct - I think Terry Glavin was a
38 witness - and he referred to the Alouette and
39 Coquitlam Rivers, but we never did get an
40 explanation of why those rivers went extinct, the
41 Alouette and Coquitlam. Do you know why they went
42 extinct?
43 DR. WOODEY: The Alouette and I believe the Coquitlam
44 both went extinct because dams were build in the
45 -- well, certainly the Alouette, I believe, was
46 the mid 20s, 1920s, and that dam was high enough
47 that it was not fitted with a fish ladder, and at

1 that time the powers that be, the provincial
2 fisheries manager at that time, or responsible
3 person, agreed that due to the power production
4 demands, that the sockeye run would not be
5 protected.

6 And the Coquitlam, I think, was primarily a
7 water source dam, reservoir for water source. The
8 details are not --

9 Q Thank you. I had one more question on escapement.
10 Now, in the mid '60s the Fraser River sockeye were
11 at very low levels, and obviously there was a
12 fishing industry that was quite active, with lots
13 of vessels, and probably in the commission - and
14 you can correct me if I'm wrong - you always had,
15 "Okay, how do we balance our desire to increase
16 the run with our desire to maintain fisheries."
17 Did you have an escapement policy that
18 accomplished those goals? I mean, obviously the
19 runs were rebuilt from the '60s/'70s/'80s, there
20 was a viable fishing industry. Did you have an
21 escapement policy during that period? I don't
22 really understand what happened then.

23 DR. WOODEY: I was not aboard the commission staff
24 until '71, and therefore I can't necessarily
25 answer the question relative to the '60s. But in
26 the '70s the Pacific Salmon -- the International
27 Pacific Salmon Fisheries Commission definitely had
28 a policy of ensuring that the conservation of the
29 stocks was foremost, but at the same time, they
30 recognized the economic and social values that
31 were posed through the commercial fishery. And I
32 say "commercial fishery" because their
33 responsibility was strictly with the commercial
34 fishery, and Canada's responsibility was for the
35 First Nations Aboriginal fisheries.

36 Q Thank you. I have one more question. If we could
37 turn to Exhibit 75, and it's the book by John
38 Roos, called, *Restoring Fraser River Sockeye*, and
39 we're at page 303. And if we go to page 303, the
40 very last sentence in that paragraph, and I'll
41 read it:

42
43 The Commission's ability to get the job done
44 was primarily related to the simplicity of
45 its mandate and the efficient manner in which
46 it was permitted to implement the decision-
47 making process.

1 Do you agree with that statement, Dr. Woodey?
2 DR. WOODEY: Yes. The power delegated by the countries
3 to the International Pacific Salmon Fisheries
4 Commission were, if you will, nearly absolute; in
5 other words, both countries delegated all
6 responsibility to the commissioners, three from
7 each country and, therefore, when the commission
8 made a decision about an issue, it became
9 implemented on both sides as part of the
10 responsibility of the countries to undertake for
11 the implementation of regulations. But the fact
12 that it was a very short line of command then led
13 to, let's say, a more efficient operation.

14 Some of those people that were instrumental
15 were Senator Bill Reid, a senator from New
16 Westminster. He was a senator of the Canadians,
17 you know, federal senate. And on the U.S. side
18 people that were either from Washington, D.C. or
19 had direct contact with people in Washington, D.C.
20 that then made the lines of decision-making very
21 quick, very short.

22 So say when money was needed to build the
23 Hell's Gate fishways in the early '40s, even
24 during the war period it was deemed sufficiently
25 important that both countries funded that request
26 of the commissioners in 1942/'43, and that was the
27 -- you would expect that that would have been very
28 difficult, but it was done because it was deemed
29 to be a very high priority issue, to rebuild the
30 Fraser River stock.

31 Q Now, so in those days, if you were faced with a
32 decision like you were faced with in 2001, it
33 would have been easier to make a decision because
34 there wasn't so many people involved in the room,
35 I guess is what you're saying, in essence? It's
36 easier when there's a direct line of
37 communication?

38 DR. WOODEY: It was a different world back then, but I
39 can't honestly relate, because I wasn't there in
40 the '40s, and I would say certainly there were,
41 from the IPSFC perspective, only one -- only two
42 clients; the fish and the fishermen, the
43 commercial fishermen. And they had an advisory
44 committee, members from the fishing -- commercial
45 fishery, sport fishery advisory group at that
46 time.

47 Q Now, at page 33 of this book there's a quotation

1 and a discussion by a De Witt Gilbert, and it's
2 about there was a strong debate in those days
3 whether the Hell's Gate ladders needed to be
4 built. And in his book he says:

5
6 Here was the Great Fallacy into which men
7 fell so readily:

- 8
9 1. That the block at Hell's Gate had been
10 removed by the subsequent excavation;
11 2. that pre-1913 conditions had been
12 restored;
13 3. that such conditions were wholly
14 satisfactory for the migration of
15 sockeye;
16 4 that all salmon which escaped the
17 commercial fishery spawned effectively
18 5 that overfishing was the sole cause of
19 the continued low level of sockeye
20 abundance;
21 6. that the situation could be corrected by
22 controlling men and their fishing.
23

24 So even back in, I guess this is from the pre-
25 1940s, there's a debate about whether over-fishing
26 is solely responsible, but is it fair to say that
27 the success of the Hell's Gate ladders proved that
28 Dr. Gilbert is right, when he was saying we needed
29 to solve the Hell's Gate ladder issue?

30 Maybe can I rephrase that, Dr. Woodey, if
31 that's a problem? That was a bit of a ramble
32 question. Or do you have an answer you want to
33 give?

34 DR. WOODEY: Mr. Commissioner, the people in the --
35 after 1913, did an extraordinary amount of
36 engineering work to try to restore Hell's Gate to
37 a pre-slide condition. When I say "pre-slide"
38 that means that there was a great amount of rock
39 that came into the river that then constricted the
40 flow of the river, made it difficult for fish to
41 get through, and they removed a lot of that loose
42 rock, which was dumped into the river by the
43 construction of the CN track running through the
44 canyon.

45 And it remained, after it had been so-called
46 "cleaned up", the people locally said, "Well,
47 we've done our job," and therefore it didn't need

1 to be done, and so it was part of a controversy,
2 and when the engineering people went in, from the
3 IPSFC, went in and looked at the velocities that
4 were at the Hell's Gate at various water levels,
5 determined -- they actually built a whole model of
6 Hell's Gate at the University of Washington
7 Engineering Hydrology Department, in the
8 engineering department, and looked at the
9 velocities at different water levels and so on,
10 and the result of that was a determination that
11 there were, in fact, blockage conditions at
12 certain water levels and certain locations, and
13 where rock was protruding into the river and
14 causing difficulty with fish passage.

15 That convinced the engineers that needed the
16 fishways. Fishways were built beginning -- the
17 first one being completed in 1945. And other
18 fishways that were what we call "higher level
19 fishways", operational at higher water levels,
20 into the early '60s. They proved very successful
21 in passing fish with little delay and, in fact,
22 after the extinction of the IPSFC at the end of
23 1985, the Department of Fisheries and Oceans did
24 construct additional facilities. So there was
25 recognition, certainly, that those fishways were
26 required and were certainly justified.

27 Q So there was two debates at that point. If we had
28 focused on simply controlling the alleged over-
29 fishing by the marine fishing fleet and not built
30 the Hell's Gate ladders, would we have had the
31 success in rebuilding the runs that we had enjoyed
32 prior to, say, 1990?

33 DR. WOODEY: I'm probably not competent to answer that
34 question. I do know that, for example, in 1941,
35 with the original configuration of the natural, if
36 you will, restored system, that there was a
37 certain range of water levels in the canyon that
38 was impassable to fish. And normally the river
39 dropped through that range fairly quickly and
40 wouldn't delay fish for very long, but in 1941,
41 that water came down into that range and stayed in
42 that range for six weeks. And it was during the
43 upstream migration of the Chilko sockeye and
44 Quesnel sockeye. And we don't know the numbers of
45 Quesnel sockeye in total, there wasn't any racial
46 ID work, but only 1,000 fish were estimated to
47 have reached the spawning grounds that year, and

1 nearly extinguishing the stock. And from that
2 1,000 fish in 1941, with virtually no fish in any
3 other line years, the Quesnel run was rebuilt to
4 where it produced over 10 million fish in 1993.

5 Q I think that's a sufficient answer. When the
6 IPSFC turned over the fishery to the Pacific
7 Salmon Commission compared to when they got it, is
8 it fair to say that was a pretty remarkable
9 achievement that anybody involved could be proud
10 of, in terms of rebuilding Fraser River sockeye?

11 DR. WOODEY: I think certainly anybody that worked with
12 the IPSFC felt that they had done a good job in
13 fulfilling the mandate that the IPSFC had been
14 given by the countries.

15 Q Thank you, Mr. Woodey. I have a few questions for
16 Dr. Walters. Are you still there, Dr. Walters?
17 Thank you. It's the question that I want to
18 clarify from this morning that Mr. Rosenbloom
19 raised, and I'll see if I can put it fairly
20 simply. After 100 years of fishing at an 80
21 percent exploitation rate, according to what you
22 saw, only three sockeye stocks were declined by
23 about 1990; do I have that correct?

24 DR. WALTERS: I just looked at the more recent data
25 period, from 1950 to 1995, where there were high
26 exploitation rates over that period. But I looked
27 at two different datasets; one of them involved 28
28 stocks, a database that DFO, Paul Ryall, put
29 together in the PSC database, and there were three
30 declining stocks out of the 28, I guess it was, or
31 27. Then I looked at a much larger database with
32 106 time trends in it, and a lot of them are
33 spawning areas that we wouldn't necessarily
34 consider to be distinct stocks. And in that
35 database I found 11 stocks declining over that
36 period.

37 In both cases, whether aggregate or
38 disaggregated data, it's about 10 percent of the
39 stocks were declining, and a much higher
40 percentage increasing or stable or increasing,
41 with some really remarkable rebuilding or
42 recolonization/rebuilding particularly in the
43 Early Summer runs of the Shuswap region.

44 Q Thank you, Dr. Walters. I want to go to the issue
45 of Cultus Lake, because it comes up again and
46 again. And we know that Cultus Lake sockeye have
47 been in trouble, and they're a unique fish in that

1 they actually spawn in the lake and stay in the
2 lake; do I have that correct?
3 DR. WALTERS: That's right. They're shoal spawners.
4 Well, yeah, I don't think the actual spawning
5 locations are well understood, but yes, they're
6 pretty weird.
7 Q Now, were you aware that in the 1950s copper
8 sulphate was dumped into the lake to try and
9 reduce swimmer's itch?
10 DR. WALTERS: No, I wasn't.
11 Q You're laughing. Does that mean you know what
12 copper sulphate is?
13 DR. WALTERS: The stock was relatively healthy. It was
14 relatively stable in abundance, so it didn't show
15 cyclic patterns. It wasn't until the '70s that it
16 started the decline and moved into a cyclic
17 pattern. At least according to the escapement
18 records of the Salmon Commission.
19 Q Fairly heavy population pressure on Cultus Lake;
20 is that fair to say?
21 DR. WALTERS: Yeah.
22 Q Recreational development, such as boating, cabins?
23 DR. WALTERS: Yeah.
24 Q Docks, a boat-launching site right next to one of
25 the preferred beaches for the sockeye?
26 DR. WALTERS: Yeah, yeah, and a whole bunch of other
27 things impacting them, like a conservation
28 hatchery that's supposed to save them that's a
29 scary possibility that it's hastening their
30 demise. Lots of things wrong with Cultus, yes.
31 Q Now, DFO, there was a successful predator removal
32 program there at one point, as well as a milfoil
33 program, but I gather that that program just ran
34 for a few years and then stopped for a long time.
35 Can you tell me about that a little bit? Are you
36 familiar with it?
37 DR. WALTERS: I don't know about the milfoil program.
38 As far as I understand, the predator control
39 program, I believe it's still continuing. It did
40 appear to increase survival rates in the lake,
41 perhaps fairly substantially. But with the
42 overall declines going on in the stock and so on,
43 it's really hard to separate out the effects, the
44 positive effects of that control program.
45 Q Those are my questions on Cultus, and I expect
46 that we'll get back to that as we move through the
47 process.

1 The last bit of questions I have to you is on
2 the exhibit that was entered this morning, the
3 Biological and Fishery-Related Aspects of
4 Overescapement in Alaskan Sockeye Salmon. Are you
5 familiar with the report, Dr. Walters?

6 DR. WALTERS: Yes.

7 Q I'm not going to go through it in detail, but I
8 thought at page 15, on the second paragraph,
9 there's a sentence, and I just need to know if you
10 would kind of agree with what you might see.

11
12 Twenty-two of 29 stocks exhibited a decrease
13 in average yield when overescapement
14 occurred. Averaged across all 29 stocks,
15 yields decreased 48% when overescapement
16 occurred relative to when the current
17 escapement goal was met. On average,
18 variability in yields increased 278% as
19 overescapement occurred.

20
21 Is that the type of issue that we were talking
22 about in the concern this morning about over-
23 escapement?

24 DR. WALTERS: In part, yes. There's certainly an
25 obvious increase in variability of returns when
26 spawning stocks are high. By their definition of
27 over-escapement, there had to be a decrease in
28 yields, right? So I guess you'd call it a
29 circular argument.

30 Q Yeah.

31 DR. WALTERS: Their definition is oriented and built
32 around a presumption that the fundamental goal of
33 management, in relation to your earlier
34 discussion, is for the fisheries, and that
35 definition is a fisheries management definition of
36 over-escapement.

37 Q That's very helpful.

38 DR. WALTERS: It basically says, "Don't waste fish."

39 Q As you go down the page a little bit, I was
40 recalling the discussion about the impact of
41 nutrients in the system, and down the page a
42 little it says:

43
44 Reduced sockeye salmon production was
45 associated with a decline in macrozooplankton
46 density from 3,590 per cubic metre...when
47 escapements were within the current

1 escapement goal range to 140 per cubic
2 metre...

3
4 So a major decline in nutrients in the system. Is
5 that a surprise?

6 DR. WALTERS: No. The Alaskans have done a lot of
7 really good research work on this whole business
8 of marine-derived nutrients in the role of
9 productivity, and they have a lot more case
10 examples than we do of systems where the MDN
11 effects seem to be large. In fact, the very first
12 research that I know of, by Ole Mathisen on the
13 Kvichak stock in Bristol Bay, he insisted, and the
14 data certainly seemed to continue supporting that
15 marine-derived nutrients were critical to the
16 health of that largest sockeye stock in the world.

17 But one of the reasons we -- we have to be
18 really careful about that in B.C. because we have
19 at least a couple of our bigger stocks that don't
20 have those benefits, because they're spawning at
21 outlets, Chilko and Adams. And as I mentioned
22 yesterday, at least some of the MDN effects are
23 already represented when we do the stock
24 recruitment analysis in the sense that the
25 recruitments we observed have been impacted by
26 those MDN effects.

27 One of the things we expect to see, if the
28 marine-derived nutrient effects are really large
29 an expect that recruitment rates ought to increase
30 disproportionately as spawning stock goes up from
31 very low levels. We see very little indication of
32 that kind of acceleration and productivity at
33 lower stock sizes in the Fraser stock.

34 That was along way of saying, "Yeah, it's
35 neat stuff."

36 Q Near the end of the paper they just have a
37 conclusion, they say:

38
39 Overescapement, in general, is not
40 sustainable, as it causes returns and yields
41 to decrease in the next generation, which
42 also result in lower escapements.

43
44 The authors of the paper, Robert Clark, Mark
45 Willette, Steve Fleischman, and Doug Eggers, are
46 they credible scientists?

47 DR. WALTERS: Yes, they are. Doug Eggers, in

1 particular, has been a real leader in the
2 development of salmon biology and salmon research
3 and population dynamics over the years. He
4 started out, like Jim Woodey, working on Lake
5 Washington and developed a lot of our fundamental
6 understanding about how fish interact with the
7 plankton communities in the lakes and the really
8 neat adaptations that predator and prey have to
9 one another. I don't know the other people. I've
10 met them, but I can certainly say that Doug Eggers
11 is a major leader.

12 MR. EIDSVIK: Thank you. I think those are my
13 questions, Mr. Commissioner. If I could only ask
14 one thing, and it's if we could have Dr. Woodey
15 and Dr. Walters back at some point? Dr. Woodey's
16 the only scientist, so far, to appear before this
17 commission that has had almost a perfect record of
18 Fraser River sockeye management. In our little
19 circles we call him the Steve Nash of Fraser River
20 sockeye, and I think he can offer an awful lot on
21 management decision-making processes, much more
22 than the subject he was confined to, today.

23 Thank you, Commissioner, and thank you, the
24 witnesses.

25 DR. WALTERS: I'm sorry, before you leave the seat,
26 sir --

27 MR. EIDSVIK: Yes?

28 DR. WALTERS: -- Mr. Eidsvik, I'd just like to say, I'd
29 be happy to come back. I'm going to be giving a
30 lecture tomorrow to the University of Florida
31 students about decision-making processes in
32 fisheries, and I'm going to use the contrast
33 between the Pacific Salmon Commission's management
34 approach that you've asked Jim to describe, with
35 relatively clear, relatively simple objectives.
36 I'm going to compare and contrast that to what I
37 heard about the DFO management system as described
38 to the Cohen Commission this last fall, and I
39 would really like to speak more to that. That DFO
40 system is a structured decision-making process
41 that, in my view, is pathological.

42 MR. EIDSVIK: Thank you, Dr. Walters.

43 MS. BAKER: The next participant is the West Coast
44 Trollers Area G, with Mr. Watson.

45 MR. WATSON: Thank you, Mr. Commissioner. Again, it's
46 Chris Watson, for the West Coast Area G and the
47 United Fishers and Allied Workers Union.

1 CROSS-EXAMINATION BY MR. WATSON:
2

3 Q At the risk of blowing my time estimate out of the
4 water, Dr. Walters, I'm very curious for you to
5 pick up on the very last point that you made about
6 the DFO system and it being pathological. Could
7 you describe for the commission, please, what you
8 meant by that?

9 DR. WALTERS: That system is what we call a structured
10 decision-making process in which a group of
11 scientists, DFO staff and so on, work with
12 stakeholders to try to reach some kind of
13 consensus on matters like the TAM rules, the
14 harvest policy rules, and at least as it was
15 described by DFO staff last fall, also in in-
16 season decision-making.

17 My experience with those kind of processes is
18 that --

19 MS. GAERTNER: Mr. Commissioner --

20 DR. WALTERS: -- what happens is that --

21 MS. GAERTNER: -- I wonder if I could --

22 DR. WALTERS: -- in the science (indiscernible -
23 overlapping speakers)

24 MS. GAERTNER: -- speak to this before he answers this
25 question?

26 MR. WATSON: Dr. Walters, just hold on a moment, thank
27 you.

28 MS. GAERTNER: I'm loathe to become argumentative on
29 this matter, but we're having a difficulty staying
30 on topic. That's been something we've been asked
31 to be encouraged to do this entire commission.
32 There are a zillion topics. If Mr. Walters'
33 opinion on this is valuable to the commission, I
34 suggest it be provided when we're dealing with
35 this topic and not dealing with the topic of
36 delayed density dependency. And we can't keep
37 cross-examining on new topics, on new ideas, in
38 the moment, and try to get finished today's topic,
39 never mind others. We've been encouraged all
40 along through this commission to stay on topic.

41 MR. WATSON: Mr. Commissioner, I'm very much in your
42 hands on that. This is a dynamic process, of
43 course. Dr. Walters is here. If there's an
44 opportunity for him to come back to elaborate,
45 then that would be --

46 DR. WALTERS: Well, let me make it really -- just to
47 give you a really quick answer. It related to the

1 issue of low exploitation rates in recent years
2 and possible over-escapement. As I see the way
3 that decision process works, people that are
4 involved in it are thrown a huge variety of
5 statistics and models and calculations and so on
6 like that, a bewildering variety that I, even, as
7 an analyst who develops those kind of models,
8 would be at a loss to advise about policy in those
9 settings. It's just too complex.

10 I think an outcome of that kind of process is
11 extreme decisions. People grab onto simple
12 objectives, like, "Let's protect Cultus," and they
13 cling to those objectives, rather than looking
14 broadly at the impact, economic and impacts on
15 fishermen and other things. More than that, I
16 think those processes are vulnerable to
17 inadvertent or deliberate abuse by the science
18 staff through the way the information is
19 presented.

20 So, for example, the Wild Salmon Policy
21 information, as it was presented to the commission
22 this last fall, involves these red light/green
23 light/yellow light things for a large number of
24 stocks. That kind of way of presenting
25 information invites misinterpretation. It invites
26 poorly balanced decision-making. There's a need
27 to return to simpler overriding objectives, clear
28 priorities, a hierarchical objective and decision-
29 making with regard to allocation among user
30 groups, always with conservation first. There are
31 a lot of ways to improve the decision process,
32 simplify and improve the decision process to make
33 it look -- work more like the Salmon Commission's
34 process did.

35 Q Okay. Thank you, Dr. Walters. I have just a
36 couple of questions for you, Dr. Walters, and
37 really following from your evidence, yesterday,
38 to bring clarification, at least to me. In direct
39 examination of you by Ms. Baker, you were asked
40 to:

41
42 ...clarify the experiment to rebuild the off-
43 cycle years, -

44 -- and that's the strategy that --

45 - is that the strategy, -
46
47

1 -- you were asked --
2

3 - that we've heard being called the
4 Rebuilding Strategy?
5

6 and you said:
7

8 That's right. The one that seems to be
9 failing, and that if we had paid closer
10 attention to [Dr. Woodey], and if we'd paid
11 closer attention to other long-term analyses
12 done by Pacific Salmon Commission staff, like
13 Gilhousen, we probably would not have
14 recommended.
15

16 So if you can recall, Dr. Walters, what was being
17 said at that point in time - I understand this
18 would be 1985, '86 or '87, in that range - by
19 Gilhousen, Dr. Woodey, that if you had been paying
20 attention to the rebuilding strategy would not
21 have been recommended?

22 DR. WALTERS: The key mistake I believe we made came
23 out in a paper by Jeremy Collie and I, and Randall
24 Peterman, in 1990, and that's when we sort of
25 officially recommended the off-cycle rebuilding
26 experiment and talked about how to do that in
27 terms of the timing groups. In that paper, we did
28 a formal decision analysis, did a kind of cost
29 benefit/risk analysis-type calculation of whether
30 it was worth pursuing the experiment, because
31 there would be immediate losses in fishing and so
32 on.

33 And we overtly discounted the possibility of
34 strong delayed density dependent effects. We
35 said, "We just don't believe the Larkin model, we
36 don't believe the delayed effects could be so
37 large." And had I known about and had we looked
38 at the Gilhousen order - I guess it wasn't out
39 quite then - if we'd looked even more carefully at
40 Ricker's older work and seen the violence of the
41 original cyclic behaviour of these populations,
42 I'd have taken Jim Woodey's warnings a lot more
43 seriously. We'd have left the Larkin model in our
44 decision analysis and it would have very likely
45 told us that the downside of potential loss of the
46 experiment exceeded its potential benefits.

47 Q Okay. Thank you.

1 DR. WALTERS: We would have proceeded with much more
2 cautious recommendations about the possible
3 downsides of the experiment.

4 Q Thank you, Dr. Walters. My other question stems
5 from a question from Ms. Baker further along,
6 yesterday, and it started being addressed to Dr.
7 Woodey about maximum sustained yield, MSY, and
8 after Dr. Woodey said what he had to say, you said
9 that:

10
11 It was discovered in the early 1970s that, in
12 general, maximum average yield is a better
13 word than sustained yield. Maximum average
14 yield for long periods of time is obtained by
15 following a fixed escapement policy, not a
16 fixed harvest rate policy, and not any other
17 more complex rule.

18
19 So if we could underscore "fixed escapement
20 policy", and I want to ask you, sir, what you mean
21 by "fixed escapement policy"? Do you mean a hard
22 cap on the number of fish escaping, or is a
23 percentage, and if it's a percentage at what rate?

24 DR. WALTERS: It's a spawning stock number, "X" million
25 fish, and when the total run is less than that
26 number, you take nothing; when the run is above
27 that number, you take all of the surplus above the
28 number.

29 Q All right.

30 DR. WALTERS: In other words, you try to hold the
31 spawning stock at that single target level and let
32 all of the variability and recruitment be absorbed
33 by the fishery. So it turns out that the maximum
34 average yield policy also maximizes variability
35 seen by fishermen.

36 Q All right.

37 DR. WALTERS: It's a peculiar result. It can be proven
38 mathematically that for a really wide range of
39 population dynamics models and so on it's a very
40 robust result. It's been confirmed through
41 optimization and simulation studies repeatedly
42 since then.

43 We also found, at that time, and we just
44 published a couple of years ago an analysis of the
45 Fraser River sockeye, in historical data, losing
46 the historical variability to look at different
47 harvest strategies, that with a relatively minor

1 loss in long-term yield, about less than 10
2 percent, it can move to a fixed harvest rate
3 policy, a fixed proportion harvest in each year.

4 So that causes over-harvesting in some years
5 relative to the optimum spawning stock, and in
6 other years you under-harvest a bit.

7 It results in a minor loss in yield, but it
8 dramatically stabilizes fishing opportunities, and
9 it's much simpler to implement in the field. We
10 can implement fixed harvest rate strategies simply
11 by fixing the times and areas of fishing at
12 locations where we have reasonable confidence
13 about what proportions of the stock will be at
14 risk to harvest, and you let the fishermen take
15 essentially everything that's in those areas at
16 those times.

17 That's really what made the historical
18 management system successful in the first place,
19 was that fisheries took place in restricted times
20 and areas that where they took a relatively stable
21 and predictable proportion of the runs.

22 Q Thank you, Dr. --

23 DR. WALTERS: Long answer?

24 MR. WATSON: Thank you, Dr. Walters. Those are my
25 questions.

26 MR. LOWES: It's J.K. Lowes, for the B.C. Wildlife
27 Federation and B.C. Federation of Drift Fishers.
28 Just a couple of questions.

29
30 CROSS-EXAMINATION BY MR. LOWES:

31
32 Q First of all, some fundamentals upon which most of
33 the discussion about over-escapement over the last
34 couple of days has taken place. Population
35 dynamics is a discipline that is not confined to
36 fish; it's a basic biological discipline and the
37 principles are well known biologically; is that
38 correct, Dr. Walters?

39 DR. WALTERS: Yes.

40 Q And in fact, the discipline goes back to, I
41 believe, the 17th century, with Malthus?

42 DR. WALTERS: That's correct.

43 Q And so the discussion that's taken place over the
44 last two days or so is really a discussion about
45 the application of principles that have been
46 studies for a couple of centuries?

47 DR. WALTERS: Yeah, Malthus pointed out that natural

1 populations of people or anything else cannot
2 continue to grow indefinitely, that they must
3 exhibit what we nowadays call density-dependence.
4 He had a view that things are very catastrophic,
5 that things would build up and catastrophically
6 over-harvest food supplies or wars and famine and
7 pestilence, bad things would bring populations
8 back down.

9 We now understand that it's generally the
10 case that as natural populations increase there's
11 a progressive decrease in reproductive success and
12 productivity as animals become more crowded
13 they're forced to use less suitable reproductive
14 sites, they encounter less food and their
15 juveniles need to spend more time feeding, and
16 they get eaten more by predators. So it's a bit
17 different picture than his, but not fundamentally.

18 Q And you've used the term, a couple of times,
19 "violent cycles". Am I correct that "violent
20 cycles", in nature, are not confined to salmon and
21 not confined to Fraser River sockeye salmon?

22 DR. WALTERS: No, there are cyclic sockeye populations
23 up in Alaska as well, like the Kvichak,
24 historically, was the biggest of them all.
25 There's lots of cyclic animal populations. I
26 guess in Canada the most famous are lynx-and-hare
27 cycles. There's also a wolf-moose cycle of much
28 longer, 35 to 40-year period. Generally, the
29 belief amongst ecologists - so it hasn't been
30 proven - is that these are associated with
31 predator-prey relationships.

32 Q And am I correct, Dr. Walters, that the density-
33 dependent effects are primarily related to, or
34 primarily impacts to survival rather than
35 fecundity; in other words, the number of eggs that
36 are laid are by and large the same amount from
37 year to year; it's the survival of the eggs or the
38 fry?

39 DR. WALTERS: Yeah, that's right. We see dependence of
40 body size on abundance, and with that a small
41 change in fecundity at very high densities. But
42 salmon seem to insist on translating competitive
43 effects that would normally impact their growth.
44 They transfer much of that effect into changes in
45 survival rate, by changing their behaviour so as
46 to try to maintain growth.

47 As Jim Woodey's pointed out, juvenile sockeye

1 certainly do show density-related changes in
2 growth as well as survival, but those get pretty
3 much wiped out by compensatory feeding as the
4 animals get older.

5 Q And at what stage of their lifecycle are the
6 sockeye most vulnerable to density-dependent
7 effects?

8 DR. WALTERS: There's a few examples where we see
9 apparently strong density dependence in the egg-
10 to-fry stage, indicating probably limitations on
11 the availability of good spawning habitat, but for
12 the larger stocks most of the density-dependent
13 mortality appears to occur early in the first
14 summer of life in the lake. So by the time
15 sampling of -- acoustic sampling of fry that have
16 been in the lake for about four or five months in
17 late summer in Quesnel, by that time we're already
18 seeing quite a strong density-dependent survival
19 relationship. And we think that continues on, at
20 least through until a smolt stage, and may even be
21 occurring in the ocean as well.

22 Q Does anyone on the panel have a challenge to that
23 evidence, or would like to express agreement?

24 DR. RIDDELL: Well, I wasn't sure what Carl meant. You
25 asked about fecundity. There are significant
26 effects on fecundity with very large population
27 sizes. The animals can get quite small. That is
28 one of the extraordinary events of 2010, where you
29 have an extraordinarily large run and very big
30 fish. That is definitely an exception.

31 So the density effects can be carried through
32 to fecundity. That definitely does occur.

33 DR. WALTERS: Yeah.

34 Q Dr. Woodey?

35 DR. WOODEY: Just to follow up on Dr. Walters' comments
36 about the lake, it's become my judgment, if you
37 will, that most of what we're seeing in cyclic
38 dominance is occurring in the lakes, and that's
39 just from my personal perspective. It's where the
40 resources are more limited, et cetera, and
41 therefore, I believe, most of the density-
42 dependent issues become expressed there.

43 What we see for fecundity is that the ocean
44 environment changes are probably much more
45 effective in determining fecundity, the number of
46 eggs that each female has. When we look at the
47 regime shift in 1977, fish size declined, mature,

1 adult sockeye fish size declined beginning at that
2 point, after being fairly stable. And, in fact,
3 in the late '40s and early '50s, quite high, quite
4 large fish. And size dropped off and, thus,
5 fecundity is dropping off. Fecundity is set
6 fairly early, well, a combination -- maybe I
7 shouldn't say this, because Brian will probably
8 correct me on it, but the fish try to maintain an
9 egg size, so if fecundity is going down in order
10 to put the resources into fewer eggs and maintain
11 egg size. But we've seen both very large runs
12 with large size and very small runs with small
13 size, so I think the expression of size and, thus,
14 fecundity, is something that is a marine-derived
15 issue, but not so much the density-dependent.

16 Q Dr. Walters, in another conversation with me, you
17 expressed the issue about reducing fishing or
18 increasing fishing in terms of the precautionary
19 approach; do you recall that discussion?

20 DR. WALTERS: Yes.

21 Q Could you perhaps put the debate or the issue that
22 we've heard about over the last two days in terms
23 of the precautionary approach?

24 DR. WALTERS: Well, the precautionary approach, it
25 appears in our management systems in two ways; the
26 original definition of it involves the avoidance
27 of irreversible harm. And in that traditional
28 definition, irreversibility refers primarily to
29 avoiding extinction in stocks. But we used the
30 term, also, to refer to adjustments we make in
31 management to reflect the uncertainties we have,
32 so there are adjustments to escapement goals on
33 the Fraser, routinely, that I don't think anybody
34 argues aren't needed, especially in recent years.

35 There's an escapement add-on to allow for the
36 possibility of pre-spawning mortality. So the
37 escapement goal would be set above what we think
38 the fish will actually reach the grounds to allow
39 for that. Those risk adjustments, or
40 precautionary adjustments, are felt by the
41 fishermen directly as a reduction in harvest. So
42 you can think of them as essentially a risk
43 premium, a loss catch risk premium that is imposed
44 on the fishery.

45 I think one problem we have in our management
46 systems is that we did not pay enough attention to
47 whether the risk premiums that our fishermen must

1 bear are reasonable and fair and necessary. They
2 have been very large, in recent years.

3 Q I was referring, Dr. Walters, to a question about
4 the precautionary principle as it applies to the
5 return to the historical levels of the production
6 of the Fraser River.

7 DR. WALTERS: You came to a seminar of mine, and you
8 heard me say this, I believe, that I don't know
9 what is precautionary right now in the Fraser.
10 The simple fisheries idea of precautionary
11 management is when you're not sure, reduce the
12 harvest, try to increase the spawning stock size.
13 But in the presence of possibly strong delayed
14 density dependent effects, that may do more harm
15 than good.

16 And in Jim Woodey's world of cyclic
17 dominance, precautionary management is not to
18 increase escapement, it's to prevent the breakdown
19 on the cycle. That's what he would call the risky
20 decision option. I don't think we even know,
21 anymore, what it means to be precautionary in the
22 Fraser sockeye management system.

23 Q Dr. Woodey, would you agree with Dr. Walters'
24 description of what your description of the
25 precautionary principle in these terms would be?

26 DR. WOODEY: Mr. Commissioner, from my perspective, the
27 attempt to so-called rebuild stocks, off-cycle
28 stocks, and so on, that carries, then, the
29 precautionary line idea, is probably not well-
30 founded, at least, if not -- not wrong. There are
31 certainly issues that need to be looked at
32 seriously by good scientists as to whether or not
33 risks are increased by not being precautionary in
34 actuality. And as Dr. Walters is pointing out the
35 protection -- well, I'll point out that the
36 protection of the dominant line escapement should
37 be the principle goal for any individual stock,
38 and that attempting to modify fishing regulations
39 in order to build up offline, particularly the
40 lower lines of Shuswap and Quesnel, can backfire
41 by the fact that you've got this delayed density
42 dependence issue, and it can then feed back on us
43 on affecting the dominant line production.

44 Just on that issue, evening out the four
45 lines, which was part of the original strategy
46 that DFO undertook several years ago, to our
47 thinking would mean that you would simply be

1 causing the predator populations to become more
2 stable and larger and thus increase the overall
3 predation rate and reduce the productivity of the
4 stocks overall, compared to what we get with the
5 cyclic dominance pattern.

6 MR. LOWES: Thank you. Those are my questions. And
7 may I say to the whole panel, it's been a
8 privilege and a pleasure to listen to you over the
9 last day and a half.

10 MS. GAERTNER: Mr. Commissioner, would you like to take
11 the afternoon break before I get started? I'm
12 totally in your hands on that.

13 THE COMMISSIONER: I don't mind you starting, if you're
14 comfortable with that.

15 MS. GAERTNER: All right.

16 MR. TAYLOR: Mr. Commissioner, Ms. Gaertner's kindly
17 let me just mention and refer to you an exhibit.
18 A number of the panellists have, this morning, and
19 elsewhere in these hearings, referred to Sue
20 Grant's paper, and I just wanted to have one of
21 the witnesses - I think Dr. Riddell might be the
22 easiest - to see the cover of Exhibit 184 and see
23 if he can identify that as what's been spoken of,
24 just so you've got a reference to what they were
25 referring to when they speak of Sue Grant's paper.
26 Now, I appreciate that's only the cover. Is
27 there something that we can take you to, Dr.
28 Riddell, that would allow you to pick out whether
29 that's what you and others have been referring to?

30 DR. RIDDELL: No, the cover's fine. That's the paper.

31 MR. TAYLOR: All right. So that's Exhibit 184, Mr.
32 Commissioner.

33 DR. WALTERS: That's the WSP CSAP doc?

34 MR. TAYLOR: Yes.

35 MS. GAERTNER: Thank you, Mr. Commissioner. Brenda
36 Gaertner for the First Nations Coalition. Mr.
37 Commissioner, earlier in this hearing and the
38 inquiry, you've had an opportunity to hear a
39 number of aboriginal witnesses, and I just wanted
40 to bring some of their comments around delay
41 density dependency, or what the biologists call
42 that, to your attention and the attention of
43 others. I don't think it will come as any
44 surprise, but I think it's useful to have their
45 words and their ideas in our minds as I begin my
46 work today.

47 You would have recalled you heard from the

1 chief, Willie Charlie, who's from Chehalis, who's
2 at the mouth of the Harrison River. And you heard
3 from Chief Fred Sampson, who's in the middle of
4 the Fraser River, above Hell's Gate, and then you
5 heard from Grand Chief Saul Terry from the
6 Stl'atl'imc, whose village sits at the mouth of
7 the Bridge River, you will recall that you spent
8 time there. And then you also heard from Dr. Ron
9 Ignace from the Secwepemc, and former Chief
10 Alexis, whose territory is the homes of many of
11 these spawning grounds the natal lakes are located
12 in.

13 And you'll recall that evidence that from the
14 perspective of these aboriginal people whose
15 territories and water systems, and fisheries, and
16 families, and communities that have relied on this
17 system since time out of mind, they don't have a
18 word for what the English call over-escapement.
19 They weren't able to tell you stories of this
20 notion of over-escapement. You heard that from
21 their cultural perspective, salmon have a vital
22 role in the entire ecosystem and that they are an
23 indicator of the health of that ecosystem.

24 You also heard from them the stories that
25 they do carry, which is that elders remember
26 stories and times when fish was so abundant that
27 they could walk across the river on the backs of
28 the fish.

29 Now, I want to recall, also, that when Dr.
30 Ignace gave evidence and that panel gave evidence
31 and we spoke about this at a preliminary level
32 deliberately because we anticipated panels like
33 this, he wanted very carefully to bring to mind a
34 Secwepemc story, an ethic story that all of their
35 fishermen from a very young age and for a very
36 long time are taught. And I'm not going to tell
37 the whole story, we won't take that time, I'll
38 just remind you of that story, and that was the
39 story of the coyote who was a critical and
40 extremely important part of bringing salmon to
41 their people and to their villages. But that
42 story also included the importance of learning
43 that if you take salmon for granted and you
44 harvest them too much, and you have a lot of pride
45 about how well you can harvest them, the salmon,
46 themselves, will respond to that and leave their
47 relationship with people.

1 And it's with that in mind, and I ask you to
2 keep that in mind, I'm going to turn to only a few
3 matters as it relates to delayed density
4 dependence, or those words that we hear in English
5 called "over-escapement."

6 My questions, at the beginning, will
7 primarily be addressed to you, Dr. Riddell, and
8 I'm going to do something slightly different than
9 the questions that have happened. I'd like to
10 take Dr. Riddell through some work that was done
11 in response to the 1999 collapse, and a meeting
12 that occurred that Dr. Riddell was present, too.
13 I'm going to take him through a number of these
14 things and get to the conclusions around delayed
15 density dependence, it might take a little time,
16 and then I'll ask the other panel members to
17 respond to it, but I'd like to get all the way
18 from the beginning to the end of the conclusions
19 before we turn to the other panel members. And so
20 Mr. Lunn, could you call up Exhibit 73?

21
22 CROSS-EXAMINATION BY MS. GAERTNER:
23

24 Q So Dr. Riddell, this was a "Synthesis of Evidence"
25 at a workshop that occurred in June of last year,
26 and I see that you were present at this workshop.
27 Do you recall this workshop and do you recall your
28 participation in this workshop?

29 DR. RIDDELL: Yes, I do.

30 Q And would you like to --

31 MS. GAERTNER: Mr. Commissioner, you've heard a little
32 bit about this workshop.

33 Q But maybe you could refresh the Commissioner's
34 memory on the purpose of this workshop and the
35 goal of this workshop, Dr. Riddell.

36 DR. RIDDELL: Well, the workshop was organized through
37 the Pacific Salmon Commission. The United States
38 and Canada both are, of course, concerned about
39 the explanation for what occurred in 2009.

40 They struck a subcommittee to organize this
41 workshop and what they did then is identify key
42 people that could address a number of hypotheses
43 that people had posed that might explain the loss
44 of fish, or the fish not returning in 2009.

45 If I recall exactly, there were 12 hypotheses
46 that were identified and a group of people were
47 assigned, most of the people working in that area,

1 of course, to make presentations to the workshop.
2 There was then, I guess, called a science panel
3 that was working with Dr. Randall Peterman as
4 chair, and David Marmorek as the facilitator, and
5 a reporter. And we worked with that subcommittee
6 for two or three days after to write reports on
7 each of the hypotheses.

8 That advisory committee then discussed the
9 reports of the participants and determined then
10 what were the sort of ratings that you would
11 assign for abilities to explain the 2009 loss and
12 to then subsequently make recommendations back to
13 the Pacific Salmon Commission on what might be
14 done to follow-up from this workshop.

15 Q I wonder if you could go first to page 33 of the
16 document, itself, which is in the introduction.
17 Dr. Riddell, you said 13, but I see nine items
18 listed as the hypotheses. You might have started
19 with 13. Did they get simplified to 9? They're
20 just at 1.1.

21 DR. RIDDELL: Yes, I think if you go to the tables,
22 that there are a number of subcomponents to some
23 of these.

24 Q Okay. And you'll see, Mr. Commissioner, and Dr.
25 Riddell, it's true, that delayed density-dependent
26 mortality is one of those topics and it's found at
27 number 7; is that correct?

28 DR. RIDDELL: Yes, and presented by Dr. Walters.

29 Q Thank you. And at page 35 of the document, I want
30 to go to the first paragraph in 1.4. And the
31 writers of the report begin with a qualification
32 about realistic expectations, and I'm going to
33 start with the second sentence of that:

34
35 The dynamics of any ecosystem, including the
36 freshwater and marine ecosystems traversed by
37 Fraser River sockeye, are affected by
38 multiple, simultaneously operating natural
39 and human sources of variability. It is
40 therefore very unlikely that there has been
41 a single cause of the long-term decrease in
42 productivity of Fraser sockeye, or that there
43 was a single cause behind the extremely low
44 returns in 2009. Such reductions can arise
45 from several mechanisms that occur in one or
46 more places in the salmon life cycle, ranging
47 from poor viability of eggs to reduced

1 survival rates of juveniles, and mortality of
2 fish while at sea. It is also clear from the
3 previous research on salmon, as well as many
4 other species of animals, that changes in one
5 mortality agent can interact with other
6 mortality factors to produce complicated net
7 effects.
8

9 Do you still hold that as a true overview of some
10 of the challenges around Fraser River sockeye?

11 DR. RIDDELL: Yes, I do. That was written by the
12 Science Advisory Panel so that is the opinion of
13 several of us that contributed.

14 Q Then I'm going to ask if you could go to page 44
15 of that report and you'll see, at page 44, that
16 we're now in the section of the document 3.1.1.2
17 "Residuals of productivity indicators to account
18 for density dependence." And I'm not going to try
19 to read the paragraph I'm going to turn you to,
20 it's the second large paragraph and there's a lot
21 of correlations that are discussed in it. I
22 wonder if you could take your time to look at
23 that. And it's my understanding from that
24 paragraph that the stocks with the lowest
25 correlation between the residual indicators of
26 productivity and the standard non-residual
27 indicator tended to be those whose spawner
28 abundance has increased dramatically in the last
29 20 years or so, example, Quesnel, Stellako and
30 Pitt. And I wonder if you could explain that.
31 That's a bit of a challenge for me to understand.

32 DR. RIDDELL: Well, I think you have the author sitting
33 with us. This is a summary of Dr. Walters'
34 presentation so --

35 Q All right.

36 DR. WALTERS: It is?

37 Q Dr. Walters, could you explain that sentence,
38 then?

39 DR. WALTERS: Could you repeat the sentence? I don't
40 remember writing it.

41 DR. RIDDELL: Oh, you don't have it present. Okay.

42 Q I'll read it again:
43

44 Stocks with the lowest correlation between
45 the residual indicator of productivity and
46 the standard non-residual indicator tended to
47 be those in which spawner abundance had

1 increased dramatically in the last 20 years
2 or so (e.g., Quesnel, Stellako and Pitt).
3

4 DR. WALTERS: That's not my writing. I'm sorry. I
5 believe that's a review of Randall Peterman's
6 work. And frankly, I can't answer you. I have no
7 idea what that sentence means.

8 Q Well, I feel complicated that I found a hard
9 sentence.

10 DR. RIDDELL: Well, yeah, I'm not sure that I can give
11 you an easy answer either, unfortunately.

12 DR. WALTERS: Yeah (indiscernible).

13 Q All right. Perhaps, if it becomes relevant, we'll
14 ask Randall Peterman, if that's who we think it
15 is. I'm going to now take you to page -- I don't
16 want to take further time with that today. I'll
17 take you to page 85 of that report now.

18 MR. LUNN: Ms. Gaertner, I just emailed the exhibit to
19 Dr. Walters.

20 MS. GAERTNER: I think he got the sentence and he had
21 the same difficulty with it, but I'm glad that he
22 had the report. Thank you.

23 Q And again, I think you spoke to this a little bit
24 earlier in the evidence, but I want to make sure
25 we understand this going forward, at page 85,
26 there's a sentence that says:

27
28 Delayed density dependence does not appear as
29 significant in the smaller stocks ...
30

31 And is that primarily because the smaller stocks
32 are unlikely to flood their spawning grounds or
33 their nursery lakes?

34 DR. WALTERS: Yeah, that's a point we've discussed
35 several times on this panel.

36 Q All right.

37 DR. RIDDELL: Yeah, if they're small and they're in an
38 environment that's still fairly healthy and
39 productive, then you would not expect to see that
40 effect.

41 Q All right. So we're primarily talking about
42 larger stocks that are of concern, and we're going
43 to get to the Quesnel stock, in particular, in a
44 few minutes.

45 And then at page 86 of the report, there is
46 this sentence at the top of the page:
47

1 The effects of delayed density dependence on
2 changes in productivity will be most evident
3 in stocks with a large range of abundance of
4 spawners over years.
5

6 DR. RIDDELL: Yes, we've talked about that extensively.
7 This is the contrast through the range of spawners
8 where you have to have some substantially above
9 the optimum level to really see that interaction.

10 Q And then I want to take you finally to the panel's
11 opinion on the effect of delayed density
12 dependence on long-term decline and productivity
13 in the 2009 event. For some reason, I don't have
14 my page number. Right at the bottom of page 86,
15 the last paragraph in 4.7.5:

16
17 The Panel's opinions about the effect of
18 delayed density dependence on the long-term
19 decline of Fraser sockeye productivity ranged
20 from likely to possible to unlikely as a
21 contributing factor.
22

23 So it's clear amongst that panel that in terms of
24 its long-term effects, it's not clear, and:
25

26 Panel members agreed, however, that delayed
27 density dependence is very unlikely to have
28 played a role in the 2009 event.
29

30 Is that conclusion something that you still hold
31 today, Dr. Riddell?

32 DR. RIDDELL: Well, let me clarify, this is the opinion
33 of about nine or 10 people. It's not my personal
34 opinion, right, and that's why you see this range.
35 All the participants that were at the workshop and
36 heard the presentations of the hypotheses were
37 asked at some point to clarify, well, in their
38 opinion, to rate what's the level of information,
39 then, would it suggest a contribution to the long-
40 term decline, which we've been hearing about since
41 the early 1990s as opposed to contributing to the
42 sudden decline that we observed in 2009. And in
43 something like the delayed density discussion that
44 we've heard here, many people were really probably
45 encountering that discussion for the first time
46 and so you have this fairly wide range of whether
47 or not that was contributing to the long-term

1 decline.

2 Whether it contributed specifically to 2009,
3 most people felt much more strongly that it would
4 not have. My personal opinion on this is that
5 seeing some of Carl's work through the last year,
6 I would suggest that it is a likely cause
7 contributing to the long-term decline. Others
8 didn't share the same opinion. I think most
9 people there, obviously, the Science Panel, felt
10 that it was unlikely to be a major cause of the
11 sudden and large decline in 2009 alone.

12 Q Okay. And then I thank you for that and I just
13 want to now take you to and bring to the attention
14 of Mr. Commissioner, the proposed research in the
15 management actions that were the outcome of the
16 work that this panel did as it relates to delayed
17 density dependence, and in particular, you'll see
18 that at the bottom of page 86 and over to page 87.
19 As I understand it, this panel of experts
20 recommended research in four areas, in making
21 adjustments to the FRSSI model, better fitting the
22 Larkin and Ricker models, having better measures
23 of abundance of different lifecycles, having a
24 better understanding of food supply dynamics and
25 better research into predator, prey, disease and
26 food supply relationships. And finally, another
27 area where proposed research was made was in
28 contrasting management strategies should be
29 applied to different stocks over enough time to
30 observe the responses.

31 Now, those are all proposed research items
32 that seem abundantly useful given the evidence
33 that we've heard today. Does anybody -- Dr.
34 Riddell, do you have any clarifications with
35 respect to that proposed research? And I would
36 welcome the panel as it relates to those five
37 items.

38 DR. RIDDELL: Yeah, well, as one of the committee
39 writing it, I mean, this was a representation of
40 what the Science Panel felt was stated on this
41 particular topic by the participants. I would
42 point out, though, that later in the document,
43 where you're looking at all of the hypotheses and
44 a very long list of research because every one of
45 them had four or five, then we had a much more
46 focussed discussion about what are the immediate
47 priorities and where would you target your studies

1 to answer those two questions, the long-term
2 decline and 2009.

3 Q Yes, I appreciate that this is only as it related
4 to delay density dependence.

5 DR. RIDDELL: Right.

6 Q And I'm going to stick on topic as it relates to
7 that today. And then of that list of the five, it
8 seems 1 to 4 are automatically, in my mind,
9 precautionary. You're not -- you're doing
10 research, you're not in any way interacting
11 directly with management strategies that may
12 affect one or other stocks. Those are all just
13 good-sense kinds of things that could be useful to
14 do; would you agree with me on that? And that
15 item number 5, if we're going to introduce
16 management strategies to specifically understand
17 at an adaptive level, preferably, rather than at
18 an experimental level, we're going to need to take
19 some precaution with that?

20 DR. RIDDELL: Well, the first four really area
21 recommendations that we've talked about in the
22 past. I mean, they're all about better
23 information in the lakes and looking at what the
24 causes are. The final one, as you're pointing
25 out, involves management strategy changes, or an
26 adaptive management study, as Carl referred to,
27 and that would take more planning because that
28 could cause, you know, impacts on fisheries as
29 we've talked about already, as well.

30 Q And impact on fish?

31 DR. RIDDELL: On fish, yeah.

32 Q And then you went on, or the group went on to talk
33 about management actions. Under that, Mr.
34 Commissioner, at 4.7.7, they spoke about
35 particular items. One is as it relates to the
36 FRSSI model and we've heard a number of people
37 directly involved in the FRSSI model already. And
38 exploring the total allowable mortality rules that
39 result from that, in particular, making sure that
40 cyclic dominance patterns are considered in the
41 context of total allowable mortality.

42 And then particularly, the Wild Salmon Policy
43 benchmarks need to account for cyclic -- the
44 nature of some of the conservation units. And
45 then if the mechanisms for delayed response can be
46 determined, mitigation of those factors may be
47 possible. Again, those are all management actions

1 that seem reasonable in the circumstances given
2 the evidence that we've heard in the last two
3 days?

4 DR. RIDDELL: I would still say so, yes.

5 Q Now, this might be an appropriate time to ask from
6 the panel whether there's any of the other members
7 of the panel have any comments as it relates to
8 those recommendations or the responses of Dr.
9 Riddell on these topics?

10 Mr. Commissioner, I'm going to go to two
11 other items. One will take a little bit of time,
12 and the other, even shorter. I'm happy to keep
13 going, but it may be an appropriate time to take a
14 short break.

15 MR. COMMISSIONER: I wonder if I could just ask the
16 panel, on these last few points, just to assist
17 me. I don't have a glossary of terms,
18 necessarily, that is one that perhaps all of those
19 in the field have agreed upon.

20 MS. GAERTNER: There's one in this one.

21 MR. COMMISSIONER: In this document, but I'm talking
22 about this document, outside this document. In
23 terms of using the term "cyclic dominance" and the
24 term "over-escapement" and the term "delayed
25 density dependence," and there's one -- I saw
26 another one, it was "delayed density
27 independence," was that -- I saw another term used
28 in one of the documents here recently. And
29 there's other terminology used in the FRSSI model
30 documents that I won't go to, but my question is
31 can I be satisfied that all of you who've been in
32 the field for as long as you have been, when you
33 use those terms, you're all talking about the
34 exact same phenomena? In other words, there's a
35 common ground amongst those in the field when you
36 talk about cyclic dominance, over-escapement,
37 delayed density dependence, and so on. So when I
38 see those terms in different documents, I can
39 reflect back on your answers and understand that
40 you did have a common-ground understanding about
41 those phenomena or those terms?

42 DR. RIDDELL: Well, let me start. I think, amongst the
43 people involved with these science reviews and the
44 discussion we've had here that I would say that we
45 would have a common understanding. But our
46 communication with many people means we probably
47 should provide you a glossary and that might be

1 actually quite a useful thing to contribute.
2 Those are not all that easy to write and get that
3 clarity so we could certainly do that in the
4 future. But I think amongst the people involved
5 with this professionally, that we would have a
6 common understanding.

7 MR. COMMISSIONER: If I see the term "delayed density
8 dependence," can I equate that to cyclic
9 dominance?

10 DR. WALTERS: No.

11 MR. COMMISSIONER: Why?

12 DR. WALTERS: You can have delayed density dependence
13 effects. That term "delayed density dependence,"
14 you can look up in ecology textbooks, right? I
15 mean, this is not our word. It's a textbook term
16 in the science of ecology, but "cyclic dominance"
17 is a particularly strong expression of the
18 ecosystem interactions that lead to delayed
19 effects. So you have delayed effects and still
20 have a relatively stable population size. Our
21 estimated delayed effects are quite strong on the
22 Early Stuart, but it doesn't cycle.

23 DR. RIDDELL: So cyclic dominance is a particular type
24 of the delayed density dependence and a very
25 strong example.

26 MR. COMMISSIONER: So that would be a consistent ground
27 of understanding throughout these different
28 research papers that I've been presented with?

29 DR. RIDDELL: Well, I don't know, I guess my opinion
30 would be I would hope so, I would think so.

31 MR. COMMISSIONER: All right.

32 DR. RIDDELL: I don't know. Carl, what do you think?

33 DR. WALTERS: Yeah, I mean, I haven't heard anything,
34 certainly around this table, that would indicate
35 any inconsistency. There used to be a bit of
36 confusion about what we meant by "cyclic
37 dominance," and there's the thing, the DSLL
38 definition that Jim Woodey and I published in a
39 paper some years ago. That seems to be the one
40 that everybody pretty much uses now in reference
41 to the phenomenon. You know, there's things that
42 are sort of cyclic and things that are regular,
43 and the cyclic dominance being the regular ones
44 with a particular pattern. Jim defined this for
45 you as we use the term today early in this panel.

46 MR. COMMISSIONER: Right.

47 MS. GAERTNER: Mr. Commissioner --

1 MR. COMMISSIONER: Thank you.

2 MS. GAERTNER: -- it actually was a line of questioning
3 I was going to ask. I just have one follow-up to
4 that, if I may?

5 Q I just want to make sure I understand it, it's a
6 regular response by, in this case we'll talk about
7 sockeye salmon, to the environment they're
8 experiencing. That's how we get strong cyclic
9 patterns for some of the Fraser sockeye that have
10 been around for a long time. In fact, there seems
11 to be some debate that that's a natural phenomenon
12 and may actually explain the predator/prey
13 relationship that salmon have worked out. But it
14 also could be salmon's response or sockeye
15 salmon's response to a changing environment; is
16 that correct?

17 DR. WALTERS: No, it's too regular. When we see
18 patterns with such regular periods and regular
19 pattern in nature, we assume that there's a set of
20 repeatable ecological feedbacks involved in
21 producing them. Other kinds of variation don't
22 produce a regular pattern.

23 DR. RIDDELL: And let me just add, too, that, I mean, I
24 think we spent quite a bit of time on this
25 yesterday, that there was a consideration that
26 were we seeing cyclic dominance because of fishing
27 pressures in the response of the fish, and there
28 were questions to us about do we think it has a
29 biological basis now? I think that all of us came
30 back and said, "Yes, we believe that it has a
31 biological basis."

32 Now, we do know it can be changed because it
33 has actually changed in the Fraser system.
34 Because of an enormous environmental event, we did
35 shift by one year from a 1913 cycle to a 1914
36 cycle. And so, I mean, it can change
37 biologically, but the extreme nature of a very
38 strong, very modest, and then much smaller, that
39 pattern has certainly re-established itself
40 through time. So it can change, but it's coming
41 back to a biologically-based cycle.

42 MS. GAERTNER:

43 Q All right. And so, in fact, that biological
44 response to Hell's Gate was it may have taken the
45 salmon quite a long time to re-establish their
46 cycles, but that may be one of the observed things
47 that we'd watched over the last century, is a huge

1 change by Hell's Gate. We also have the Quesnel
2 logging incident that affected Quesnel Lake.
3 Those are two large impacts on the runs and we're
4 watching salmon, with human assistance, or
5 otherwise, respond to those very strong impacts in
6 their environment, correct?
7 DR. RIDDELL: Well, yeah, I think we're saying the same
8 thing, that the animal is able to come back from
9 these major events that we've caused, but they
10 come back, in the Fraser sockeye, in this cyclic
11 dominance in these particular lakes. And I think
12 Carl made a good point about that yesterday in
13 terms of we do see this pattern re-establishing.
14 Q And so it's quite possible that cyclic dominance
15 is a very good thing for salmon?
16 DR. RIDDELL: I think that's what we were coming to.
17 MS. GAERTNER: Do you want me to keep going, Mr.
18 Commissioner?
19 DR. WALTERS: I'm sorry, could I ask for clarification,
20 a very good thing for salmon?
21 DR. RIDDELL: For Fraser sockeye.
22 Q Fraser sockeye salmon, sorry.
23 DR. WALTERS: What one was --
24 Q For those Fraser sockeye salmon that had cyclic
25 dominance.
26 DR. WALTERS: So things that (indiscernible) that we
27 understand in general to be negative feedback,
28 i.e. predators that are eating them, or parasites,
29 or diseases that are attacking them, or they're
30 running out of food. It's hard for me to imagine
31 how anyone would call that positive for salmon.
32 MS. GAERTNER: Your question was how much longer I'll
33 be?
34 MR. COMMISSIONER: Ms. Gaertner -- right.
35 MS. GAERTNER: I have one item that may take about 10
36 minutes and one that will take five. I would say
37 15 minutes.
38 MR. COMMISSIONER: All right. Madam Reporter, are you
39 comfortable with that?
40 THE REPORTER: I'm comfortable, yeah.
41 MR. COMMISSIONER: Mr. Registrar, is that -- all right.
42 Well, if the witnesses are comfortable, we'll go
43 with that. Thank you, Ms. Gaertner. Ms. Baker,
44 will there be more questioning after that?
45 MS. BAKER: There might be a couple of minutes of
46 questioning after that.
47

1 MS. GAERTNER:

2 Q I just wanted to make sure, we've heard from the
3 panel around the Quesnel returns and the concerns
4 that have been raised around Quesnel, with a
5 little bit more precision, if I may, Mr.
6 Commissioner, because I expect that if this
7 becomes important, that I'll seek to have Peter
8 Nicklin, who's a biologist in the upper Fraser
9 watershed speak to this on it, and I just want to
10 make sure that what he says might be something
11 this panel can respond to. And I think we're
12 dealing with the same numbers so I just want to
13 make sure that that's true.

14 Dr. Woodey, you referred to the Quesnel
15 returns in 2001 as being around 3.5 million, and
16 '02, around 3 million, in your evidence yesterday,
17 that's correct?

18 DR. WOODEY: Those were the level of escapements to the
19 spawning grounds in those two years, yes.

20 Q And that was in response to a peak, actually, in
21 '97, if that's correct, if I've got my numbers
22 right. There was a peak escapement in all of the
23 areas of the upper Fraser in '97 that would have
24 brought us to 2001 and there was also -- and that
25 actually was -- the response to the '97 peak was
26 good escapement in '01 and that was largely
27 because the Quesnel numbers were quite large in
28 '01; is that correct?

29 DR. WOODEY: That's correct.

30 Q Now, in 2009, which is the complementary years, we
31 have the collapse in 2009, but we also have the
32 evidence that suggests delayed density dependence
33 was not a cause of that collapse, or not a
34 significant cause of that collapse. And just
35 today, we've learnt that the Department of
36 Fisheries and Oceans have now publicized the
37 escapement updates for 2010, and I just want to,
38 if I may, Mr. Lunn, these are on the website, and
39 I'd like to take you just to the paragraph on
40 Quesnel and have you speak on this. So you'll see
41 Mr. Lunn has taken you to the Department of
42 Fisheries and Oceans website of 2010 and he's now
43 going to take you to the component of that site
44 that takes us to the 2010 summer run sockeye
45 salmon near-final escapement estimates. And on
46 the third page of that, we have the report on
47 Quesnel. And I expect that you may not have seen

1 this, gentlemen, at all, and so if you could just
2 take a moment and read that paragraph, it appears
3 that there's been spawning success for the Quesnel
4 system in the 2010 year, well over the long-term
5 system average of 84, we've got a 95.5 percent
6 spawning success, is how I read the concluding
7 line of that paragraph. And that the escapement
8 in 2010 represents the first increase relative to
9 the brood year for this system since 2004, 69
10 percent greater than the 2009.

11 And so I'm just wondering, given that
12 positive return in 2010 and, in particular, as it
13 relates to Quesnel, how that might inform your
14 earlier comments, concerns around the Quesnel and
15 its return, it appears that it did have trouble in
16 2009. Well, it had trouble in '05 and '06, and
17 '09, but it didn't seem to be responding well in
18 2010. The returns in 2006 were 169,000, roughly,
19 of spawners, and now in 2010, we have 249,000
20 spawners.

21 Dr. Woodey, would you like to respond to
22 that? That would be helpful to us.

23 DR. WOODEY: The dominant line has for over 60 years
24 been larger both in terms of the total return and
25 the escapement, larger than the sub-dominant for
26 following year run. So now we come to 2009 and
27 for the first time, the sub-dominant line run and
28 escapement are larger than the dominant line. And
29 this puts us into a point of we don't know what's
30 going to happen in terms of the maintenance of
31 that long-term cycle dominance that is the
32 2001/2009 line.

33 The escapement in 2009 was small enough that
34 it would be commensurate with, almost as low as
35 some of the low off years when it was cyclic
36 dominance in the '80s, '90s, and up until now.
37 There's certainly the possibility that the stock
38 is going to switch dominant line, that is become
39 dominant on the 2010 and the possibility is there,
40 I can't forecast that at all, but it will be very
41 interesting to see. I have requested from Jeremy
42 Hume, who is a biologist in charge of the lake
43 survey program, the data from the 2010 juvenile
44 surveys, to look at size and numbers of juveniles
45 and that will tell me quite a lot as to whether or
46 not there will be much in the way of carryover
47 effects, delay density-dependent effects on the

1 2010 run.

2 It wouldn't take much more than a low marine
3 survival in the 2013 run to get that switched to
4 the 2010. It may be a little up in the air right
5 now, but we're certainly -- when we did the
6 simulation modelling of the work that I did in
7 2005, and Carrie Holt, who had been a witness for
8 you, but not on that subject, we presented two
9 papers to the Pacific Salmon Commission Southern
10 Endowment Fund, one on the I call cyclic dominance
11 issues and models for that, and then the second
12 one is a simulation of those results. And her
13 simulation results indicated that you would expect
14 to get not infrequent switches as to what the
15 dominant line would be. And so, you know, in
16 10,000 runs, something like 50, 60 percent, 70
17 percent would maintain that cyclic dominance and
18 then the other times, it would switch. And so
19 it's another part of the experiment, I guess you
20 would have to say, experiment that's been carried
21 out because of the Late Run sockeye issues that
22 are being managed for.

23 Q I'm not sure if anybody else has a comment on
24 that. Dr. Riddell?

25 DR. RIDDELL: Well, I think Jim's pointed out that it's
26 going to be interesting to really monitor this
27 lake system because the dominant line and this
28 sub-dominant line, those are very, very small
29 escapements in an enormous lake, right? I mean,
30 they could easily carry the capacity of that
31 spawn. And so who knows, maybe we'll see two
32 lines competing with each other and we can sort
33 this out.

34 Q Mr. Wilson, I don't want to overlook the fact that
35 you have, of course, worked in the Upper Fraser,
36 also, and know Mr. Nicklin. His comment as it
37 relates to these numbers is it's hard for him to
38 understand the concern around delayed density
39 dependence. There appears to be lots of spawning
40 capacity in the Quesnel system and abilities in
41 the lake. Do you have anything to add to that at
42 this point in time?

43 MR. WILSON: Well, I would just say, Mr. Commissioner,
44 that I view cyclic patterns and returns in Fraser
45 sockeye for many stocks to be an entirely natural
46 circumstance, and I'm sure we all agree with that.
47 So from a biological perspective, it doesn't

1 concern me that the dominant cycle might shift
2 from one year to another. And I don't see that we
3 should necessarily be managing to maintain a
4 particular dominance pattern. I think we should
5 let the Fraser sockeye do what Fraser sockeye do
6 and adapt to those changes.

7 MS. GAERTNER: Ms. Baker, do you know the exhibit
8 number for Dr. Walters' CV? Sorry.

9 MS. BAKER: 401.

10 MS. GAERTNER: Thank you.

11 Q I just have one more line of questions and they
12 will be very brief, and they're for you, Dr.
13 Walters. I got a little confused yesterday when
14 you gave evidence in response to Ms. Baker's
15 question, in particular, her question was so how
16 do you balance the protection needs for weak
17 stocks like Cultus against the risks of over-
18 escapement. I don't want to go through that whole
19 debate again, but we heard from each of the panel
20 speaking about the biological issues around
21 biodiversity and various different responses, but
22 in your response, and I find that at page 61 of
23 the transcript, your first response to this
24 question is, "I have to wear two hats in answer
25 that question." You began as a biologist, to say
26 that you're in favour of biodiversity. I'm just
27 curious, I looked at your resume last night, and I
28 wonder what other hat you're wearing in answering
29 this question, what other expertise you were
30 speaking from?

31 DR. WALTERS: My other response to you was speaking to
32 you as a member of the public who is concerned
33 about the people who are impacted by these
34 policies.

35 Q All right. And then earlier today, you gave
36 evidence about some numbers you've run around the
37 socio-economic impacts of some of these decisions.
38 We've heard from Dr. Riddell that he felt that the
39 numbers you have ran within your models would
40 require scientific review, and your suggestion is
41 that that go to FRSSI. So those are the first set
42 of numbers you gave, but then you threw out
43 another number that troubles me and I want to make
44 sure that we don't hear about it for the rest of
45 the commission, which is this \$200 million number
46 as it relates to the impacts that these decisions
47 are having. And, again, I don't see in your

- 1 resume any expertise for running that type of
2 number. I wonder if you could explain that
3 number. Is that a number that you've done --
- 4 DR. WALTERS: That's the number of fish I calculate to
5 have been lost from the catch.
- 6 Q Yeah, but how do you get to 200 million, and do
7 you have expertise in running socio-economic
8 impacts associated with the loss of fish to
9 aboriginal communities or to other communities,
10 socio-economic impacts? From my --
- 11 DR. WALTERS: Well, this biological loss of catch,
12 which I calculate to be in the order of 20 million
13 fish from the stock recruitment analysis times \$10
14 a fish --
- 15 Q And so you --
- 16 DR. WALTERS: -- is a very simple indicator of landed
17 value loss.
- 18 Q And but you'll --
- 19 DR. WALTERS: I don't think that it's the only economic
20 or social performance indicator, but it does bring
21 home that there was substantial loss in income to
22 people, wherever they are, and whoever they are.
- 23 Q Dr. Walters, there isn't an indicator in your CV,
24 and that's at Exhibit 415, of the socio-
25 economic -- expertise in developing socio-economic
26 analysis of the value of fish; do you agree with
27 me on that?
- 28 DR. WALTERS: Well, yeah. I actually did a graduate --
- 29 Q Can you point to me --
- 30 DR. WALTERS: -- minor in resource economics, but that
31 was a long, long time ago. About all I can
32 remember how to do these days is to multiply the
33 price of the fish times the number of fish. As I
34 told you, that's what I did, and I don't think
35 that requires a huge amount of expertise in
36 economics.
- 37 Q No, but I will suggest to you, from the work that
38 I have done with experts on socio-economic impacts
39 associated with the loss of fish in aboriginal
40 communities, it's just not a simple number and so
41 you're suggesting that it is a simple number from
42 your perspective, is that correct?
- 43 DR. WALTERS: Oh, no, no, no, I gave you one simple --
- 44 Q Could you let me finish my question, please? And
45 that you do not have expertise in running socio-
46 economic impact analysis on the loss of fish?
- 47 DR. WALTERS: No.

87
PANEL NO. 18
Cross-exam by Ms. Gaertner (FNC)
Re-exam by Ms. Baker

1 MS. GAERTNER: Thank you. Those are my questions.
2 MR. COMMISSIONER: Ms. Gaertner, would you like to mark
3 that last document, the --
4 MS. GAERTNER: Yes.
5 THE COURT: -- final escapement estimates?
6 MS. GAERTNER: Thank you. Yes, I would.
7 MR. COMMISSIONER: It will be marked as Exhibit number
8 420.
9

10 EXHIBIT 420: 2010 Summer Run Sockeye Salmon
11 - Near Final Escapement Estimates (DFO)
12

13 MS. GAERTNER: That's correct, you've marked the
14 document that came from the DFO website, 2010
15 Summer Run Sockeye Salmon --
16 MR. COMMISSIONER: That's right.
17 MS. GAERTNER: -- Near Final Escapement Estimates?
18 MR. COMMISSIONER: That's correct.
19 MS. GAERTNER: Thank you.
20 MS. BAKER: Thank you. Actually, Mr. Leadem is
21 entitled to re-examine. No? And is Canada doing
22 a re-exam of Dr. Riddell? I'm not sure exactly
23 what your capacity is with Dr. Riddell on this
24 panel so --
25 MR. TAYLOR: I think that we've accepted that, on this
26 panel, Dr. Riddell is an imminently qualified
27 scientist and he's here in that capacity as
28 distinct from a former DFO employee so I'm not
29 proposing to re-examine.
30 MS. BAKER: Thank you. I have just a couple of re-
31 examination questions.
32

33 RE-EXAMINATION BY MS. BAKER:
34

35 Q Dr. Walters, when Don Rosenbloom was asking you
36 questions about whether there were any
37 recommendations any of the panel members would
38 have to resource managers, you said that you felt
39 there should be a return to high harvest rates and
40 that there should be -- you should try to re-
41 establish the cyclic dominance of some stocks, but
42 you put a caveat on there and you said but first
43 there are severe environmental effects on some
44 stocks and survival declines in the high watershed
45 need to be reversed before you would go to the
46 recommendation that you made. Hopefully, I've
47 captured what you said. My question is can you,

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1 first of all, identify which stocks you're
2 referring to when you say that there are these
3 environmental effects that need to be studied and
4 understood, first, and then second, what actually
5 needs to be done to understand why there are these
6 survival declines and to get the data needed, I
7 guess, to satisfy you on that front?

8 DR. WALTERS: Yeah, the Commission has engaged Randall
9 Peterman to do a review of the stock productivity
10 trends, and he's produced a very nice picture of
11 where in the system these downward trends in
12 productivity are occurring. And he will be
13 complementing his earliest analysis with two
14 improvements, one showing the residual deviations
15 in survival variation not accounted for by the
16 Larkin model, as well as the Ricker model, and
17 he'll also be correcting a problem with use of a
18 thing called a Kalman filter, a statistical method
19 for examining the trends in the data. His early
20 reports underestimated the severity of the trends
21 so you'll see corrections on that, but my
22 recollection, just off the top of my head is that
23 it's basically all of the upper basin stocks, all
24 of the Stuart complex, to some degree the Quesnel
25 beyond what can be accounted for with any cyclic
26 dominance effects and on down. And it includes
27 some lower system stocks, too, like the Weaver
28 Creek.

29 Q Okay. So can I take it, then, from that answer
30 that the caveat that you were referring to is
31 something that we'll get more information on when
32 Randall Peterman's report is tendered in evidence
33 and he's here to talk about it?

34 DR. WALTERS: Absolutely. You know, I can go through
35 and describe stock by stock, but I think if you're
36 willing to wait for his report, he has a very nice
37 graphical way of summarizing a picture of where
38 the survival declines are occurring and which
39 stocks they're affecting.

40 Q Okay. Thank you.

41 DR. WALTERS: And the geographic organization of this
42 decline.

43 Q All right. Well, we'll wait for Dr. Peterman to
44 give us a bit more detail on that, then. And then
45 just to follow up a question that was put to you
46 -- I'm not sure if it was a direct question on
47 this, but in answer to some questions from Mr.

1 Rosenbloom, you talked about this retrospective
2 analysis of loss and Brenda Gaertner has also
3 talked to you about that just now. I just wanted
4 to be clear, the numbers that you presented, which
5 was you had done a calculation of \$200 million
6 loss in the '95 to 2009 period, plus maybe 40
7 million for 2010, those calculations were done in
8 an effort to get somebody to actually look at what
9 the real loss would be, to actually engage in a
10 full study to understand the loss, that's why you
11 did those numbers; is that right?
12 DR. WALTERS: Well, the actual numbers were done in
13 terms of numbers of fish, added numbers of fish
14 that could have been caught.
15 Q Right, but I think you indicated that it was
16 fairly rough and there was things in there that
17 you hadn't taken into account. And your point was
18 really to go to DFO, you said you went to Jeff
19 Grout, and others, and said, "Look, this is a
20 problem, you need to look at this more
21 carefully --
22 DR. WALTERS: Right.
23 Q -- and you need to take it into account." That
24 was why you did those numbers, is that right?
25 DR. WALTERS: Yeah. I've been involved in publishing a
26 couple of papers in recent years using this
27 retrospective approach to analysis of past harvest
28 management performance, and I now recommend it as
29 a critical part of every fisheries management
30 agency's practice.
31 Q Right. But you're --
32 DR. WALTERS: To go back and look at how much better
33 they could have done and to learn from that how to
34 improve their management.
35 Q All right. But the point I just want to make sure
36 we're clear on is the numbers that you talked
37 about, you're not asking our commissioner, today,
38 to rely on those as true numbers of loss, there
39 hasn't been a study that actually has quantified
40 that. You did some calculations to say, "Look,
41 it's a problem, you should look at it more
42 carefully," but you're not saying that the
43 commissioner should be relying on any of those
44 numbers that you presented here today as an
45 accurate or true measure; is that fair?
46 DR. WALTERS: No number of that kind is guaranteed to
47 be completely accurate. It involves predictions

1 ahead that are highly variable and data that are
2 -- but yeah, I think the calculations are correct,
3 but Brian Riddell is absolutely right, that this
4 needs to go through a peer review process, it
5 needs to be redone by DFO scientists using a
6 larger set of stocks and better information.

7 Q Okay. Thank you. Also, some questions were asked
8 to Dr. Woodey about the Early Entry, Late Run
9 issue and Mr. Watson asked some questions -- or,
10 sorry, Mr. Eidsvik asked some questions about the
11 experiment that was done, and I just wanted to
12 confirm whether Dr. Riddell had anything to add to
13 that discussion?

14 DR. RIDDELL: Actually, on that, I do, because I think
15 that as much as the response from Jim was correct
16 in terms of what I think they referred to as the
17 elephant in the classroom, that was not the
18 experiment and so I think we're confusing two very
19 important considerations here. The experiment
20 that I believe Carl was talking about, and Carl
21 was very involved with in the late '80s, and he
22 referred to a paper that he wrote with Jeremy
23 Collie, that was the experiment. The experiment
24 was developed to test whether we could restore --
25 not restore, but increase the production of Fraser
26 sockeye for everyone's potential use, commercial
27 fishing, First Nations, ecosystems.

28 Q This was the rebuilding strategy?

29 DR. RIDDELL: This was the rebuilding strategy. It was
30 a very deliberate set of discussions following the
31 1985 treaty and Canada, at that time, thinking
32 that we should test whether we can improve sockeye
33 production. And that experiment is why we were
34 increasing the escapements. Now, what we
35 subsequently heard from Dr. Woodey was really a
36 discussion about the way the environment changed
37 in the midst of this study. The change in the
38 sockeye biology in 1985, the change in the
39 environmental conditions in the river and the in-
40 river mortalities that we subsequently had to deal
41 with and develop the environmental watch program
42 to compensate. Through the 1990s, these changes
43 substantially increased the complexity of in-
44 season management. This became a much more
45 difficult task than had been faced previously, but
46 those are not the experiments. The experiment had
47 to go on in the face of that uncertainty. So I

1 think I agree with the way Carl described it
2 yesterday in the sense that we've done the
3 experiment, we need to move on. I absolutely
4 agree to that. We can move on to a new
5 experiment. We are not going to fix the sockeye
6 behaviour quickly, nor are we going to change the
7 conditions in the river. We're still going to
8 learn how to deal with those. So the experiment
9 and the subsequent environmental conditions really
10 are two different elephants.

11 Q Right. And the FRSSI model and the TAM rules that
12 have been created using the FRSSI model, those --
13 again, how does that relate to some of those
14 concerns that you're talking about? Because I
15 understand some of those constraints that have
16 been put in place since the '90s operate --
17 they're not independent of the escapement goals,
18 obviously, but they're not generated through the
19 FRSSI model and, in fact, the rules for harvest on
20 the Late Run are not even generated using the
21 FRSSI model, they're derived separately; is that
22 fair?

23 DR. RIDDELL: I would have to admit to being a couple
24 of years out of date on the FRSSI model, but the
25 FRSSI model last I was really involved with it did
26 try to take into account in-season -- or, I'm
27 sorry, in-season, in-river mortalities and project
28 those so it does have the capability of
29 incorporating those. It does add a great deal of
30 uncertainty in how you do the assessment, then,
31 because your success in management in a year is
32 confounded with the environmental quality of the
33 year so it still makes it more difficult.

34 Q And the experiment that you talked about in 1987,
35 the rebuilding strategy were trying to even out
36 the cycle years. The FRSSI model is not doing
37 that either; is that right?

38 DR. RIDDELL: No, the FRSSI model moves on from that.
39 This is more -- Carl described earlier today the
40 fixed escapement policy versus the fixed harvest
41 rate policy. Well, you can also have a variable
42 harvest rate policy, which is more what the FRSSI
43 model is about. What's an appropriate harvest
44 rate policy for what we want to test in the Fraser
45 and what's the best way to manage our fisheries.

46 Q All right. But the point of FRSSI is not to try
47 and even out cycle lines and build up those off-

1 cycle years?

2 DR. RIDDELL: No, unless I'm very mistaken, I don't
3 believe that that's part of the discussion at all.

4 Q All right. Thank you.

5 MS. BAKER: Does anybody else --

6 DR. WALTERS: It can make predictions about policies
7 that would reinforce cycles, but it's not an
8 objective of it to do anything like that.

9 DR. RIDDELL: Yes.

10 MS. BAKER: Is there any other panel member which wants
11 to respond to anything that's been raised in re-
12 examination? No? Thank you. Those are my
13 questions. I guess I shouldn't be sitting down
14 just yet. Sorry. So we are at four o'clock.
15 This panel has been completed. Thank you very
16 much for coming.

17 Tomorrow, we are going back to some of the
18 decision-making panels that we started earlier
19 this month and on that note, if my friends could
20 just stay after and talk to me about what you're
21 -- I'm not clear who still needs to examine the
22 first decision-making panel so I'd appreciate it
23 if you could just touch base with me on that front
24 before you leave. And then I can also make some
25 decisions about whether we can get Mr. Ryall on,
26 who is the last witness that we have on this large
27 topic of harvest management. So we may not be
28 able to complete him tomorrow, but I'd like to
29 make some judgment of that after I hear from
30 people's estimates for tomorrow's panel.

31 MR. COMMISSIONER: Thank you, Ms. Baker. Silence must
32 mean that counsel are out of questions or just
33 simply exhausted. I just want to do a couple of
34 things. I want to thank the members of this
35 panel, including Dr. Walters, who was kind enough
36 to come to us and is now leaving us. It is late
37 in Florida. I don't know whether to thank the
38 panel, or not, because we started off this
39 Commission studying sockeye salmon, it appears
40 we're now also examining and investigating
41 elephants, but I'll stick with the sockeye for
42 now. I wanted to thank all of the panel members
43 very much. I was remiss yesterday. Ken Wilson
44 was kind enough to lend us his expertise on not
45 just this panel, but an earlier panel. I think I
46 forgot to thank him, and Mike Staley, and Rob
47 Morley, and Al Cass when we completed that panel

1 so I do that now, belatedly. I apologize for not
2 doing that yesterday, and to express my deep
3 appreciation to all the panel members,
4 particularly Dr. Riddell, who seems to show up on
5 a lot of panels, but thank you again for your
6 patience. And I thank all counsel for meeting
7 your time commitments. Again, I'm very grateful
8 for that. And thank you very much to our -- oh,
9 Dr. Walters is back. I hope you'll accept our
10 appreciation, Dr. Walters. Yes. Yes. Yes, I
11 thought as much. We wished you had started
12 drinking a little earlier in the day, actually,
13 but thank you very much for being available to us
14 on this link. And I gather we're back tomorrow
15 morning again at 10:00 a.m.; is that right, Ms.
16 Baker? Yes.

17 MS. BAKER: That's right.

18 MR. COMMISSIONER: Thank you. And thank you to our
19 courtroom staff who were willing to sit straight
20 through. Thank you very much.

21 THE REGISTRAR: The hearing is now resumed for the day
22 and will resume at 10 o'clock tomorrow morning.

23
24 (PROCEEDINGS ADJOURNED TO FEBRUARY 11, 2011,
25 AT 10:00 A.M.)
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1 I HEREBY CERTIFY the foregoing to be a
2 true and accurate transcript of the
3 evidence recorded on a sound recording
4 apparatus, transcribed to the best of my
5 skill and ability, and in accordance
6 with applicable standards.
7
8

9
10 _____
11 Diane Rochfort
12

13 I HEREBY CERTIFY the foregoing to be a
14 true and accurate transcript of the
15 evidence recorded on a sound recording
16 apparatus, transcribed to the best of my
17 skill and ability, and in accordance
18 with applicable standards.
19

20
21 _____
22 Karen Acaster
23

24 I HEREBY CERTIFY the foregoing to be a
25 true and accurate transcript of the
26 evidence recorded on a sound recording
27 apparatus, transcribed to the best of my
28 skill and ability, and in accordance
29 with applicable standards.
30

31
32 _____
33 Karen Hefferland
34

35 I HEREBY CERTIFY the foregoing to be a
36 true and accurate transcript of the
37 evidence recorded on a sound recording
38 apparatus, transcribed to the best of my
39 skill and ability, and in accordance
40 with applicable standards.
41

42 _____
43 Irene Lim
44
45
46
47