

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:

Room 801
Federal Courthouse
701 West Georgia Street
Vancouver, B.C.

Thursday, April 14, 2011

Tenue à :

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

le jeudi 14 avril 2011

APPEARANCES / COMPARUTIONS

Brian Wallace, Q.C. Wendy Baker, Q.C. Maia Tsurumi	Senior Commission Counsel Associate Commission Counsel Junior Commission Counsel
Mitchell Taylor, Q.C. Hugh MacAulay	Government of Canada ("CAN")
Boris Tyzuk, Q.C.	Province of British Columbia ("BCPROV")
No appearance	Pacific Salmon Commission ("PSC")
Chris Buchanan	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")
Christopher Harvey, Q.C.	West Coast Trollers Area G Association; United Fishermen and Allied Workers' Union ("TWCTUFA")
No appearance	B.C. Wildlife Federation; B.C. Federation of Drift Fishers ("WFFDF")
No appearance	Maa-nulth Treaty Society; Tsawwassen First Nation; Musqueam First Nation ("MTM")
Sarah Sharp	Western Central Coast Salish First Nations: Cowichan Tribes and Chemainus First Nation Hwlitsum First Nation and Penelakut Tribe Te'mexw Treaty Association ("WCCSFN")
Brenda Gaertner Leah Pence	First Nations Coalition; First Nations Fisheries Council; Aboriginal Caucus of the Fraser River; Aboriginal Fisheries Secretariat; Fraser Valley Aboriginal Fisheries Society; Northern Shuswap Tribal Council; Chehalis Indian Band; Secwepemc Fisheries Commission of the Shuswap Nation Tribal Council; Upper Fraser Fisheries Conservation Alliance; Other Douglas Treaty First Nations who applied together (the Snuneymuxw, Tsartlip and Tsawout); Adams Lake Indian Band; Carrier Sekani Tribal Council; Council of Haida Nation ("FNC")
No appearance	Métis Nation British Columbia ("MNBC")

APPEARANCES / COMPARUTIONS, cont'd.

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

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1 Vancouver, B.C. /Vancouver
2 (C.-B.)
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4 2011
5

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

7 MR. WALLACE: Good morning, Mr. Commissioner. Brian
8 Wallace for the Cohen Commission. I just have a
9 short administrative matter, which is to file as
10 an exhibit the written re-examination - I think,
11 Mr. Lunn you have it - from the Government of
12 Canada. It is in a letter to the Commission dated
13 April 7th. This is left over from the WSP Panel
14 of the Regional Directors General of March the
15 4th, and at the conclusion of that day we ran out
16 of time. I indicated I had one question in re-
17 examination. On reflection, I don't. Mr. Timberg
18 indicated he had two, and there was an exchange of
19 correspondence, and the resulting letter from the
20 Department of Justice to the Commission, including
21 the two questions to the two panellists for re-
22 examination, and their answers. And I would ask
23 that that be marked as the next exhibit.

24 THE REGISTRAR: That will be marked as Exhibit 717.

25 MR. WALLACE: Thank you.
26

27 EXHIBIT 717: Canada's Written Re-Examination
28 of WSP RDG Panel (Paul Sprout and Sue
29 Farlinger)
30

31 MS. BAKER: Thank you. Mr. Commissioner, it's Wendy
32 Baker for the Commission, with Maia Tsurumi.
33 Today we have Mr. Karl English testifying in
34 relation to Technical Report 7, entitled "Fraser
35 River Sockeye Fisheries and Fisheries Management
36 and Comparison with Bristol Bay Sockeye
37 Fisheries". Mr. English will be reminded of his
38 oath. He was here earlier.
39

40 KARL ENGLISH, recalled.
41

42 THE REGISTRAR: I wish to remind you that you are still
43 under oath.

44 A Yes.

45 THE REGISTRAR: Thank you.

46 MS. BAKER: You'll recall, Mr. Commissioner, that Mr.
47 English was here in the very opening panel of this

1 Commission in the fall.

2 Perhaps we can start by marking the report,
3 and then I'll follow that with c.v.s for the
4 authors of the report. So the report has been
5 circulated to all parties and it's before you on
6 the screen. If that could be marked as the next
7 exhibit.

8 THE REGISTRAR: Exhibit 718.

9

10 EXHIBIT 718: Technical Report 7, Fraser
11 River Sockeye Fisheries and Fisheries
12 Management and Comparison with Bristol Bay
13 Sockeye Fisheries, February 2011
14

15 MS. BAKER: And then I'd like to mark the c.v.s of the
16 authors in the order they appear on the cover of
17 this report, and those c.v.s have also been
18 circulated to the parties. So I will begin with
19 the c.v. of Mr. English. And I will take him to
20 the c.v. once we finish marking all of the
21 authors' c.v.s. So if Karl English's c.v. could
22 be marked as the next exhibit.

23 THE REGISTRAR: Exhibit 719.

24

25 EXHIBIT 719: *Curriculum vitae* of Karl K.
26 English
27

28 MS. BAKER: Followed by Tim Edgell.

29 THE REGISTRAR: Exhibit 720.

30

31 EXHIBIT 720: *Curriculum vitae* of Tim C.
32 Edgell
33

34 MS. BAKER: Robert Bocking.

35 THE REGISTRAR: Exhibit 721.

36

37 EXHIBIT 721: *Curriculum vitae* of Robert C.
38 Bocking
39

40 MS. BAKER: Michael Link.

41 THE REGISTRAR: Exhibit 722.

42

43 EXHIBIT 722: *Curriculum vitae* of Michael R.
44 Link
45

46 MS. BAKER: And finally Scott Raborn.

47 THE REGISTRAR: Exhibit 723.

3
Karl English
In chief on qualifications by Ms. Baker

1 EXHIBIT 723: *Curriculum vitae* of Scott W.
2 Raborn
3

4 EXAMINATION IN CHIEF ON QUALIFICATIONS BY MS. BAKER:
5

6 Q Mr. English, you saw as those *c.v.s* were up on the
7 screen for the different authors of the report,
8 and can you confirm that those are the *c.v.s*
9 provided for the authors.

10 A Yes.

11 Q Thank you. And I'd like to then take you to your
12 *c.v.*, which is, what did we say that was, 720 --

13 THE REGISTRAR: 719.

14 MS. BAKER:

15 Q -- 719, thank you, and just review this with you.
16 You have a Masters in Zoology from the University
17 of B.C. in 1981?

18 A That's correct.

19 Q And you've worked in the area of fish science
20 through your whole career, it looks like; is that
21 correct?

22 A That's correct.

23 Q You have prepared numerous publications and
24 reports and those are outlined in your *c.v.*; the
25 publications being on page 6, and the reports are
26 set out beginning on page 8. And if I could just
27 review some of the project reports. You've
28 prepared reports on the commercial sockeye salmon
29 fishery in B.C. for the Marine Stewardship
30 Council?

31 A That's correct.

32 Q That was in 2010?

33 A Yes.

34 Q You've also been involved in studies looking at
35 radio telemetry for in-season assessment of
36 sockeye returns in the Fraser system?

37 A Yes.

38 Q You were an author of a Tsawwassen First Nation
39 Post-Season Fisheries Report in 2009.

40 A That's correct.

41 Q You have done work on review of salmon indicator
42 streams and estimating escapement, catch and run
43 size for conservation units?

44 A Yes.

45 Q You have looked at feasibility of fish wheel use
46 for escapement estimation and looked at results
47 from salmon radio tracking on the Lower Fraser.

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1 A That's correct, yes.

2 Q You've looked at river entry, timing survival and
3 migration behaviour of Fraser River sockeye.

4 A Yes.

5 Q You've looked at in-river migration behaviour and
6 survival of summer-run sockeye caught and released
7 in the Lower Fraser.

8 A Yes.

9 Q And many other topics. You've compared the
10 Canadian-Alaska sockeye stocks harvested in the
11 Northern Boundary area.

12 A Yes.

13 Q Your c.v. sets out obviously many more projects
14 than I've highlighted, and many more, and you have
15 articles on the topics that I've just reviewed
16 with you. You've had publications published on
17 those topics, as well?

18 A Some of them, yes.

19 MS. BAKER: Okay. Mr. Commissioner, I would ask that
20 Mr. English be qualified as an expert in fisheries
21 management and stock assessment.

22 THE COMMISSIONER: Yes, thank you.

23 MS. BAKER: Thank you. So I'll just review the report,
24 Project 7, which has now been marked as Exhibit
25 718. First of all, your report, if I can just
26 provide a bit of an overview, it deals with four
27 -- oh.

28 MS. GAERTNER: Ms. Gaertner. I just have a question on
29 the expertise.

30 MS. BAKER: Oh, all right.

31 MS. GAERTNER: I'm not doubting the expertise in any
32 way, Mr. Commissioner. I'd just like to
33 understand what we mean by "fisheries management"
34 in that expertise. Are we talking about the
35 management by DFO, or in which type of expertise
36 are we talking about.

37 MS. BAKER: Mr. Commissioner, I propose that Mr.
38 English be qualified as an expert in fisheries
39 management, science generally, and of course in
40 particular to sockeye in the Fraser system and in
41 Alaska.

42 A Did you want me to respond --

43 MR. TAYLOR: I'm not sure that he's limited to the
44 Fraser and Alaska.

45 MS. BAKER: No, I didn't say that. I said generally
46 and in particular Fraser and Alaska.

47

5

Karl English

Cross-exam on qualifications by Ms. Gaertner (FNC)

Ruling on qualifications

In chief by Ms. Baker

1 CROSS-EXAMINATION ON QUALIFICATIONS BY MS. GAERTNER:

2

3 Q Mr. English, you're aware that aboriginal people
4 have many forms of management; is that correct?

5 A That's correct, yes.

6 Q And are you in any way suggesting that you have
7 expertise in their forms of management?

8 A I work with aboriginal fisheries managers, and as
9 I have with federal and provincial fisheries
10 managers, so but I'm not a fisheries manager, per
11 se. I have worked with those people and studied
12 their fisheries, but I certainly don't profess to
13 know all the First Nation fisheries management
14 strategies. They're very diverse across the
15 province.

16 MS. GAERTNER: Thank you, Mr. Commissioner.

17 MS. BAKER: Mr. Commissioner, can I take this witness
18 as qualified?

19 THE COMMISSIONER: Yes.

20 MS. BAKER: Thank you.

21

22 EXAMINATION IN CHIEF BY MS. BAKER:

23

24 Q Mr. English, your report deals with four broad
25 topics, if I can just set the context for it, and
26 I would describe these as, and I'm asking you to
27 confirm this or provide your own summary, but I
28 understand your report to deal with fisheries
29 harvesting on the Fraser, fisheries management on
30 the Fraser, fisheries harvesting and management in
31 Bristol Bay, Alaska, and then a comparison of the
32 Fraser and Bristol Bay fisheries.

33 A That's correct, yes.

34 Q I'd like to start with the first part of your
35 report, which deals with fisheries harvesting.
36 And again I understand this section deals with the
37 accuracy, precision and reliability of catch
38 estimates in the Fraser system, and also impacts
39 of non-retention fisheries; is that right?

40 A That's correct, yes.

41 Q Thank you. So beginning with the catch estimate
42 portions of your report, at page 21 you begin
43 dealing with this topic. And there's a table on
44 page 21, Table 2, which sets out just a useful
45 summary, if I could just start with that and ask
46 you with reference to the conclusions that are set
47 out in that summary, what was the methodology that

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1 you used in performing your analysis?

2 A So the first step here was to provide a definition
3 of the terms, "accuracy", "precision" and
4 "reliability", because those have different
5 meanings to different people. So on subsequent or
6 the previous page, I'm not sure which page it's
7 actually on.

8 Q That's 17?

9 A Yes, 17, where the three definitions are provided.
10 The important aspect here under "Fisheries
11 Harvesting" is that we actually don't know the
12 true value of the catch, true number of fish
13 caught. They are all -- all the numbers for most
14 fisheries are estimates. Some are certainly more
15 reliable than others.

16 So in terms of definition for accuracy, we
17 looked at that in terms of the degree that
18 managers are confident in that the catch reported
19 reflects the actual harvest. And it's often that
20 we have fisheries on a relative basis, so accuracy
21 is really focusing on whether the estimates are
22 biased or not. So if they're relatively unbiased,
23 you have a good estimate. If they have some known
24 biases, then they get a lower rating for terms of
25 accuracy.

26 Precision typically is looking at the
27 variance around the catch estimate, how precise we
28 actually know what that estimate is in a
29 statistical sense. However, for a lot of
30 fisheries estimates of precision are not provided
31 or available, and, however, for ones where you're
32 getting a complete count through a census type
33 program, the precision would be very high, as
34 would the accuracy.

35 And then reliability was looked at in terms
36 of the degree to which managers can rely on the
37 catch estimates for in-season and post-season
38 assessment. And we used the similar ratings
39 there. The most important to note is that while
40 an estimate could have a known bias, it says here,
41 it could still receive a higher rating, a medium
42 rating for reliability if the direction of that
43 bias is known. So that individuals are aware,
44 that managers essentially are aware that it is an
45 underestimate or an overestimate of the catch.

46 Q Okay. So that explains those three terms. What
47 else was important to the methodology being used

- 1 to assess the catch monitoring.
2 A So from there we looked at methodologies used in
3 the different catch monitoring programs, and any
4 reports that we could obtain which actually
5 described those methods, the numbers of samples
6 taken, the numbers of surveys conducted. And also
7 in the table it presents an indication of the
8 relative size of each of these fisheries during
9 the 2001 to 2009 period, so roughly a portion of
10 the total catch.
11 Q Okay. So that's again looking at Table 2 on page
12 21.
13 A That's correct, yes.
14 Q All right. So if you can just summarize what your
15 results found with reference to this table.
16 A So for the period noted there, and more details
17 are provided further on about different periods,
18 but for 2001 to 2009 being the most recent period,
19 we found that within the First Nation fisheries
20 that estimates for food, social, ceremonial catch
21 were rated as good accuracy, unknown precision in
22 terms of statistical estimates of precision, and
23 medium reliability. For the economic opportunity
24 harvest, for reasons that we can get into a bit
25 later, it was rated similar in terms of accuracy,
26 higher in terms of precision, and higher in terms
27 of reliability.
28 Both the commercial and recreational
29 fisheries were rated as fair in terms of accuracy,
30 and unknown or unavailable in terms of precision,
31 medium in terms of reliability.
32 The selective fisheries, which include
33 fisheries that are targeting specific species and
34 often are live capture fisheries, and frequently
35 they have a requirement for 100 percent observer
36 monitoring or dockside reporting, so they have
37 higher degree of accuracy, precision and
38 reliability.
39 And the systems in the U.S., Alaska and
40 Washington, were also rated as higher in terms of
41 accuracy, precision and reliability, as were test
42 fisheries.
43 Q And the selective fisheries that you note there,
44 that's a component of the Canadian commercial
45 catch; is that right?
46 A Yes.
47 Q Okay. Now, I'd like to just go through each of

1 these, and fairly quickly if we can, just to
2 outline the significant conclusions that you
3 arrived at. The first area that you talk about is
4 the First Nation fisheries, which again begins on
5 page 21, as you see. And I think perhaps if we
6 could go to page - I've got my page number wrong
7 here - page 25, this sets out a table which breaks
8 the fisheries down into a more detailed level.
9 And also I'll just flag for you Tables 6 and 7.
10 And I think if we can focus on those tables, those
11 are found at pages 29 -- or, sorry, they're both
12 on page 29. So if we look at Table 4 and Tables 6
13 and 7, perhaps you can just review what your
14 conclusions were with respect to starting with FSC
15 fisheries.

16 A All right. So for FSC fisheries, as you can see
17 in the table, this was divided into three
18 different strata if you like, or areas: the
19 marine fisheries, the fisheries in the Fraser
20 River below Sawmill and fisheries above Sawmill.
21 The reason for the separation within the Fraser is
22 they're different fisheries management situations
23 below and above Sawmill, mostly related to the
24 economic opportunity fisheries which occur below
25 Sawmill.

26 The terms of the summary of the findings,
27 again for this 2001 to 2009 period, the marine and
28 Lower Fraser fisheries were rated as good in terms
29 of accuracy, unknown regarding precision, and
30 medium in terms of reliability.

31 A slightly lower rating was provided for
32 fisheries above Sawmill, and that's primarily
33 related to the difficulty in monitoring extensive
34 fisheries over a large area with, in some cases,
35 much lower levels of effort. So encountering
36 fishermen and obtaining samples is much more
37 challenging in the upper river.

38 And then lastly the economic opportunity
39 fisheries were rated better, certainly for the
40 period as it's noted in the footnote 2004 to 2009,
41 and than in the previous periods. But they're
42 given a higher rating because of the requirement
43 for the fish to be landed at a specific landing
44 site with complete enumeration or landing sites, I
45 should say, not a single site.

46 Q So the first part of Table 4, which sets out the
47 FSC fisheries, there's more detail on that, I

1 think in reference to Tables 6 and 7, perhaps we
2 can turn there, page 29, and you can explain what
3 data you reviewed and what the catch monitoring
4 methods are that are relevant to these fisheries.

5 A Yes. So here we have two different periods noted,
6 1992 to 2000 and then 2001 to 2009. There isn't a
7 similar table for prior to 1992 because in 1992
8 was when the Aboriginal Fisheries Strategy program
9 kicked in and a lot of effort, a lot more effort
10 was put into catch monitoring and working with
11 First Nations to improve catch monitoring
12 programs.

13 So in the early period here there was, you
14 know, a lot of the fisheries methodology were
15 being developed, a lot of individuals were being
16 trained and get experience, so the reliability of
17 the numbers was less than in the latter period.
18 The distribution of the catch between marine
19 fisheries at Lower Fraser and Upper Fraser, so
20 below and above Sawmill also has changed, you can
21 see in the table. And this also reflects the
22 portion of the catch taken in these fisheries
23 versus other First Nation fisheries.

24 Q And what are the monitoring methods currently
25 being used in the First Nation fisheries, FSC
26 fisheries, in the current period?

27 A So they're a combination of effort estimates, but
28 I guess it varies between the areas. So in marine
29 fisheries it's done by reporting. Essentially the
30 First Nations report their catch numbers obtained
31 from interviewing and talking with their
32 fishermen, and providing those to DFO. In the
33 Lower Fraser there's a variety of methods used to
34 try and generate estimates. Certain First Nations
35 do a complete enumeration of their FSC catch
36 through interviews with all their fishermen.
37 That's in the case of groups like Tsawwassen. And
38 others, there's a combination of aerial over-
39 flights to count effort, and interviews to get
40 catch per effort estimates and generate an
41 estimate which is independent of the total catch
42 reporting for the fishermen on a voluntary basis.

43 And similar methods are used upstream of
44 Sawmill. There they have a combination of aerial
45 counts, on-water counts, shore-based counts using
46 trucks to estimate effort, and then interviews
47 again to estimate catch per effort.

- 1 Q Thank you. The economic opportunity fisheries, you
2 touched on that earlier with Table 4, but that is
3 dealt with in more detail in your report beginning
4 at page 33. And if I can again take you to --
5 you've done another summary of the economic
6 fisheries, which is at page 36, Table 10. Again
7 could you in the same way review the conclusions
8 of that you've set out, including the catch
9 methods, monitoring methods that are used for the
10 economic fisheries?
- 11 A So here we have the two different periods or three
12 different periods identified: pre-AFS, when there
13 essentially isn't information on First Nations
14 catch portion; the early AFS programs in 1992 to
15 2003, where there had fisheries occurring for both
16 FSC and commercial purposes at similar times,
17 essentially not a complete separation as in the
18 period after 2004; and the methods used since the
19 beginning of AFS was to require fish that were
20 landed for commercial purposes or either through
21 the pilot sales or economic opportunity fisheries
22 to be landed at specific landing sites and
23 enumerated at those sites.
- 24 Q Okay. And then lastly in this section at Tables
25 11 and 12 you set out specific tables with respect
26 to Musqueam, Tsawwassen and Sto:lo fisheries.
27 What's the significance of this data in relation
28 to the reliability of catch estimates?
- 29 A All right. So you can see in this table there is
30 columns that refer to allocations, and the
31 allocations are defined or not defined, depending
32 on whether there's an agreement with those First
33 Nations. And there's columns associated with the
34 catch estimates for each of the years. For the
35 period prior to 2003, there are I think generally
36 agreements in all those years, but the separation
37 of the catch between FSC and sales is not as
38 reliable as post that period. But the total catch
39 estimates are believed to be pretty reliable for
40 the periods, and improving, as I said before,
41 because the catch monitoring programs evolved and
42 improved steadily since the '92 initiation of the
43 Aboriginal Fisheries Strategy program. In --
- 44 Q So -- sorry, go ahead.
- 45 A Sorry. In years without agreements, there isn't
46 an allocation, so and in some years there wasn't
47 an actual estimate obtained, as you can see in

1 2003.
2 Q So the 2004 period and following that, where you
3 see the allocation broken into FSC and sales, that
4 correlates with the earlier table, Table 10, where
5 you have your data broken into early AFS, '92 to
6 '03, and then recent AFS, 2004 to 2009.
7 A That's correct.
8 Q Okay. So that you said that the total catch
9 estimates you consider to be reliable. There may
10 be inaccuracies between the two columns, FSC and
11 sales, but the total is considered to be reliable?
12 A Yes. As you can see, there is large fluctuations
13 from year to year in the numbers of fish that are
14 in either the FSC or sales columns, and those are
15 clearly not reasonable, given what we know about
16 the fisheries. So the suspicion is that it's not
17 being appropriately assigned in those specific
18 years.
19 Q But the total for the year for that --
20 A Yeah.
21 Q -- First Nation is correct or reliable.
22 A Yeah, it's certainly the most reliable and
23 improving over time.
24 Q Okay. Thank you. Now, moving to commercial
25 fisheries, that section in your report begins at
26 page 39, and there's a lot of detail in this
27 section, and in the interests of time we're going
28 to go through this fairly quickly.
29 I'd like to start with Table 14, which is on
30 page 42. This sets out a summary of the different
31 commercial catch areas and gear types, again with
32 the quality of catch estimates for those different
33 gear types and areas set out. Can you provide an
34 overview of the monitoring and estimates for each
35 of the fisheries.
36 A Yes. I think the first point I'd like to make is
37 that this again covers the 2001 to 2009 period.
38 Prior to '98 a lot of the estimates for commercial
39 catch were derived from sales slip programs and
40 since then they've been derived from a variety of
41 other programs, including on-water gear counts,
42 logbook programs, phone-in data, on-water hauls,
43 dockside monitoring and occasional observer
44 programs. So it's changed quite dramatically from
45 earlier years to the more recent timeframe. So
46 this table is referring to the 2001 to 2009
47 period.

1 In terms of the different fisheries, you can
2 see that the net fisheries, whether they're in
3 Area 20 with seine nets, or gillnets in Area 29,
4 or a combination of gear in Areas 11 to 16, they
5 were given a fair rating and with medium
6 reliability. The rationale for that is that for
7 most of those fisheries and most of this period,
8 compliance rates for phone-in reporting and were
9 relatively low in the 10 to 25 percent of the
10 fishermen providing phone-in records. And the
11 lack of catch validation at landing sites for most
12 of that period.

13 Q Can I interrupt for a moment. I wonder if you
14 could, before we get into the results, just using
15 this as a touch point, explain what the different
16 monitoring programs are, catch monitoring programs
17 are in the different fisheries, and then we can
18 maybe move to the conclusion, so there's a context
19 for that.

20 A Sure. For the net gear, the programs that are
21 currently used are related -- use a combination of
22 these aerial counts or on-water gear counts at the
23 beginning of fisheries. These fisheries are often
24 contained to a few days, so -- and possibly a
25 single day. So there's a gear count. And then
26 the on-water hauls, phone-in data, logbook data,
27 are combined to get catch per effort, and so the
28 catch per effort is applied to the total effort to
29 generate a catch estimate.

30 For troll fisheries they are distributed over
31 a much longer period of time often, and so they'll
32 get a gear count of trollers at the same time as
33 they're doing a count for seiners or gillnetters.
34 But they won't be doing gear counts every day, so
35 there'll be an estimate of the number of trollers
36 active. They might also use other information
37 from contacting directly the trollers in an area
38 to determine the number of boats active. And then
39 again using the haul data and phone-in data to get
40 catch per effort information.

41 I started off talking a bit about the
42 compliance rates. The compliance rates for
43 trollers are much better, and that's why you see a
44 higher rating on this scale of fair, good to very
45 good for accuracy, and higher in terms of
46 reliability.

47 Q And then the last fishery is the selective

- 1 fishery.
- 2 A Okay. And so for selective fisheries, as
3 indicated earlier, there's a requirement for 100
4 percent either dockside monitoring of catches, or
5 observers on board in these fisheries to validate
6 the catches, so it receives the highest rating.
- 7 Q In 2010 dockside monitoring was introduced into
8 certain commercial fisheries. Can you describe
9 which fisheries were the subject of dockside
10 monitoring, where those fisheries -- which
11 fisheries that was implemented in, and what the
12 impact that dockside monitoring had on catch
13 estimates in those fisheries?
- 14 A So 2010 it was a requirement for both seine and
15 troll fisheries, and it was a requirement for 100
16 percent dockside monitoring in those fisheries,
17 and in the Lower Fraser gillnet fishery, and in
18 fisheries, I guess, also in Johnstone Strait,
19 there was 35 percent requirement, requirement to
20 have dockside monitoring represent 35 percent of
21 the catch.
- 22 Q And what did that impact, or does that impact the
23 reliability of the catch estimates?
- 24 A Yes. 100 percent dockside monitoring obviously
25 should vastly improve the estimates of catch
26 versus, you know, no dockside monitoring, and is
27 generally the approach used in other fisheries to
28 really improve the reliability of catch.
- 29 Q And did the experiment in 2010 with dockside
30 monitoring change any of your assessment or impact
31 of the assessment that you have in Table 14 on the
32 quality of catch estimates?
- 33 A No, because the period is for 2001 to 2009.
- 34 Q Okay. How long would you need to have dockside
35 monitoring in place at the 100 percent to change
36 your assessment of the quality of catch estimates?
- 37 A Well, I think for whatever years it's done for, it
38 would -- should immediately change the quality of
39 the catch information.
- 40 Q Okay. Just while we're in the commercial fishery
41 section, on page 43 of your report, the very first
42 paragraph on that page, you'll see about halfway
43 through the paragraph a reference to an "FOS"
44 system. What does that FOS refer to?
- 45 A That's Fisheries Operational System, Fisheries
46 Operations System.
- 47 Q And what is a Fisheries Operations System?

- 1 A It's the program that DFO currently uses to
2 accumulate all the information on effort,
3 estimates, from the various commercial fisheries,
4 and catch per effort estimates from either
5 fisheries officer hails, phone-in programs,
6 logbooks, any sources of those information. It's
7 also used to organize catch information from other
8 fisheries now.
- 9 Q I'd like to move to recreational fisheries, which
10 is page 48 in your report is where you begin that
11 discussion. And on page 50 in Table 16 you set
12 out the "Estimates of Fraser Sockeye harvested in
13 Canadian recreational fisheries" and you have the
14 percentage, which is defined as the recreational
15 catch. Is that on this table, is that percentage
16 calculated against the total Canadian and U.S.
17 catch, or against the Canadian catch only?
- 18 A It combines both Canadian and U.S. catch.
- 19 Q Have you done a calculation to see what the
20 percentage would be against the Canadian catch
21 only?
- 22 A Yes, I have.
- 23 Q And does it change the outcome in that column?
- 24 A It does change the numbers, obviously, they all go
25 up slightly because in most years the U.S.
26 fisheries catch some Fraser sockeye.
- 27 Q Does it significantly chance the numbers in that
28 column?
- 29 A No, it's fairly small. It's usually a percentage
30 or a percentage and a half different.
- 31 Q Okay. So has the -- on your calculation has the
32 recreational catch ever exceeded five percent of
33 the total Canadian catch?
- 34 A Not in these years using the data I have.
- 35 Q Turning the page to page 51, Table 17. Again, can
36 you review the results and review also what the
37 catch monitoring program is for the recreational
38 fisheries as shown on this table?
- 39 A So here we have three different areas in tidal
40 waters. Tidal waters being for the -- in the
41 context of the Fraser, everything below the
42 Mission Bridge and to the marine environment. And
43 non-tidal waters, most of the fishery occurs for
44 sockeye between Mission and Hope, B.C.
- 45 In the tidal waters that is the Georgia
46 Strait, creel survey has been conducted since the
47 early 1980s, and I have a fair bit of experience

1 with that, since we conducted the survey from '86
2 through to about '99. The estimate, there's a
3 column there shows the estimate of the portion of
4 the recreational catch of sockeye that is coming
5 from each of these fisheries, so you can see that
6 in this time period, 2001 to 2009, Georgia Strait
7 fishery only represented five percent of the
8 catch, Johnstone Strait two percent, West Coast
9 Vancouver Island less than one percent. So it's
10 showing up here as a very small amount. And then
11 most of the fishery is occurring in the Fraser
12 River, between Mission and Hope, most of the
13 recreational fishery.

14 The methods used to estimate catch are
15 similar in Georgia Strait and Johnstone Strait.
16 However, the level of effort applied in those two
17 areas varies and can vary quite significantly
18 between years. The effort estimate is derived in
19 a similar manner to I think what you've already
20 seen for the Lower Fraser, in that people do
21 aerial flights over the strait, count numbers of
22 boats fishing, sport fishing, and then interview
23 people at landing sites to get information on
24 catch per effort, and those two things are
25 combined. They use activity patterns to figure
26 out whether they're seeing a large portion of the
27 effort, or a smaller portion and expand the effort
28 appropriately.

29 The precision estimates for -- that are
30 available for Georgia Strait are pretty broad,
31 depending on the year, and even broader if you
32 look at for specific statistical areas, parts of
33 the fishery. And the reason for that is that
34 sockeye are not the primary target for most of the
35 marine fishery, marine sport fisheries. They're
36 targeting chinook and coho primarily. And
37 there's quite a variability in the efficiency of
38 the anglers that fish, so you get variability in
39 catch per effort. Some really know how to catch
40 sockeye and a lot of people don't.

41 The result of that, plus the fact that
42 there's relatively small catch compared to the
43 target species, means that the sample sizes are
44 poorer, so the estimates are only given a fair in
45 terms of accuracy, but a medium in terms of
46 reliability, because the fishery, you know, catch
47 monitoring for Georgia Strait has good coverage of

1 the entire area and time when sockeye are caught.

2 Lower ratings for Johnstone Strait because of
3 the lower effort and difficulties with complete
4 coverage.

5 West Coast Vancouver Island is much more
6 difficult because assessing what portion of the
7 sockeye in that area are associated with the
8 Fraser versus other stocks they can catch. Most
9 of the catch out there is for Barkley Sound
10 stocks. So the reliability estimates for Fraser
11 are much less.

12 And then in the Fraser River itself, they're
13 using aerial flights and angler interviews spread
14 out over a wide area. The ratings there were
15 somewhat lower, mostly because there's a huge, a
16 large amount of the catch in some years is fish
17 that are released, and so the numbers, you're
18 relying on angler recall for the numbers of fish
19 they've caught and released. You can't actually
20 examine the numbers released when you interview a
21 person, they only have the fish they retained.

22 Q The numbers that the catch estimates that we see
23 on here for those non-tidal water recreational
24 fishers that you just described, does that just
25 reflect, then, the caught and retained fish, or
26 does it also include the caught and released fish?

27 A I think those numbers are just the retained fish.

28 Q And I'm just not sure if creel surveys have been
29 defined yet in the hearings, and I wonder if that
30 might be something you could just quickly do here.
31 Is it the same as angler interviews, or could you
32 just give us a shorthand for what that means.

33 A Yeah, I use the term because that was the name
34 given to the program used in Georgia Strait for
35 years. Strictly speaking is directly related to
36 interviews, so you're talking with people and
37 you're examining their creel. People used to put
38 their fish in a creel when it started. In these,
39 when it's referred to as a particular program,
40 like the Georgia Strait Creel Survey Program, it
41 includes all the other elements of aerial surveys
42 and effort counts. So it's more than just
43 interviews.

44 Q Okay. On page 53 and 54 you discuss a study that
45 you were involved in 2002, which recommended
46 certain changes to the catch monitoring program.
47 And in your report at the top of page 54, you

1 state that:

2
3 It is unknown if all of these
4 recommendations...

5
6 You set out six recommendations:

7
8 It is unknown if all of these recommendations
9 were implemented but, as mentioned
10 previously, the precision of the estimates of
11 sockeye salmon for GSCS has declined since
12 1999.
13

14 And I wonder if you could just review what you did
15 in that work and what the recommendations are, and
16 whether you have any more information now about
17 whether they've been implemented.

18 A Yes. So at the end of our involvement with the
19 Georgia Strait Creel Survey we prepared a report
20 for the years prior to 1999, or including 1999 and
21 before, and that was published in 2002. And in
22 that it contained I think it was six
23 recommendations. Some related to just the effort
24 that we thought was appropriate to obtain reliable
25 estimates for either catch per effort or what we
26 refer to as activity patterns, the pattern of
27 fishing activity over the day. It also proposed
28 some changes to estimation methods to make them
29 more robust. And some logistical suggestions with
30 regard to how the estimates should be reviewed by
31 people familiar with the survey.

32 So I did subsequent to preparing this report,
33 we were able to talk with the people currently
34 doing the program and confirm that they are
35 targeting the numbers of interviews, and
36 conducting analysis in a manner consistent with
37 recommendations 1 and 2 in that report. The only
38 caveat there is the issue of budgets and whether
39 there's funds to carry out the work in all the
40 areas.

41 There's some question about the current, how
42 much of the analytical changes had been
43 implemented. There's been reviews since this
44 report was prepared that have suggested some other
45 changes to the estimation procedures. The degree
46 that those have either compensated for the same
47 issues or been done in addition to these is yet to

1 be determined. And the current program has -- the
2 programs that we wrote have been revised in what
3 they refer to now as the CREST system. Don't ask
4 me what CREST stands for because I don't want to
5 answer that, but it's a system that they use to do
6 the programming which allows the managers more
7 flexibility in selecting information that they
8 think is most reliable to get the estimates. So
9 some of those recommendations that we had related
10 to that are incorporated into the new CREST
11 system.

12 Q Non-retention fisheries, you mentioned this in
13 your discussion of recreational fisheries just now
14 that there's a proportion of the recreational
15 catch which is released. And if I can take you to
16 that section of your report, it begins at page 56.
17 If you can just describe for us what non-retention
18 fisheries are.

19 A Okay. So we have two types of examples of non-
20 retention, those where a fish is physically caught
21 and then released because it's of a species that's
22 not permitted to retain, or in the case of
23 anglers, the individual has exceeded or achieved
24 their bag limit so they can't retain any more of
25 that species.

26 And then there's the types of non-retention
27 where the gear doesn't retain fish. So in the
28 case of a gillnet, for example, the fish may
29 encounter it, the fisherman doesn't get to the
30 fish in time, so the fish escapes that gear and is
31 not retained by it, so it escapes capture.

32 Q Okay. And that second type that you've described,
33 is that in your report you call it "net fallout".
34 Is it also called "dropout"? We've heard that
35 term.

36 A Yes.

37 Q Okay.

38 A Net dropout.

39 Q And what was the methodology that you followed in
40 your analysis of the effects of non-retention
41 fisheries?

42 A So for non-retention fisheries we did a review of
43 the -- this was done by some of the individuals
44 who have done extensive work on the physiology and
45 stress of fish, there was a number of references
46 regarding the work that has been done recently on
47 the effects of handling, capture and handling on

- 1 the survival of sockeye. And then we looked at
2 some of the initial results from studies that have
3 been conducted in the last few years, specifically
4 in the Lower Fraser where fish are captured,
5 tagged and released, or tagged and held and
6 released. And also information from sockeye
7 telemetry studies that have been conducted from
8 2002 to 2009, which provide information on the
9 timing, location of en route losses as well as
10 portions that don't make it to the spawning
11 grounds.
- 12 Q And is there a particular fishery where non-
13 retention issues are of most importance for Fraser
14 River sockeye?
- 15 A Yes. So the catch and release side of the non-
16 retention, that's the Lower Fraser recreational
17 fishery, is the place where most of that occurs.
- 18 Q And is there any significance of the non-retention
19 fishery in relation to the total allowable
20 recreational catch?
- 21 A Yes. In four out of the last six years the
22 releases of sockeye in the Lower Fraser
23 recreational fishery have exceeded the retained
24 catch. I say the last four to six -- six years,
25 the years I'm referring to is 2004 to 2009.
- 26 Q All right. And why does that matter if the fish
27 have been released?
- 28 A Well, if the fish are released in healthy
29 condition, been handled well, the temperatures are
30 not too high, then there's a good chance they'll
31 continue their migration and hopefully spawn. If
32 those things are not true, then you could end up
33 with a number of those fish dying before reaching
34 the spawning grounds.
- 35 Q In Table 18 on page 60 of your report sets out
36 some information with respect to survival rates.
37 If you could review that information.
- 38 A Yes. So this is a study that has just been
39 recently published, as you can see, by Donaldson
40 et al, in 2011. And it provides information on
41 the short-term, so up to 24 hours after capture,
42 survival up to 48 hours after capture, to 96 hours
43 after capture, and then results of tracking radio
44 tagged fish from the -- caught using the different
45 gear, from the release site to the spawning
46 grounds, or to areas close to the spawning areas
47 for these stocks that they were tagged.

1 There's three different capture methods and
2 handling approaches, if you like. There's beach
3 seine -- just two capture methods, really, beach
4 seines and angling. And then some of the fish
5 were retained in a net pen for recovery, thinking
6 that it would -- actually it might help in the
7 recovery of the fish. It obviously didn't.

8 Q Yes. So if you can just explain the results of
9 the study.

10 A Okay. So for a short-term survivorship, whether
11 it's caught with a beach seine or angling, it
12 appears to be pretty high. You can see the
13 percentages are over 95 percent survive that
14 immediate period. They start to drop just within
15 the first 48 hours, and further in the 96 hours.
16 And then the portion of the fish that actually go
17 from the release site to the spawning grounds is
18 substantially lower.

19 The difference between the gear start to
20 appear the further -- or to become more dramatic
21 the further you go up, further from the release
22 site. And by the time you're getting to the
23 spawning grounds, you're seeing 52 percent of the
24 fish that were released from beach seines have
25 made it to the spawning grounds or areas, and 36
26 percent from angling, and only two or three
27 percent from those that were held in a net pen.

28 Now, it's also important to note here is that
29 there is a number of things that go on between the
30 release site in terms of other fisheries, and
31 other environmental factors. So these should be
32 used as -- viewed as relative values, not absolute
33 values that are specifically associated with that
34 particular gear type. There's other things that
35 can happen to the fish. Some of these fish could
36 readily have been caught by other fisheries en
37 route.

38 Q All right. What kind of scientific work has been
39 done on post-release mortality associated with
40 freshwater gear types across the different fishing
41 sectors for Pacific salmon?

42 A Can you repeat the question, sorry.

43 Q Yes. I'm looking at page 57 of your report, the
44 first paragraph on that. I'm asking you what
45 scientific information there is in the community
46 on post-release mortality associated with
47 freshwater gear type.

1 A Well, there is not, as it says in the report,
2 there is not a lot of information. That's one of
3 the reasons for this study that was quoted here.
4 There's an ongoing research program that has been
5 funded through NSERC, and it's a program, it's a
6 collaborative effort between Carleton University
7 and UBC to actually examine the post-release
8 mortality for fish caught using a variety of
9 different gears. The recent stuff, which I just
10 talked about, plus the information from fish that
11 have been radio-tagged from either tangle netting
12 or caught using fish wheels, also provides
13 additional information on survivorship post-
14 release.

15 Q You say in your report that there is:

16
17 ...little research to quantify levels of
18 mortality or to understand the mechanism
19 underlying mortality in order to better
20 mitigate or prevent mortality.
21

22 What do you mean by that?

23 A Well, that's specifically getting issue of that we
24 need more information, especially under the higher
25 stress conditions with warming temperatures in the
26 river. If you're going to conduct fisheries that
27 are having additional stresses on fish that are
28 being released, then you need to take that into
29 account when you're opening those fisheries, the
30 timing of those fisheries, and the location of
31 those fisheries.

32 Q All right. And what are the implications then to
33 fisheries management of non-retention fisheries,
34 catch and release fisheries.

35 A Well, I think it's what I said, is both the
36 fishers and the managers need to consider the
37 impact of their fisheries on the stocks they're
38 targeting or releasing in some of these cases,
39 during periods when these fish are stressed,
40 either because of high temperatures or flow
41 conditions in the river.

42 Q All right. And on page 61 in the middle paragraph
43 you make the statement, you say:

44
45 While there is little that can be done about
46 annual water temperatures or difficult
47 passage points, it is possible to minimize

1 cumulative effects environmental and fishery
2 related factors by disassociating the timing
3 and location of in-river fisheries from these
4 other stressors.
5

6 And is that a summary of the point you were just
7 making?

8 A That's correct, yes.

9 Q Okay. Is that being done now, that there is an
10 awareness of mortality impacts in terms of fishing
11 plans and recreational fishery openings?

12 A I think there's a growing awareness and
13 consideration of these in the plans for fisheries
14 in the last few years.

15 Q Okay. The next section that I wanted to take you
16 through in your report deals with fisheries
17 management. In this section, which begins at page
18 63, you address pre-season forecasts, in-season
19 run size assessment, escapement enumeration,
20 escapement targets, over-harvesting, and Cultus
21 Lake recovery efforts.

22 I'd like to start with pre-season forecasts.
23 What methodology did you follow in assessing pre-
24 season forecasts used presently by the Department
25 of Fisheries and Oceans?

26 A So the first step was to examine the types of
27 models and methods that were used for the pre-
28 season forecasting, and then to obtain the data,
29 essentially the estimates of what the forecasts
30 were for each year prior to the fishing season,
31 and then compare those with the return that was
32 tallied up at the end of the year.

33 The difference in our analyses for evaluating
34 pre-season forecasting compared to those for the
35 catch monitoring that we just talked about is that
36 we actually know what the value is that's trying
37 to be estimated. Although we might not know
38 exactly how many fish truly returned in a given
39 year, we know that we're trying to estimate what
40 the number is that we're tallying up at the end of
41 the year. So that was viewed as the true value
42 that we're trying to estimate, and we compare the
43 forecast with those post-season values. And --

44 Q Okay. Sorry, go ahead.

45 A Sorry. And we did that using two primary tools, a
46 regression analysis, which I can describe, and
47 estimates of absolute percent error, so the amount

1 that the forecast differed from the actual return.
2 Q And the page that's on the screen in front of you,
3 underneath the indented paragraphs about the
4 fourth line down, it says:

5
6 The Fraser River Sockeye Spawning Initiative
7 (FRSSI) process uses forecast of adult
8 returns for each of the four run-timing
9 groups to define the target harvest rates for
10 each group.

11
12 We have spent some time talking about the FRSSI
13 process and the FRSSI model in these hearings, and
14 I just want to be clear here you're not -- are you
15 suggesting that the FRSSI computer model is in any
16 way the same as the pre-season forecast computer
17 model?

18 A No, the FRSSI model is not the same as the pre-
19 season forecast model. They might use similar
20 stock recruitment analyses as some of their
21 options, but they're not the same model.

22 Q Okay. And what, turning to page -- looking, I
23 guess, still at page 63 at the bottom, what were
24 your conclusions about the reliability of the pre-
25 season forecasts as being explanatory of actual
26 returns?

27 A Okay. So the forecast for the total return to
28 Fraser sockeye in a given year, so at that level
29 that's combining all the different stocks and run-
30 timing components. As explained, 44 percent of
31 the year-to-year variability in returns, this
32 leaves more than half of the variability
33 unexplained. So it's accounting for not all the
34 variability. The percent error in the forecast
35 for most of the Fraser stocks is high compared to
36 some of the other fisheries, specifically Bristol
37 Bay sockeye fishery, and that's described sort of
38 later in the report.

39 Q And do you draw any inference from that?

40 A Yes. So there's the more detailed inferences come
41 with trying to look at the components of the
42 stock, not just at the overall estimates for the
43 Fraser, and that was done using this regression
44 analysis. The important thing, regression
45 analysis is relating the returns over time to the
46 forecasts over the same period. So what you're
47 looking for there -- I don't know whether it's

1 possible to put up one of the appendices. I can
2 show what the relationship looks like.
3 Q Yes. If you can just tell us the page number.
4 A Okay. So in one of the appendices back here, we
5 could put up the one for the overall Fraser, which
6 is I think the first one on page G-2. So it's
7 Appendix G, page 2.
8 MR. LUNN: Is there a page number for that?
9 MS. BAKER: No, there's not, I'm sorry. It's about
10 halfway through the appendices. I don't know
11 where that is. Sorry.
12 A You've got to go find "G". All right, It's got to
13 be close there. Yes, G-2.
14 Q There we go. Perfect.
15 A So these are done on a logarithmic scale and you
16 have the forecast on the lower axis and the
17 return, the estimated return for each of the years
18 on the "Y" axis, the perpendicular axis. And what
19 we were doing is looking to see if there is
20 significant relationship between these two values.
21 The important things that are being examined are
22 the "R" value, so whether it's significant or not.
23 The "P" value there indicates whether it is
24 significant. So you can see it's much less than a
25 .05 level, which would typically be used for
26 evaluating significance. So it's a significant
27 relationship.
28 The other things we examined, whether the
29 slope is significantly different than zero. If it
30 was zero, the slope of that line would be
31 horizontal. So that the reason why that's
32 examined is to see whether when we forecast more
33 fish, that more fish actually return. So there's
34 a relationship between the two values. And then
35 also look to see whether the intercept, where this
36 line intersects with the "Y" axis, the vertical
37 axis, is significantly different than zero. And
38 all those things tell you about the quality of the
39 relationship between forecasts and the return.
40 Q Okay. I wonder if we could go to page 77 of the
41 report, and on this page you have a figure that
42 sets the year-to-year variation in returns, as
43 explained by the forecast.
44 A So here it is displaying the R^2 value, so this is
45 the degree to which those points you saw in the
46 last line are tight to the curve, so that -- or
47 the lines are not differing a lot and you have a

1 significant relationship or not. So where there
2 is an asterisk over the column, it indicates that
3 the relationship is statistically significant, and
4 the height of the bar indicates the R^2 value. So
5 the higher the bar, the better the relationship.

6 On the very far right you have the Fraser
7 River as a total, so all component stocks
8 combined. The next four bars on the right are for
9 each of the run-timing groups, and then the bars,
10 the remainder bars are colour-coded according to
11 the different run-timing groups. So the dark bars
12 are for Late run fish. The clear bars are for
13 Summer run. The shaded bars are for Early
14 Summers, and then the one with the diagonal
15 hatching is for Early Stuart. So you can see the
16 Early Stuart component is identical in both the
17 far left and in the right graph, because it is
18 just one stop.

19 Q And in the text that follows this table you say
20 that the:

21
22 ...forecasts for all run-timing groups were
23 deemed to be statistically significant, since
24 they tracked the patterns of rise and fall in
25 the actual returns for the period 1980 to
26 2009.

27
28 That's correct?

29 A That's correct. Yes. But there is quite a
30 difference in the R^2 value in the level of
31 confidence you have in the relationship between
32 these variables, between what we see for Late
33 Summer and Early Stuart a much higher R^2 value than
34 we do for the two Summer time groups.

35 Q Right. And the table that follows, Table 21, is
36 this an analysis of those run-timing groups in a
37 bit more detail?

38 A Yes, that provides the other statistics from the
39 regression analysis and also provides the MAPE,
40 which is the median absolute percent error. So
41 that gives you an indication of how variable the
42 points are around the line. The slope is what you
43 look at to see if that value is close to 1. so
44 slopes that are close to 1 are more reliable
45 relationship or more useful relationship to ones
46 that are further away. And then the regression
47 intercept, that's whether it intersects "Y" axis

1 at a point significantly different than zero or
2 not. So for every one of these cases the
3 intercepts are not significantly different than
4 zero and the slopes are significantly different
5 than 1.

6 The most, the reason for the poorer
7 regression values for -- sorry, the "R" value for
8 the Summer time groups, and also Early Summers,
9 they are slightly different. To go back to the
10 previous graph, I can maybe describe it better
11 with that up. So you can see that some of the
12 Summer time groups have a high R^2 and significant
13 R^2 where two of them don't, they're non-significant
14 and low, Chilko and Stellako. So they're
15 resulting in, you know, much less reliable
16 forecasts. And it's particularly noteworthy
17 because the Chilko stock contributes on average
18 about 24 percent to the total return. So that's a
19 significant difficulty when the forecasts are low,
20 low in terms of R^2 . And for the Early Summer
21 forecast, because the components of the stock are
22 relatively small and three of the eight stocks,
23 you can see the shaded bars, are non-significant
24 relationships. That's the reason for the overall
25 timing group to have a lower R^2 .

26 Q Right.

27 A Plus these fish are distributed throughout the
28 whole watershed, as opposed to some of the other
29 ones that are more confined in parts of the
30 watershed.

31 Q The table that we were just looking at, Table 21,
32 I just wanted to draw your attention to the title
33 or the caption. The third line down it says:

34
35 Proportional size of CU relative to total
36 Fraser return...

37
38 Is that really supposed to read:

39
40 Proportional size of run-timing group
41 relative to Fraser return...

42
43 A That's correct. The CUs are provided in the
44 appendix.

45 Q Okay. And the "Return Explained by Forecast (R^2)"
46 column on this table is what we see in Figure 10
47 that we've just been looking at, the 44 percent,

1 76 percent, et cetera, that's the -- if we go back
2 to Table 10, that's the values you see on the
3 right-hand side of that table?

4 A That's correct.

5 Q Okay. And then is there a relationship, does this
6 tell the whole story, or do we need to also look
7 at what the information is Figure 9, which is page
8 76, the page previous to this?

9 A Yes. Now, this figure was provided because the
10 regression analysis doesn't tell the whole story.
11 It's very important for the management of
12 resources to have a small error, or a small
13 difference between the forecast and the return.
14 And you can see from this graph that it shows the
15 distribution of estimates over this period, that
16 from 1980 to 2009, and it's summarized in what's
17 called a box and whiskers plot.

18 The box defines the space between the 25th
19 and then the 75th percentile, so the middle 50
20 percent of the estimates falling within those --
21 that box. The line is the median, so it's 50
22 percent of the estimates are below that line, and
23 50 percent of the estimate are above that line.
24 And the whiskers extend out to either the lower
25 fifth percentile or the upper 95th percentile. So
26 the length of these whiskers, now some -- in order
27 to be able to see this on a graph, the scale was
28 limited to 1 to 350 percent of the estimate. You
29 can see the values at the top of some of those
30 lines extend to as high as 844 percent, or 882, I
31 guess the highest for Portage.

32 So there have been obviously returns that
33 vary very substantially from the forecast. And
34 this becomes most graphic in the comparison
35 between these values and the ones for Bristol Bay,
36 which we'll talk about later. But it shows pretty
37 clearly that there's a fair bit of uncertainty
38 associated with the estimates, both for individual
39 stocks and for the different timing groups.

40 Q Does whether a stock is a cyclic stock, or a
41 strongly cyclic stock, versus a non-strongly
42 cyclic stock have any impact on the reliability of
43 the forecast?

44 A Yeah, what we see in most cases with the more
45 cyclic stocks, if you go back to the other graph,
46 the other plot, so you can see it in both, but
47 I'll start here. The Late Shuswap stock and the

1 Quesnel are two of the most cyclic stocks, and
2 also Early Stuart is a somewhat cyclic stock, but
3 not as extreme as the other two, we have higher R^2
4 and this is because the range of returns is very
5 large. So you get a better regression, if you
6 like, if you have a larger range of returns, and
7 you can distinguish between, you know, the small
8 years and the big years based on those cycles.

9 The other thing that it does is if you go
10 back to the previous graph, Figure 9, you could
11 get for Late Shuswap, for example, if you are --
12 if you mis-estimate a very small return, but you
13 could easily do it by three or four times.
14 Whereas virtually all the large returns for Late
15 Shuswap would be well within the box. So the
16 length of the whisker or the length of the line is
17 more determined for that stock and for Quesnel by
18 the returns in the off-cycle years, in the small
19 years.

20 Q Just to finish this section and then I guess we'll
21 take the break. But if I could ask you to turn to
22 page 80 of the report. Your final paragraph in
23 the section -- oh, no, back up. Stop. You say at
24 the last sentence really that:

25
26 Importantly, our trend analysis is based on
27 historical data and may have limited ability
28 to predict the future reliability of
29 forecasts for a particular stock, especially
30 if changing environmental conditions
31 undermine the utility of even the best
32 performing pre-season forecasts based on
33 historical data, yet another reason why pre-
34 season forecasts are of little use in the
35 management of Fraser sockeye and many
36 southern B.C. salmon stocks.

37
38 And earlier in that paragraph you note that
39 managers rely on in-season information in the
40 Fraser system to manage the stocks. So I just
41 have a couple of questions about that. First, is
42 it reasonable for managers to rely on in-season
43 information to manage fisheries, first of all.

44 A Yes, it's both reasonable, safer and a more robust
45 approach.

46 Q Okay. And do you think pre-season forecasts could
47 be made more accurate so that managers didn't have

- 1 to rely as heavily on in-season assessments?
2 A Yes, they probably could be made more accurate,
3 but they would need to still rely on in-season
4 assessments, mainly for the reason that the
5 forecasting is all based on information you have
6 from the past, and the information that you really
7 need is what's going to happen in the future, or
8 what's going to happen in the specific year in
9 question. So you need that in-season information.
10 Q All right. Do you think that the pre-season
11 forecasts are of use to -- that pre-season
12 forecasts, maybe not these ones, but pre-season
13 forecasts as a concept are of use in managing the
14 Fraser sockeye system?
15 A Yes, I think you need to have something to work
16 with for the pre-season planning for, you know,
17 setting initial fishing plans. But those fishing
18 plans need to be robust to substantial changes in
19 the returns, because that's going to happen.
20 Q So you agree that there -- we did hear in this
21 Commission testimony from fisheries managers, both
22 at the Department of Fisheries and Oceans, and
23 from the Pacific Salmon Commission, that they did
24 use pre-season forecasts, and they described the
25 value that they put on those forecasts. And it
26 sounds like you're agreeing that there is a role
27 for pre-season forecasts in management; is that
28 right?
29 A Yes, there is definitely a role for it.
30 Q Okay. So how do you think your -- do you think
31 there should be a different way of using pre-
32 season forecasts or a different way of generating
33 pre-season forecasts that would be better used in
34 the Fraser system than what's being done now?
35 A Yeah, I think that it's the amount of resources
36 spent doing the forecasts versus some of the other
37 tasks that might need to be done by in many cases
38 the same analysts. So I personally recommend that
39 forecasts be done expeditiously so people don't
40 spend a lot of time with them. They have a
41 number. They know they're going to -- managers
42 are going to not pay a lot of attention to that
43 number for in-season management. They've used
44 that number for planning, but then get on with the
45 tasks of doing some of the other work, like
46 defining benchmarks for the CUs that will require
47 some of the -- a lot of the same analysis and

1 effort, and would be a far more useful expenditure
2 of the time and energy.

3 Q So how would you recommend the pre-season
4 forecasting process as it's currently being done
5 to be changed.

6 A Well, to the extent that -- and I don't know
7 exactly how long it takes to go through that
8 process, but to the extent that it could be made
9 simpler or done very efficiently, so that there's
10 a number that people could use for the planning,
11 recognizing that it's going to be changed in-
12 season, and the focus should be on more robust
13 management systems, so that you can respond to
14 changes in-run.

15 Q All right. Do you recommend that they continue to
16 assess the best fit model pre-season, or, sorry,
17 stock recruitment model each year for each stock?

18 A Well, that's one area which has been examined in
19 Alaska. We may talk a bit about it in a review of
20 the Bristol Bay fishery. But there is a different
21 approach to evaluating the models every year.
22 There's quite a number of models, as you can see
23 in this report, that have been used. And there's
24 quite a number of times they shift, and there's
25 often -- for most stocks, there's rarely the same
26 model used in successive years, whereas in Bristol
27 Bay they tend to use the same model that has had a
28 good result for the last three years, at least, if
29 not more.

30 Q This is probably a good time to take a break. So
31 I just wanted to leave with you, are there any
32 other comments you would make on pre-season
33 forecasts before we take the break?

34 A No, I think that pretty much covers what I was
35 hoping to say.

36 MS. BAKER: Thank you. Mr. Commissioner, could we take
37 the morning break now.

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

40
41 (PROCEEDINGS ADJOURNED FOR MORNING RECESS)
42 (PROCEEDINGS RECONVENED)

43
44 THE REGISTRAR: The hearing is now resumed.

45
46
47

1 EXAMINATION IN CHIEF BY MS. BAKER, continuing:
2

3 Q Now, Mr. English, when we broke, we had just
4 finished pre-season forecasts. Now I'd like to
5 look at end-season run size estimates. And I
6 should say we're moving through your report very
7 quickly and certainly, the report is taken as read
8 and everything that's contained within it is
9 evidence in the hearing. I'm just trying to go to
10 the high points as we move through. There's a lot
11 to cover. So looking at in-season run size
12 estimates, can you just explain what methodology
13 you used in this section?

14 A Sure. So here we looked at obtaining the
15 information that was available for in-season
16 forecasts for recent years. This extended back to
17 1997. So '97 to '99, we obtained estimates of
18 forecasts made in season for each day or each
19 period that the forecast applied to, and then, of
20 course, the final in-season forecast, it amounted
21 to 13 years, so 13 points per day was what we were
22 using, essentially, as the analysis. I've been
23 asked by some to liven this up a bit so it's sort
24 of like --

25 MS. BAKER: I told Mr. Rosenbloom that if you crack any
26 jokes, it's coming off his time, just so you know.

27 A Oh, okay. This is kind of like, you know, what
28 people were thinking in September, October with
29 regard to the Canucks and those in-season
30 forecasts might not have been as optimistic as
31 they are now in the post-season, but right now,
32 we're right at the what we would call the final
33 in-season forecast and it's looking promising, but
34 anyway, that's the nature. I'm not sure how many
35 times they make forecasts for the hockey teams in
36 season, but they do it a lot for sockeye.

37 Q Okay. And I think it's typically described as an
38 estimate in season, they don't use the language
39 "forecast" as often; is that fair?

40 A Yes, in-season forecasts referred to here are in-
41 season estimates, the returning run size.

42 Q Okay. And just a couple of minor points. On page
43 81 of your report, you have a paragraph that has
44 some information that's very similar to what shows
45 up on page 84. So before we move, if you see,
46 halfway through this paragraph, there's a line
47 that reads:

1
2 The accuracy of in-season run size estimates
3 tend to be biased high (i.e. forecasts larger
4 than runs) with low precision, 25 to 78-
5 percent error.
6

7 Do you see that line?

8 A Yes, I do.

9 Q And then if you turn to page 84, you'll see
10 virtually the same language in the third full
11 paragraph, but the difference is that the
12 percentages in that range I just read off are
13 different, and I just wanted to get you to explain
14 that. So the first line there, says:
15

16 The accuracy of in-season run size estimates
17 tend to be biased high (i.e. forecasts larger
18 than runs) with low precision, 50 percent to
19 78-percent error.
20

21 And in the previous page, it says 25 to 78-percent
22 error. Can you just tell us what's going on
23 there?

24 A Yeah, the value, or the numbers on this page
25 you're looking at right now are the correct ones.
26 The previous page was not corrected between the
27 draft on the final report. And when we did the
28 final report, we had to respond to some comments
29 from reviewers that wanted to see the estimates
30 calculated for the percent error done slightly
31 differently so we went back and redid the analysis
32 of it. And the previous was an overview for the
33 section, was not updated.

34 Q Okay. So on page 81, we should just stroke out
35 the "25 percent" and replace it with "50 percent,"
36 is that right?

37 A That's correct, yes.

38 Q Okay. And one other small correction, on page 82,
39 under "Cumulative Normal Models" --

40 A Yeah?

41 Q -- the very last line of that first paragraph
42 says:
43

44 Particularly important is the determination
45 of whether Summer Run sockeye are delaying
46 off the mouth of the Fraser.
47

1 Is that right?

2 A No, that should be Late Run sockeye.

3 Q Thanks. All right. So --

4 A That was put in to see if the biologists were
5 reading the report. And very good, the lawyer
6 caught that one. Three biological reviewers
7 missed it.

8 Q So in this section, you deal with an explanation
9 and a review of the in-season estimation done for
10 the Fraser system, and at the end, if I can just
11 ask you what your conclusion is, are the in-season
12 estimation methods presently employed on the
13 Fraser system sufficient to manage the fisheries
14 to meet management objectives?

15 A Yes. And generally, as stated on page 85, however
16 there are significant challenges associated with
17 the Late Run timing group and the achievement of
18 management goals for specific indicator stocks or
19 CUs. So those shouldn't be ignored. For example,
20 the variable delay in Late Run stocks in lower
21 Georgia Strait makes it difficult for the total
22 run size and available harvest to be determined
23 for marine fisheries. So the other timing groups
24 move more consistently between the marine test
25 fishing sites and the Fraser River site at Mission
26 so they can get a better handle on the size of
27 those returns in season, whereas the Late Run
28 timing group, as evidenced from the returns last
29 year, you know, there's more uncertainty once they
30 passed the test fishing sites as to exactly how
31 many there are, until we get to see them at
32 Mission.

33 Q Okay. I think I'm going to leave that section.
34 It's clearly written and the conclusion is as
35 you've just described.

36 Moving to escapement enumeration, again,
37 what's the methodology that you used in assessing
38 escapement enumeration methods?

39 A So first of all, we looked at both the in-season
40 escapement estimation methods and the post-season
41 monitoring program and assessed it with regard to
42 the accuracy, precision and reliability of the
43 estimates on a relative basis because here again,
44 like with catch, we don't know what the true value
45 is. We can be pretty confident in areas where
46 there's a complete ability to count all the fish
47 past the counting fence, but those are few and far

1 between. There's a lot of places where we use
2 other methods to try and get a precise estimate.
3 When I say "we," I mean the people actually doing
4 this work, Department of Fisheries and Oceans, but
5 we don't know the true value.

6 Q Table 22 sets out the results of your analysis.
7 That's on page 89. If you could just review the
8 results there.

9 A Yes.

10 Q And maybe also comment on why it's broken into two
11 different timeframes.

12 A Yes, the first point is that there are two
13 different time periods, that the second time
14 period from 2006 to 2009, we received detailed
15 information from Keri Benner, who works with DFO
16 at Kamloops from the annual escapement reports for
17 all the years in that period. We didn't get those
18 for all the years between 1980 and 2005, but there
19 was a review done, it got completed and published
20 by Schubert and Houtman in 2007, that described
21 the evolution and the most significant
22 developments with regard to escapement estimation
23 during that period, for most of that period. That
24 report was discussing the returns most
25 specifically to the 1998 returns. So the coverage
26 between '98 and 2005 is less good for either that
27 report or the information we obtained from DFO.

28 The three primary different methods for
29 estimate escapement, market capture, fence counts
30 and visual surveys. Market capture methods are
31 essentially you put a tag on a fish close to the
32 spawning grounds, either within the spawning
33 river, or adjacent to the mouth of it and then
34 look for recaptures in dead pitch survey, so the
35 carcass is examined, fished for tags, and use a
36 variety of different models to generate a
37 population estimate. It's considered to be a
38 reliable method in the Fraser as long as they can
39 apply lots of tags to the returns. The fence
40 counts, these are they put a weir across the river
41 and count the fish through the weir, either
42 visually or using DIDSON technology, acoustic
43 technology, in more recent years.

44 And then there's where it could be largely
45 done from the ground, walking along the streams,
46 counting fish in spawning areas and enumerating
47 the dead fish. Also, it's done from the air for

1 some streams so there are aerial surveys.

2 The reliability of these methods is good or
3 likely good, depending on how well they can apply
4 the marks. Essentially, the reliability's high.
5 The accuracy is good or likely good for market
6 capture and fence counts. There is a number of
7 reports that indicate that the visual surveys are
8 likely biased low. And there are estimates of
9 precision associated with the market capture
10 estimates. The fence counts, as long as it's a
11 complete count, would have very high precision,
12 and the visual surveys tend to be unknown or
13 undocumented precision.

14 Q And what is your overall conclusion on the
15 reliability of sockeye escapement estimates on the
16 Fraser system?

17 A The methods, you know, in all the areas that I've
18 looked at and done escapement monitoring and
19 directed programs elsewhere, they seem appropriate
20 for the types of runs that they're enumerating,
21 and the application of the methods, themselves, is
22 as good as anywhere else in B.C.

23 Q Okay. I'd like to move now to escapement targets,
24 which begins on page 99 of your report. Now, is
25 it fair to say that in this section, while you do
26 briefly describe the FRSSI process, your focus is
27 primarily on commenting on what you see as a
28 preferred method of setting escapement targets?

29 A Yes, primarily the need to define both lower and
30 upper benchmarks for each stock, as well as the
31 specific escapement goals. What is the number of
32 spawners you would like to have for a particular
33 population.

34 Q Okay. All right. And what were your objectives
35 and what was the methodology that you used in
36 addressing this issue?

37 A So information has been provided through the
38 review of Fraser sockeye that was done for the
39 Marine Stewardship Council's certification of
40 Fraser sockeye and that provided information on,
41 essentially, limit. What is referred to in that
42 process is limit reference points and target
43 reference points. These could be similar to lower
44 benchmarks and upper benchmarks, but not
45 necessarily identical. And that information was
46 compiled from those submissions that were provided
47 by DFO and compared with the historical escapement

- 1 data for the 1960 to '99 period. That's what the
2 graphs are, yeah, 1960 to 2009, sorry, period.
3 And as well as a four-year moving average of the
4 escapement values.
- 5 Q Okay. And on page 101, you have some discussion
6 about the four-year average, and you described
7 some concerns you have with using a four-year
8 average as an escapement goal for cyclic stocks.
9 And because we've heard quite a bit about FRSSI
10 already in the hearings, I just want to clarify
11 with you, do you agree that the FRSSI model uses a
12 four-year average as an interim lower benchmark,
13 but it doesn't actually use that four-year average
14 to directly set the escapement goal?
- 15 A The lower benchmark is not the escapement goal.
- 16 Q Okay. And the FRSSI model takes into account the
17 cyclic nature of stocks by using the Larkin stock
18 recruitment model; is that fair?
- 19 A It does and has used a variety of stock
20 improvement models to take into account both
21 cyclic and non-cyclic stocks.
- 22 Q Okay. And your discussion on page 101 and over to
23 102, is it fair to say that in this section, this
24 is reflecting your view that rather than using a
25 process which allows an escapement goal to vary
26 with run size, which is what the FRSSI model does,
27 in your view, fisheries managers would be better
28 served in using a fixed escapement goal for each
29 cycle line of a stock?
- 30 A Yeah. So the issue here is the definition of the
31 actual escapement goal, what value you're
32 targeting for a specific stock. And for non-
33 cyclic stocks, you might have a single escapement
34 goal that would apply to all years. And whereas
35 ones for cyclic stocks, you might have a higher
36 goal for the on cycle, and a lower goal for the
37 off-cycle stocks, that these escapement goals set
38 in this context, what I'm referring to, would be
39 based and have a biological basis based on the
40 capacity of the spawning area and rearing capacity
41 of the lake-type stocks, or the spawning ground
42 capacity for river-type stocks. And the ability
43 of managers to achieve these goals, obviously,
44 would be largely dependent on the returning run
45 size, but the goal would not change just because
46 the run size is small or large.
- 47 Q And why do you think that that -- sorry, before I

- 1 ask that question, a fixed escapement goal, that's
2 how that escapement setting method is described,
3 it's the same goal for that stock no matter how
4 big the run size gets, right, it's just that
5 number?
- 6 A Yes.
- 7 Q Okay. And why do you say that is a better way to
8 set escapement goals?
- 9 A Well, it gives the managers a very clear target so
10 that people can evaluate whether they're achieving
11 that goal on a year-to-year basis, or headed
12 towards that goal over time, recognizing that in
13 any one year, you might not achieve that goal
14 because there may not be sufficient returns to
15 achieve that goal.
- 16 Q Okay. And what about for users, how would a fixed
17 escapement goal work for users of the resource?
18 Would there be any difference?
- 19 A No, because the people's access to the resource
20 will be determined by the management strategies
21 that were discussed with them when you're setting
22 the fishing plans.
- 23 Q Okay. What about other values? Are there other
24 values that may be supported by escapements larger
25 than a fixed escapement goal? So for example,
26 using FRSSI, where the escapements may increase
27 with run size, does that increased escapement
28 support other values, like habitat enhancement
29 values, for example?
- 30 A Sure, there could be other reasons why you might
31 decide that you would allow for escapements or
32 target escapement levels that were higher than the
33 biological goal for a specific stock that was
34 based on a rearing capacity or a spawning-area
35 capacity, but managers need to, and users need to
36 be cognizant of the fact that there could be other
37 implications of exceeding a biologically-based
38 escapement goal.
- 39 Q All right. Would protecting co-migrating stocks
40 at risk be a reason why you might exceed a fixed
41 escapement goal?
- 42 A That's correct, that's one.
- 43 Q In your report, you suggest that escapement goals
44 need to be clear and easier to understand. Is
45 your view that the escapement goals set through
46 the FRSSI process, and as currently implemented by
47 the Department are not understood by the actual

- 1 managers of the Fraser River system?
- 2 A Well, I cannot speak for the managers. I'm sure
3 some of them understand them very well and others
4 might not, but I do hear from a number of the
5 people associated with the groups that harvest
6 Fraser sockeye that they don't understand, they
7 have misunderstandings, or don't understand the
8 FRSSI process, don't know what the escapement
9 goals are for various stocks, or why those
10 escapement goals change from year to year, or
11 between cycles and non-cycles.
- 12 Q All right. So you're reflecting a concern that
13 the users may not understanding the goal setting
14 using the FRSSI model, is that primarily what
15 you're talking about?
- 16 A Yeah, and the importance of having understanding
17 not just within the management system when you're
18 managing people, you're managing the fisheries,
19 the people who are impacted and need to know why
20 decisions are being made.
- 21 Q Right, but the manager is the actual fisheries
22 managers who allow for openings based on an
23 ability to meet the escapement goals that are set
24 through FRSSI, you're not commenting on their
25 ability to understand the FRSSI goal-setting
26 process?
- 27 A Well, I can't comment on what their perception
28 might be of this particular process because
29 there's a large number of them and different ones
30 may have different opinions.
- 31 Q All right. I'd like to move on to your section of
32 your report on over-harvesting. That begins on
33 page 111. What was the method that you used in
34 addressing the potential of over-harvesting from
35 1995 to the present as set out in the Statement of
36 Work?
- 37 A So for the over-harvesting component, we focussed,
38 as it mentions in there, not on the impacts, but
39 the evaluation of whether there might have been
40 periods when over-harvesting occurred. They did
41 it looking at each of the different run timing
42 groups and looking at run size, trends, and
43 exploitation rate levels. So figure 22 on page
44 116 is the relevant figure. And these show four
45 charts where abundance is on the left axis and
46 exploitation rate is on the right axis of the
47 numbers, at least. And the dark line is the trend

1 in exploitation rate. The blue bars are the
2 returning run size for each of the different
3 timing groups in each of the years.

4 Q On page 113, you sort of review the extent of
5 potential for over-harvesting in the different run
6 timing groups and for your first paragraph, you
7 talk about the Early Stuart Run, and partway that
8 paragraph, you say, about halfway through:

9
10 With declines in recruits per spawner
11 starting in the mid-1980s, it's likely that
12 some degree of over-harvesting occurred
13 during the 1984 to 2000 period.

14
15 Can you explain that? How did you arrive at that
16 conclusion?

17 A There ought to be a correction in there that it
18 was in the early '80s, late '70s that there was
19 quite a dramatic reduction in recruits per spawner
20 so just slightly before the mid-80s, if you like,
21 and this was from some of the analysis that
22 Randall Peterman reported on in his 2010 report
23 from a workshop and activities, I think at the
24 Pacific Biological Station. That was the end. If
25 you go back to the graph, I can show you the high
26 exploitation rates on Early Stuart, it's on page
27 116. And so if we can just focus in on the Early
28 Stuart graph. It's in the top left-hand corner on
29 this page. And you can see that harvest rates
30 from 1960 through to the early 1980s, '83,
31 roughly, I can see it better now, are very high.
32 And this is a pattern you can see for a lot of the
33 run timing groups. The harvest rates in this
34 period were much higher than what they have been,
35 obviously, in recent periods and pretty high for
36 sockeye stock, not just the Fraser stock.

37 There is a period, looking in the late '70s
38 and early 1980s when productivity is dropping for
39 this particular stock, but the harvest rates were
40 not being adjusted as quickly. And so those high
41 harvest rates probably resulted in some level of
42 over-harvesting during that period. Plus just the
43 harvest rates, probably, throughout that period at
44 least through 1960 to the late '70s were probably
45 holding this stock down and once the harvest rates
46 dropped, you can see that the returns during the
47 mid to late '80s and through the '90s for the

1 various run timing groups were actually higher at
2 somewhat lower harvest rates, on average,
3 exploitation rates, sorry.

4 Q And then for maybe each of the run timing groups,
5 you can just comment on whether you saw evidence
6 of over-harvesting in the different run timing
7 groups. So maybe you can move to the next graph.

8 A Yeah, so if you flip to the Early Summer group
9 next, so that's across, here, you have a situation
10 where, again, the exploitation rates from 1960 to
11 a little bit later, to the early '90s, are fairly
12 high, averaging over, I think, 75 percent
13 exploitation rate. And once the exploitation
14 rates were reduced, in the mid '90s, and have been
15 held lower, we've seen an increase in the run
16 size. Now, it's also going to be a function of
17 marine productivity, but this suggests that the
18 exploitation rates may have been a little bit high
19 early in this period and not allowing this stock
20 to grow to levels that we have seen in some of the
21 years in the '90s and early 2000s.

22 Other figures, if you go to Summer, so we
23 don't see as -- we have high exploitation rates,
24 again, through from 1960 to the early 1990s, but
25 what we also see is that the dominant cycle for
26 Summer Runs had built up even through these high
27 exploitation rates, and then subsequently has
28 declined, even though exploitation rates have
29 dropped. So it appears like these populations,
30 and certainly the major contributing ones, are
31 more being determined by productivity, both
32 freshwater and marine factors, other than the
33 exploitation rates, alone. And then you have the
34 Late Run, which is the next one to the right,
35 again, there's a very cyclic pattern. This is
36 driven largely by the Shuswap Lake, or,
37 essentially, by the Shuswap Lake sockeye returns,
38 Adams River, and Lower Shuswap, being the major
39 ones. And the runs building through this period,
40 despite these pretty high exploitation rates, and
41 then exploitation rates dropping in the mid-90s
42 and we don't see, you know, a massive increase.
43 We're seeing, again, the returns on the cycle
44 years largely being the dominant returns for this
45 stock. And they're within the range of the
46 historical average, even at reduced exploitation
47 rates.

- 1 Q Thank you. I'd like to move to the Bristol Bay
2 analysis, and that section begins at 125 of your
3 report. And you do a detailed analysis of the
4 Bristol Bay fishery, looking at, basically, the
5 same aspects that you looked at for the Fraser
6 system, and then you followed that with a
7 comparison between the Bristol Bay fishery and the
8 Fraser system, correct?
- 9 A That's correct, yeah.
- 10 Q What I'm going to do, I think, today, is go
11 directly to the comparison section just as a touch
12 point to go through your evidence, and we may go
13 back into the details periodically, but I think
14 we'll use the comparison section just to go
15 through the questions, and that begins at page 62
16 (sic) of your report.
- 17 A Mm-hmm.
- 18 Q 162, sorry. Now, the first topic that you deal
19 with is management structures, and if you could
20 just describe for us the significant differences
21 between the Bristol Bay fishery and the Fraser
22 fishery.
- 23 A Yes. So on the management side, and I should make
24 the point here that this part of the report was
25 prepared by Michael Link and Scott Raborn.
26 Michael Link works in the Anchorage office for our
27 company, and Scott actually works out of
28 Louisiana, but he travelled up to Alaska and has
29 worked with Michael on a variety of these projects
30 in Bristol Bay. And so their knowledge is
31 obviously much more in depth than mine, and if you
32 need to drill deeper than what I can provide, you
33 can always try to tap into those guys.
- 34 Q You have your own knowledge, though, of the Alaska
35 fishery; is that fair?
- 36 A Yeah. No, and I've talked with them and discussed
37 this with them for quite a while. I think I
38 probably can -- I'm certainly familiar with what
39 they wrote here and was involved with editing and
40 trying to clarify a lot of the points.
- 41 Q And do you have your own experience with the
42 Bristol Bay fishery, as well as what you've read
43 in this report?
- 44 A I don't have direct experience with the Bristol
45 Bay fishery. I have not worked with managers in
46 that fishery, myself, no.
- 47 Q But you are familiar with that system?

1 A Yes.

2 Q Okay.

3 A So what's identified here in the management
4 section as the key difference is, obviously, with
5 the Fraser system, we have a Salmon Treaty that is
6 very active with the Pacific Salmon Commission in
7 the management. We have a very complex situation
8 where you've got to balance the domestic and the
9 international commitments. In Bristol Bay, it's
10 entirely within the United States and under their
11 jurisdiction so they don't have the same
12 complexities as would be the case in the Fraser.

13 There is a Fraser Panel, which you've
14 probably heard all kinds of details on already,
15 but they're ones that do a lot of the in-season
16 decision making and discussions, providing
17 recommendations and, essentially, managing the
18 fishery.

19 In Alaska, the Commissioner of Alaska
20 Department of Fish and Game delegates full
21 management authority for the four management areas
22 in Bristol Bay to these area management biologist.
23 So that's a really important distinction, is that
24 they bring people in specifically to take on the
25 tasks. They're going to be experienced people,
26 people that they have a lot of history working
27 with and understanding, and their job is to make
28 the decisions, get the advice they need, but their
29 authority is very high for making decisions in
30 each of their respective districts in season. So
31 it's a much less complicated management process
32 and decision-making process in Bristol Bay than in
33 B.C.

34 Q And why is that significant? In terms of
35 practical differences on the ground in B.C., what
36 difference does it make?

37 A Well, I guess there's -- the other thing you
38 should note is the Bristol Bay fishery is a much
39 shorter duration fishery so decisions often have
40 to be made more quickly because if they don't,
41 they're going to miss the fish and so that's
42 another reason for having this system where they
43 put a lot of faith and responsibility in a few
44 individuals to make decisions.

45 The degree to which decisions can be made as
46 quickly down here is the function of the degree
47 that there's agreement between the parties that

1 are all part of the panel, Fraser Panel
2 discussions, and slightly to create some delays in
3 decision making and a lot more effort to make
4 decisions in season.

5 Q Do you have any actual knowledge of delays in
6 decision making on the Fraser system?

7 A Well, you see that there -- if you read the
8 various in-season updates, there is discussion and
9 conclusions that they're not going to adjust the
10 run size, they're not going to do this until a
11 little later point. And to the extent that that's
12 because there isn't agreement with all the groups,
13 or if they just don't have enough data, I'm not
14 privy to those occasions, but I do know that from
15 the way they described the Alaska, or the Bristol
16 Bay system in specific, it has the capability with
17 an individual, on a matter of a few hours' notice,
18 can open or close any of these fisheries based on
19 the information they're provided and their
20 concerns about abundance of returns.

21 Q Okay. I think it's important to understand the
22 difference between the two river systems, and I
23 think if we turn to page 29 of your report, you
24 have a map of the Bristol Bay fishery, and we've
25 all seen maps of the Fraser system so we can
26 probably hold that in our memories, and maybe you
27 can, using this map, explain --

28 MR. LUNN: Sorry, Ms. Baker, which page?

29 MS. BAKER: 129.

30 MR. LUNN: Ah, thank you.

31 A Yeah?

32 MS. BAKER:

33 Q Can you just describe the differences between the
34 Fraser system and what we see in Bristol Bay in
35 terms of the fisheries, itself, what the river
36 systems are and what --

37 A Yeah. So the most graphic and fundamental
38 difference is that there are a number of separate
39 districts here identified. There's the five
40 districts, they're in purple, and they have a
41 variety of sockeye-producing rivers or river
42 systems within those districts. And the vast
43 majority of the catch that is taken in Bristol
44 Bay, certainly, in the most recent years, occurs
45 within those district boundaries that are seen --
46 that go across the mouths of the bays associated
47 with each of the different districts. And this

- 1 allows for less mixed stock harvesting than,
2 clearly, on the Fraser, where you've got runs from
3 a variety of different populations, but they all
4 have to travel through the same fisheries.
- 5 Q In the Fraser system, there's a significant marine
6 fishery that would be quite a ways from the mouth
7 of the Fraser. Is that also the case in Bristol
8 Bay?
- 9 A No, the vast majority of the harvests occur in
10 these areas. There's small fisheries that have
11 occurred further out, but, you know, I'm not sure
12 of the exact statistics, but it's probably more
13 than 90 percent of that harvest occurs within the
14 districts.
- 15 Q Okay. And harvest up the river system, it appears
16 that this harvest is limited, really, to the mouth
17 of the rivers. The Fraser system has harvests
18 going up along the length of the river to the
19 interior of B.C. Is there a similar harvest in
20 Alaska?
- 21 A There's a very small subsistence harvest in-river
22 and there's some sport fishing that occurs, but I
23 think the numbers are in the report and it's
24 either close to or less than one percent of the
25 catch.
- 26 Q Is subsistence a recreation?
- 27 A No, subsistence fisheries in Alaska allow for
28 anyone to go out and set a net to collect fish for
29 personal use.
- 30 Q And what's the volume of that percentage? What's
31 the volume of that fish on a percentage basis?
- 32 A Well, the subsistence and recreational fisheries,
33 I think it's in the report, or somewhere, but I
34 can't remember exactly where, but I'm pretty sure
35 the number is close to or less than one percent.
- 36 Q Okay. And what are the implications of the
37 terminal nature of the fisheries we see in Bristol
38 Bay as compared to what's been described as a
39 gauntlet-style fishery in the Fraser system?
- 40 A So the management decisions whether to open a
41 district, exactly when to open it, getting down to
42 the specific tides, when you're going to allow
43 fishing to occur are made very close to where
44 their enumeration sites are so just a short
45 distance up the major river systems, they
46 enumerate the numbers of fish escaping a fishery.
47 And so there's a very close connection in-season

1 between where the fish are caught and where
2 they're going to escape and there's a much less
3 mixed stock issue. Most of the population in
4 these areas is fish destined for those specific
5 streams, which is substantially different from the
6 Fraser where we can't distinguish until you're
7 getting well up the river between a lot of the
8 major populations in terms of fishing pressure.
9 The bulk of the management decisions related to
10 the Fraser are associated with run timing. So we
11 distinguish between the stocks based on timing
12 groups as opposed to geographic location of
13 rivers.

14 Q All right. So is it simpler, then, in Bristol Bay
15 to manage those fisheries?

16 A Yes, much less complicated.

17 Q In your report, you talk about the stocks, as
18 well, and there's reference to a portfolio effect
19 of the Bristol Bay fishery. Can you explain what
20 that refers to?

21 A So that really is focussed in on the diversity of
22 the populations and probably the most significant
23 part of that is in the age structure. There's
24 quite a diverse age structure in Bristol Bay
25 sockeye. If you look at -- I think there's a
26 table.

27 Q Yeah, Table 28 on page 157.

28 A Yeah, that's right. If you can pull that up, you
29 can see that there is a number of different ages
30 and depending on the specific river system or
31 district you're in, and they have -- a substantial
32 portion are these ones that are referred to as
33 1.3, which is fish that's been one year in
34 freshwater and three years in the ocean. So that
35 1.3s are similar to what we have in terms of
36 Fraser sockeye. These are fish with a similar
37 life history for a lot of the Fraser sockeye
38 population, but there's substantial numbers that
39 spend two years in freshwater and then two years
40 in the ocean. There is others that spend one year
41 in the freshwater, two years in the ocean, and
42 then significant numbers in some of the population
43 that spend two years in the freshwater and three
44 years in the ocean. So if you combine these two
45 numbers, you get the total age of the fish. So
46 there's many more age five fish in the Bristol Bay
47 fishery than there are in the Fraser.

1 Q All right. And what's the significance of that?

2 A I means that you're going to have returns from a
3 couple of different brood years, that the ocean
4 conditions and freshwater conditions encountered
5 by the fish are going to differ and so you'll have
6 what is referred to as a portfolio effect. It's
7 like a more diverse portfolio of life history
8 strategies than you have on the Fraser.

9 Q All right. Does that have -- oh, sorry, I'll come
10 back to this in a minute. I'm conscious of time
11 here and I want to move to your section on
12 variability and returns, and escapement goals.
13 How are escapement goals set in Bristol Bay?

14 A All right. So that's --

15 Q In your Comparison section, it's page 165.

16 A Yeah, I think it doesn't really deal explicitly
17 with it as earlier in the report so probably page
18 139 is the best place to look for the specific
19 statement, and it's partway down the page. It
20 begins with the word, "Today," and it's the second
21 full paragraph. So it says:

22
23 Today, all Bristol Bay sockeye escapement
24 goals are characterized as sustainable
25 escapement goals, SEGs, as opposed to MSY-
26 based BEGS, biological escapement goals.

27
28 These are further described in the next page, and
29 with some examples, as to how they're set. So in
30 the section, there, "Bristol Bay," it talks about
31 the annual escapement goals and it's the
32 statement, at this stage, the Board of Fisheries,
33 they accept the escapement goals, which is most
34 common, or modify them to accommodate social,
35 conservation and allocation concerns by users and
36 ADF&G. So these goals are discussed and evaluated
37 in that context.

38 There are occasions when the escapement goals
39 may be higher or lower from the biological
40 reference points to protect weak stocks in mixed
41 stock fishing districts. So there could be a
42 variety of different stocks within a district that
43 have concerns similar to some of the situations on
44 the Fraser so that could affect the escapement
45 goals. As well as there are occasions when the
46 escapement goals have been -- well, I guess, the
47 next point is also that there's examples of where

1 the escapement goals have been raised to protect
2 weaker stocks.

3 Q So is this a variation on the escapement goal
4 setting that you were recommending for the Fraser
5 system?

6 A I think the biggest difference here, and it can be
7 seen by the figures, is that the escapement goals
8 have been pretty consistent across a long period.
9 There's a range defined. If you look in the
10 figures, on Figure 28 for a couple of districts
11 here, page -- sorry --

12 Q The next page.

13 A -- page 141, you can see that -- and in most
14 cases, it's similar to this, where there's a lower
15 value, sort of like the minimum target escapement
16 goal for this particular stock, and then an upper
17 value. And in virtually every case, the
18 escapements are above the minimum and there are a
19 few instances when they've exceeded the upper part
20 of the range, but they try to manage the fisheries
21 so they are in that range, or close to that range
22 of escapement for each of the districts.

23 Q And so unlike the FRSSI escapement goal-setting
24 process, those goals don't vary with run size, is
25 the point?

26 A Yeah, and they have had some periods when stocks
27 were cyclic. During this particular time period,
28 you'll note that you don't see cyclic patterns and
29 returns for these or any of the other stocks, with
30 the exception of Chiniak (sic) has some
31 indication. If you look at page 143, just so that
32 you can see that, they're not without some cycles,
33 stocks that cycle. All right. So it's the second
34 graph, there. It's not Chiniak, it's the other
35 name, it's the Kvichak system. The pronunciation
36 of that word is Queejak (phonetic). You know, we
37 can see that in 83 and 84, for example, then
38 followed up by 89 and 90, and followed up by 94,
39 95, there are a couple of strong cycles. That
40 pattern has broken down more in recent years, but
41 it was very common for this particular stock prior
42 to this period.

43 Q How are escapement --

44 THE COMMISSIONER: Ms. Baker --

45 MS. BAKER: Oh, sorry.

46 THE COMMISSIONER: -- I think it's a good time to take
47 the break? Thank you.

48
Karl English
In chief by Ms. Baker

1 THE REGISTRAR: The hearing is now adjourned until 2:00
2 p.m.
3

4 (PROCEEDINGS ADJOURNED FOR NOON RECESS)
5 (PROCEEDINGS RECONVENED)
6

7 THE REGISTRAR: The hearing is now resumed.
8

9 EXAMINATION IN CHIEF BY MS. BAKER, continuing:
10

11 Q We were talking before the break about escapement
12 goal setting in Bristol Bay. And my next question
13 is, how are escapement goals met in Bristol Bay?
14 Is there a difference in how they manage to meet
15 their escapement goals?

16 A Yes, so the goals, once defined, they become the
17 primary objective of the fisheries management
18 biologists, the area management biologists, to
19 achieve that goal. That's what they're evaluated
20 on pretty much solely post-season whether they've
21 been able to get the escapement above the lower
22 line. And somewhere between the lines is good.

23 Q In your summary on page 165, you talk about the
24 high variability in returns and uncertainty
25 associated with optimum escapement goals for
26 Fraser sockeye resulting in managers and fishers
27 selecting more complex abundance-related harvest
28 rules to set management goals. Can you explain
29 that further?

30 A Yes, so the goals vary with run size on the Fraser
31 so they're substantially different from ones that
32 are the same, not only for all different sizes of
33 runs but across years and there isn't -- as I
34 started to point out there, there is only one
35 stock in the Bristol Bay that has this cyclic
36 pattern like some of the Fraser stocks have and
37 even that has been much less in recent years so
38 they define the goals for a particular population
39 and strive to achieve those. Whereas, in the
40 Fraser scenario, while people are defining goals,
41 they vary substantially. And it's more of an
42 escapement target, I guess, is the best way to
43 describe what's done in the Fraser, as opposed to
44 a specific goal for a specific stock. So they
45 define escapement targets by run timing group.

46 Q Whereas the goals are on a stock basis in Bristol
47 Bay?

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1 A Yes.

2 Q And is that partially a result of the fact that
3 stocks -- they don't have as much of a mixed stock
4 fishery in Bristol Bay in that they are all going
5 to different river systems?

6 A Well, it gives them more latitude, I guess, to
7 control the fisheries to achieve a specific goal
8 so they're not having to balance the goals for
9 multiple stocks. But they do have that -- in the
10 different districts, they'll have sub-population
11 goals. But the one that is really clear is the
12 goal that the -- the primary goal that they're
13 striving for is whatever goal they set for that
14 particular district not for the sub-component
15 stocks.

16 Q So maybe it's not a run timing group but it is an
17 aggregate of certain stock groups?

18 A Yes.

19 Q Okay. Moving to pre-season forecasts, how are
20 pre-season forecasts generated in Bristol Bay?

21 A So they use a lot of the same tools as the ones
22 for the Fraser. I think there's a whole list of
23 them described under that in the report. I don't
24 remember what page the pre-season forecast is on.
25 I'll just find that here quickly. The description
26 of the forecast methods is on page 146. And right
27 at the bottom of that page, it talks about the --
28 or actually, that's the in-season one.

29 Q Perhaps on 149?

30 A 149? Okay. Yes, that's what I'm looking for. So
31 pre-season, top of 149. So they're using what
32 they refer to as four types of models, very
33 similar to the models that are used in the Fraser.
34 These mean models, which refer to sort of average
35 returns per spawner. There's stock recruitment
36 models, which might be like the Larkin model or
37 other, Ricker models, that look at relationships
38 between spawners and recruits. Sibling models
39 meaning the use one age population to predict
40 returns of another.

41 So you're using a younger age return for
42 sockeye. And because they have multiple ages of
43 sockeye, that works better than in the Fraser
44 where you have most of the returns are age four.
45 And then smolt-related model, so this is looking
46 at the smolt output. They do a number of
47 enumerations on out-migrating smolts for various

1 stocks and look at the relationship between that
2 and adult returns.

3 Q All right. In your comparison section on page
4 166, you say that:

5
6 When all stocks are aggregated, median
7 absolute percent error appears slightly
8 better for Bristol Bay than for the Fraser,
9 but not by much.

10
11 Can you just comment on that?

12 A Yes. So probably the graph to look at there is on
13 page 152. And so the top chart shows you the
14 absolute percent error and the bar once again
15 shows you the median. So where the line goes
16 through the box is the median. And if we actually
17 look at the value, I think it's 25 percent is the
18 value when you look at all systems combined. And
19 that's the most far right box and whiskers. And
20 then the districts, the five management districts,
21 are the next five things that you see on the graph
22 there. And this is the top graph I'm referring
23 to.

24 And then you can see across the different --
25 on the left side of the dashed line are all the
26 different major river systems within each of those
27 districts. You can see by the bottom which ones
28 are in each of the districts. They should have
29 colour-coded the ones on the right-hand side.
30 Then you could have seen which ones refer to each
31 of the districts. But the first, just so people
32 know, Egegik just has one major river system. And
33 then the first two have -- Togiak has one and
34 there's three in the Nak and Kvichak systems. So
35 there's the three dark bars refer to that. And
36 then the last three are in the Nush, Wood, Igu
37 district.

38 The important part of this graph is that you
39 saw the previous one for Fraser, the length of the
40 whiskers, the amount of variability in any one
41 given year is substantially less for Alaska
42 forecast compared to returns than what we're
43 seeing in for Fraser.

44 Q But just picking up on what you have to say in
45 your summary paragraph, I take the lower figure is
46 similar to the Figure 10 we saw for Fraser sockeye
47 and you see all systems are given a 48 percent R

- 1 value for reliability; is that right?
- 2 A Yeah, so that's the R square value that compares
3 with the 44 percent for the entire Fraser River.
- 4 Q All right. So the differences appear more on the
5 individual stock level?
- 6 A Yes, and also the biggest difference is in the
7 absolute percent error, as opposed to the R value.
- 8 Q And is there a reason why the pre-season forecasts
9 in Bristol Bay have a lower absolute percent error
10 than on the Fraser system?
- 11 A Yes, that's mostly because of this portfolio
12 effect, the diversity of populations. And also
13 the stability of returns assists in that, as does
14 the lack of cyclic dominance. So you have more
15 consistent returns year-to-year in Bristol Bay
16 than you do in the Fraser.
- 17 Q So is it fair to say that the better accuracy you
18 see on the individual stock level analysis results
19 not so much from better models in Bristol Bay but
20 really just the predictability on a biological
21 level with the stocks themselves?
- 22 A Yeah, there's that element. Another one I should
23 mention is they're using more consistently the
24 same model for each of these populations year in
25 and year out, which may provide and seems to
26 suggest it provides a greater degree of precision.
27 If you look on page 153, it shows the trends in
28 mean absolute percent error across time. So
29 that's Figure 35. And you can see that in the
30 most recent period, 2001 to 2010, the mean
31 absolute percent error has been reduced over what
32 it was historically. And it's in that period when
33 they started using the model that is performed
34 best in the number of years not just the most
35 recent year.
- 36 Q Okay. Thank you. In-season estimates in your
37 summary section and your comparison section to
38 B.C., focusing on the differences, what are the
39 differences in the way in-season estimates are
40 generated in Bristol Bay, as compare to the Fraser
41 system?
- 42 A Okay. So that's back on page 146. And it talks
43 about the different in-season methods used. So
44 right at the bottom of this page. So in terms of
45 in-season, they have an offshore test fishery at
46 Port Moller. This is a gillnet test fishery not
47 dissimilar to some of the gillnet test fisheries

1 that are used in British Columbia. Then they have
2 district test fishing. They have commercial
3 fishery performance with catch and age sampling.
4 So that's looking at the actual fisheries
5 information. They might have a test fishery
6 inside the commercial fishery, which looks at fish
7 that are escaping that particular district
8 fishery. They have aerial surveys where they
9 might count quantities of fish from the air, as
10 well as escapement monitoring, which is lower down
11 in the river system.

12 Q All right. Is in-season estimation used by
13 fisheries managers in Bristol Bay to manage the
14 fishery in the same way in-season estimation as
15 used by Fraser River managers?

16 A Yes.

17 Q Okay. Do the Bristol Bay fishery managers rely on
18 in-season estimation to the same extent as Fraser
19 River managers do?

20 A Yes, they rely very heavily on it.

21 Q All right. And in your summary underneath the
22 heading "In-Season Forecast", you state:

23
24 In-season forecasting is of limited use to
25 Bristol Bay managers who rely mostly on daily
26 escapement counts and day-to-day movements of
27 fish in the districts to manage the fishery.

28
29 So do I take it from that, that when you look at
30 the seven different methods that you just
31 reviewed, the primary one used by managers in
32 Bristol Bay is escapement monitoring and not so
33 much the other test fishing methods, for example?

34 A Yeah, the primary one is combining catch and
35 escapement data. So they get catch data from the
36 fishery immediately following fishery and then
37 they have escapement data for the same period.

38 Q All right. And is that different from what
39 happens in the Fraser?

40 A Yes, because the catch information in the Fraser,
41 well, it's used as is information on escapement.
42 There is a greater reliance, I think, on looking
43 at abundance using the test fisheries in approach
44 waters. The fishing may be more sporadic as well
45 and probably is more sporadic on the Fraser than
46 it is in Bristol Bay when they have major
47 fisheries happening every couple of days. So

1 they're getting a lot of information from the
2 fisheries. This is really more similar to what
3 the situation was back ten or 15 or 20 years ago
4 on the Fraser where they were using a lot more
5 data from fisheries to do in-season assessments.

6 Q And has the situation in the Fraser changed such
7 that it would not be reasonable to rely on catch
8 and escapement as the primary methods of doing in-
9 season estimates in the Fraser system today?

10 A Well, if you don't have a fishery, you'd be
11 waiting for just the escapement information and
12 the first escapement information you'd be using
13 would be that from the Mission hydroacoustics site
14 and there has been a number of difficulties with
15 that site providing reliable estimates depending
16 on the conditions and the year. And so it would
17 be much more tenuous to just rely on that versus
18 conducting some additional test fisheries in the
19 ocean.

20 Q And in your conclusion on the Fraser River test,
21 in-season estimation process was that it was, in
22 the Fraser system, a reliable system. Is that
23 right?

24 A Yeah, the reason why it has been developed and
25 what makes it a more robust approach than relying
26 on one thing or another is that you're looking at
27 abundances of fish as they're moving through the
28 approach waters in Johnstone Straits or Juan de
29 Fuca and then assessing for the Early Stuart,
30 Early Summer and Summer timing groups, how many of
31 those fish are passing Mission. So you're
32 comparing what is seen in the ocean test fisheries
33 with what's seen at Mission and it's giving you
34 sort of two indications of whether -- if one says
35 there's a lot more fish and the other says there's
36 a lot fewer fish then you have -- a red flag goes
37 up that, hey, we may not be measuring as big a run
38 as we thought. But if you see a consistency
39 between those two, you have a higher comfort
40 level. And they have been performing pretty well
41 with that regard. The caveat is on Late run where
42 the fish don't move in every year right through to
43 Mission. So you have this gap of could be two,
44 three weeks of holding time or more in the Lower
45 Gulf and so that doesn't give you the same degree
46 of confidence on Late Run, as it does on the other
47 timing groups.

- 1 Q Are you suggesting that the Alaska method of in-
2 season estimation is superior or would be better
3 used on the Fraser system?
- 4 A Well, it can't be done the same way as it's done
5 in Alaska because things are confined more in
6 space and time. You couldn't use it identically.
7 But if you changed the fisheries to operate in
8 those similar spaces and times where you have
9 reliable information on escapement and good
10 information on catch and there was substantial
11 catch, yes, you could use the same system.
- 12 Q So if we limited our fishery to the mouth of the
13 Fraser, for example? Is that what you're saying?
- 14 A Well, no, to have the exact analogy, you'd
15 probably have to limit it to fishing more
16 terminally than even the mouth of the Fraser. But
17 because they don't have the stock -- the ability
18 to -- because part of the Bristol Bay system
19 should be clear to everybody is that they have the
20 ability to turn on and off the fisheries' four
21 specific stocks, not just the whole fishery all at
22 once. So they can close one district, open
23 another district, move it around, depending on
24 what stocks they want to target.
- 25 Q And this is because there's multiple rivers in
26 that fishery; is that right?
- 27 A Yes, multiple rivers and geographic separation
28 between the fisheries.
- 29 Q All right. So that's not an option for the Fraser
30 system?
- 31 A It's not an option with the current model for how
32 the Fraser's managed with marine interception
33 fisheries and lower river interception fisheries.
- 34 Q Okay. Escapement enumeration and abundance
35 estimates. I'll deal with these together. How is
36 escapement enumeration conducted in Bristol Bay?
- 37 A All right. So that's described in a section here.
38 In a nutshell, they rely heavily on these tower
39 counts, which are located a short distance from
40 fisheries so in the lower river. The big
41 difference in Bristol Bay with regard to the
42 enumeration is that the rivers they're enumerating
43 sockeye return to, you can see the fish. So
44 they're actually visible. And they have towers,
45 which is a counting platform raised up above the
46 shoreline so that he can look out and count fish
47 moving past a certain point. And they also use

- 1 acoustic systems on one of the rivers. But the
2 tower counts, the vast majority of the escapement
3 information, has come from these tower counts.
- 4 Q And is there a count done on the spawning grounds
5 in Bristol Bay?
- 6 A They do not rely on spawning ground counts and
7 don't put a lot of effort because if you looked at
8 that map we had out before, you'd see that the
9 spawning areas are spread out over quite a range
10 of locations. And they would be costly to go in
11 and enumerate at all those different spots. And
12 they don't believe that they're going to get a
13 more reliable estimate than from the tower counts.
- 14 Q And is there any catch of any significance past
15 the counting stations that must be accounted for
16 in their escapement enumeration?
- 17 A No. So that's the reason for having more
18 confidence. That, plus the shorter distance
19 between the tower counts and where the spawning
20 grounds are so you're not losing -- there's no
21 indication that they lose substantial numbers of
22 fish through mortality and they know that they
23 don't have significant fisheries above those
24 towers.
- 25 Q All right. So given those differences, could the
26 escapement enumeration system from Bristol Bay be
27 used reliably on the Fraser system?
- 28 A Not if the first escapement enumeration site is at
29 Mission because there's lots of both fisheries and
30 other sources of mortality between Mission and the
31 spawning grounds.
- 32 Q Okay. Given the differences between estimates at
33 Mission and on the spawning grounds in the Fraser
34 system, which we didn't talk about today but we
35 have heard quite a lot about earlier in the
36 hearings, and also the distances travelled by
37 spawners after Mission, is there anything from the
38 Bristol Bay escapement enumeration systems or
39 abundance estimating processes that we can learn
40 from here on the Fraser system? Does Bristol Bay
41 have any lessons for us that we should be paying
42 attention to here on that topic?
- 43 A Yes, I think it's just the basic one that it's
44 obviously easier to manage multiple stocks in
45 terminal stock-specific fisheries than it is in
46 mixed stock fisheries.
- 47 Q And the mixed stock fishery is what we have here

56
Karl English
In chief by Ms. Baker
Cross-exam by Mr. Taylor (CAN)

1 in the Fraser system?

2 A Yes.

3 MS. BAKER: Mr. Commissioner, I don't have time, I
4 don't think, to go through the state of science in
5 the report, Project 7. It's clearly laid out,
6 though, in the state of the science and so I'll
7 leave it as read and same with the recommendation
8 section. And I'd like to turn the questioning
9 over to Mr. Taylor for Canada at this time.

10 A If I could add one point before I leave (sic) --

11 Q Yes.

12 A -- because I did make a mistake earlier that was
13 pointed out to me by Randall Peterman, was that
14 when I quoted the age structure associated with
15 Table 28, so if you could pull that Table 28 back
16 up. It's on page 157. This is for Bristol Bay
17 again. It's the 1.2 age group, that is, our four-
18 year-old fish, one-year in freshwater and two full
19 years in the ocean, they come back after four
20 years. The 1.3 would be five-year-old fish, as
21 would be 2.2 fish, both five-year-olds, and then
22 2.3 would be six-year-old fish. So I was one year
23 off in my total age. So you have both four or
24 five and six-year-old fish representing
25 significant portions of returns in Bristol Bay
26 where in the Fraser it's primarily age four.

27 Q Thank you.

28 MR. TAYLOR: Mitchell Taylor and with me, Hugh
29 MacAulay. We're counsel for the participant,
30 Government of Canada, Mr. English, and that, of
31 course, includes the Department of Fisheries and
32 Oceans. Mr. Commissioner, I have, I understand,
33 70 minutes, seven zero, starting at 2:25.

34

35 CROSS-EXAMINATION BY MR. TAYLOR:

36

37 Q Mr. English, I have some questions that mostly
38 focus on two areas. We think your report is
39 mostly solid and commend the report. There are
40 two areas of concern and questions associated with
41 them. One has to do with your treatment of the
42 pre-season forecasts. And the other has to do
43 with consideration of the TAM rules, which I'll
44 come to each of those. I have a number of
45 questions on various other statements in your
46 report and matters arising from what's said.
47 Before we go into the content of the report, let

- 1 me ask you this. I understand that there's
2 multiple authors to this report and you're the
3 lead author; is that right?
- 4 A That's correct, yes.
- 5 Q And can you say which parts of this report you
6 wrote?
- 7 A Yes, it might be easier to say what parts the
8 other people wrote.
- 9 Q That would be fine.
- 10 A Okay. So Bob Bocking focused mostly on the
11 recreational fishery component. The pre-season
12 and in-season forecasting component for the Fraser
13 side of things was done by Tim Edgell. The Alaska
14 section was drafted by Michael Link and Scott
15 Raborn. And of course, I edited and contributed
16 to all those sections at one form or another but
17 the rest of the report was primarily written by me
18 and edited by them.
- 19 Q All right. And I take it then that you reviewed
20 everything before it came before the Commission?
- 21 A That's correct, yes.
- 22 Q Thank you. So specifically then the pre-season
23 forecasting was written by Tim Edgell, was it?
- 24 A Edgell, yes.
- 25 Q Edgell, thank you. And what particular expertise
26 does he have? I've read his resumé but can you
27 capsulize (sic) in a nutshell what is his
28 expertise? He says to be an ecologist and
29 analytical biologist.
- 30 A Yes, well, he's a good statistician in terms of
31 can do analysis with any numbers whether they're
32 coming from Fraser sockeye fisheries or other
33 sources, has a good statistical background. And
34 that was the main reason for focusing in on the
35 datasets, which were provided by the Department
36 and just analyzing them with regard to some very
37 specific tasks.
- 38 Q Okay. Am I correct then that your expertise is
39 not particularly focused on pre-season
40 forecasting?
- 41 A Well, I don't know. We've done a fair bit of work
42 with pre-season forecast, not as extensive as
43 what's been done on the Fraser. I've been
44 involved with other fisheries in the Nass and
45 Skeena looking at forecasting methods. But it
46 wouldn't be an area where I've spent a lot of my
47 time.

- 1 Q All right. Is your knowledge and experience
2 focused mainly on in-season work?
- 3 A I guess most of the stuff that I've personally
4 done has been trying to design programs to improve
5 the information available for fisheries
6 management. Some of those are in-season, some of
7 them are more post-season in escapement monitoring
8 programs but also catch monitoring and run size
9 estimation.
- 10 Q All right. In the consideration in your report of
11 pre-season forecasts, as I read it, you or your
12 firm or Mr. -- and I apologize. Hopefully I'll
13 get it right --
- 14 A Edgell, yeah.
- 15 Q -- before the end of these questions, Edgell?
- 16 A Edgell, yeah.
- 17 Q All right. Thank you.
- 18 A Think about the razor, the edge --
- 19 Q All right.
- 20 A -- edge and gel.
- 21 Q I'll do that.
- 22 A There you go.
- 23 Q For the moment I'll say "his". His writing seems
24 to regard the pre-season forecasts as point
25 distributions. And by that, I mean the number
26 that's given as the 50 percent number is taken as
27 a point distribution, as distinct from a statement
28 of probability.
- 29 A That's correct.
- 30 Q So you agree with me that the report takes it as a
31 point distribution?
- 32 A That's right.
- 33 Q Now, would you agree with me, though, that really
34 what that is, is what I said a moment ago, it's a
35 statement of probability? So for example, there's
36 a 50 percent chance that the run size is going to
37 be more or less than the number that's then
38 stated?
- 39 A Yes.
- 40 Q All right. And I want to, if I may, take you to
41 some evidence that's been given already in these
42 proceedings. It's evidence of Sue Grant, who's a
43 Department of Fisheries and Oceans biologist.
44 It's on January 26th. And I'm at page 45. Am I
45 right that you know Sue Grant?
- 46 A Yes, I do, yes.
- 47 Q All right. And she is a well-respected fisheries

1 biologist, is she?

2 A I think she must be. She's been doing a lot of
3 work on these issues.

4 Q All right. You say she must be. Do you agree she
5 is?

6 A Well, I know of her work and the stuff that I've
7 seen I think is good quality. I don't know what
8 other people's opinion of her are.

9 Q All right. Now, at page 45, about two-thirds of
10 the way down the page in a large paragraph that
11 begins "So-so", and this is Sue Grant speaking in
12 answer to questions by Ms. Baker. And you can see
13 the question at the top essentially is asking Ms.
14 Grant about whether the pre-seasons forecasts are
15 reliable or unreliable or accurate or inaccurate,
16 or is it all a communication problem. And partway
17 down that paragraph that begins, "So-so," about
18 halfway down, at line 26, there is a passage
19 that's picking up in mid-sentence, and you can
20 read the whole sentence for yourself there but it
21 says:

22
23 DFO never expects the 50 percent probability
24 level to be what will return. That's a
25 midpoint in the probability distribution and
26 we actually have a one-in-two chance that the
27 run will come in above or below that actual
28 value. So that value isn't a deterministic
29 DFO expects 10.6 million to come back.
30

31 Do you agree with what she says there?

32 A I think that's probably true, yeah, but I imagine
33 the reason for presenting a probability
34 distribution is it defines the level of
35 uncertainty associated with the pre-season
36 forecasts. And we did include those, by the way,
37 in our report, the ranges.

38 Q All right. And what you just said is a big part
39 of the equation, isn't it? There's a high level
40 of uncertainty with regard to forecasting Fraser
41 sockeye returns.

42 A Yes, that's right.

43 Q And you've spoken to some of the reasons why. But
44 when you're doing pre-season forecasting, am I
45 correct that you're looking to the past to predict
46 the future?

47 A That's right, yes.

- 1 Q And the theory is that if you have a set of data
2 that reaches back far enough in time, you're going
3 to be better off than if you have only a short
4 span of data, right?
- 5 A Well, yes and no. If you're reaching back a long
6 way in time and a lot of your data is associated
7 with a time period that doesn't resemble a current
8 time period's trends then going back a long way is
9 not going to be helpful. It might actually lead
10 you astray.
- 11 Q Okay. If we could go to the chart in your report
12 that's at page G-2, that's the appendix we were in
13 before. Thank you. And I'm looking at the bottom
14 chart there at the bottom part. That chart has an
15 approach, it seems to me, that you are using as a
16 reference point the forecast number as a
17 deterministic number, if I could put it that way,
18 as distinct from a statement of probability?
- 19 A That's correct, yes.
- 20 Q Would you agree with me that that makes that
21 number then look more firm than it really is meant
22 to be?
- 23 A It definitely is a firm number that's being
24 compared with another firm number, yes.
- 25 Q Sorry. Could you say that again?
- 26 A It's trying to compare two firm estimates, as
27 opposed to a range of alternative estimates. So
28 we're trying to get a sense of how close the
29 return was to this point estimate which may be
30 based on the 50 percentile.
- 31 Q Isn't it, though, comparing apples and oranges
32 because you're taking a statement of probability,
33 you're turning it into or pretending to turn it
34 into a deterministic number and then comparing it
35 against the actual returns?
- 36 A No, because there is -- whether the number is
37 precise or imprecise because of uncertainty
38 doesn't prevent those numbers from being used as
39 to drive a management planning process, which
40 they're input in. So the harvest rates or the
41 exploitation rate numbers or the TAM rule, which
42 you'll probably get into in a minute, is derived
43 from picking a number within the range of the
44 forecast and applying it to the TAM rule that
45 comes out of the FRSSI process and so you have to
46 pick a number at some point. The range is useful
47 to know. It's useful for managers to know that

1 there's a fair bit of uncertainty with the number
2 but part of the reasons for doing it this way was
3 so we could compare forecasts in Alaska in Bristol
4 Bay with forecasts for Fraser in a head-to-head
5 manner. And they don't use the same forecasting
6 models exactly and these probability forecasts in
7 Alaska.

8 Q Maybe I could put it another way and I think
9 you've spoken to this in your answer just now and
10 see whether I've got it right or you'll agree with
11 me. Do you agree with me that there's a high
12 level of uncertainty built into the probability
13 forecast that you, for example, have then used to
14 make the chart on page G-2?

15 A Around the forecast estimate, there is a high
16 degree of uncertainty, yes.

17 Q And one of the elements of that uncertainty is
18 that environmental conditions could make things
19 turn out to be quite different from what might be
20 forecast; is that right?

21 A That's correct, yes.

22 Q And so in fact, if environmental conditions go off
23 what we've seen in the historical time period then
24 the forecast is going to be probably off?

25 A That's correct.

26 Q In terms of pre-season forecasting, are you aware
27 of the terms of the Pacific Salmon Treaty that
28 require that there be pre-season forecasting done?

29 A Yes.

30 Q All right. So it's not an option; it has to be
31 done, right?

32 A That's correct, yes.

33 Q And do you agree that pre-season forecasting has
34 value to it? I think you've spoken to this but I
35 want to sure that I've got it right.

36 A Yes.

37 Q So you're not quibbling with pre-season
38 forecasting; you're more speaking to the
39 particulars of what's done, are you?

40 A I think my main point is that the forecasts have
41 their use but they're -- they're not used
42 extensively in-season because people rely more on
43 in-season information. And that is the vital
44 piece here because of all the reasons we've just
45 talked about, the uncertainty with the forecasts,
46 the changes associated with environmental
47 conditions that could lead you to very different

- 1 returns than what is forecast, as we've seen most
2 graphically in the last two years.
- 3 Q Okay. Well, let me suggest that there's at least
4 three reasons for doing pre-season forecasting.
5 One we've spoken about already and, that is, it's
6 required under the treaty. So secondly, and you
7 were just speaking to manager's use of pre-season
8 forecasting a moment ago, but let me suggest as a
9 second reason beyond that it's required under the
10 treaty, that DFO managers use the pre-season
11 forecasting early in-season and early in the post-
12 season to set up the current year against the
13 long-term averages and get a sense of what's
14 happening or going to happen. Do you agree that
15 they use it for that aim?
- 16 A Yes.
- 17 Q All right. And then a third broad purpose, I'll
18 suggest to you, as to why pre-season forecasting
19 has value and it's useful to do, is that it helps
20 scientists to understand the population dynamics
21 and the uncertainties associated with that.
- 22 A Yes.
- 23 Q Okay. And if you come to the 2009 and then I'm
24 going to come to the 2010 year, were you at all
25 part of the work that was done and then -- I don't
26 mean within fisheries but within the science
27 community, the work that was done and then the
28 observations made and I expect at some point in
29 time there was a sort of, oh, my gosh, what's
30 going on here realization by scientists. Were you
31 engaged in that in 2009?
- 32 A In the actual evaluations in-season, do you mean,
33 of what's going on?
- 34 Q Well, I don't mean doing the evaluations but as
35 part of the science community engaged in the
36 something important and quite dramatic has
37 happened here and is happening.
- 38 A Well, it was evident. We were doing studies in
39 2009, which had the requirement for us to try and
40 put tags on returning sockeye and we were trying
41 to allocate those across the run. And so from
42 that perspective, I was involved in-season to
43 looking at what was going on with the run and
44 talking with managers and people at the Salmon
45 Commission about what was happening and whether
46 the run was late or a variety of different
47 explanations for why we were not seeing anywhere

- 1 near the numbers that we had expected to return.
2 Q And so in the 2009 year, would you agree with me
3 that with the pre-season forecast in-hand and then
4 seeing what was starting to happen, or rather not
5 happen in terms of the non-return, would you agree
6 with me that that allowed managers very quickly to
7 understand that something important was happening
8 and allow them to adjust their early in-season
9 planning and actions accordingly to take account
10 of that?
11 A Well, what allowed them to do that was the in-
12 season monitoring because the forecast just gave
13 him a number to compare against but assuming that
14 they could define what their goals for that run
15 were, they could have compared their goals for
16 that particular return with what they were seeing
17 in the test fisheries and at Mission and said,
18 okay, we have a problem; this run is way less than
19 what we anticipate or would like to see return for
20 that particular stock.
21 Q They could see in absolute terms that not very
22 many fish were returning but they could also see
23 in those early days, couldn't they, that not only
24 was there not many fish returning, but they could
25 compare that lack of fish against what the
26 probabilities were set out to be in the pre-season
27 forecasting and realize the magnitude of what was
28 going on, if you like, because there was a
29 comparator to put it against based on the pre-
30 season forecast, which, in turn, relies on
31 historical returns.
32 A Sure. But what I'm saying is that, especially in
33 these extreme cases, but even in less extreme
34 cases, you could compare returns that occurred and
35 what your test fishery tells you about returns in
36 a given year with the size of returns that you
37 expect or would like to see for a specific timing
38 group of Fraser sockeye and tell you right away
39 whether, number one, is what we're seeing
40 consistent with the timing we want the fish
41 returning under, and the abundance? So you could
42 have thrown out the forecast entirely and just
43 said, okay, we want to see x number of thousand
44 fish and they should come in over this time
45 period, compared those numbers to what you would
46 expect in the test fishery and seen, boy, we're
47 way under expectations and, therefore, we need to

1 close the fisheries.

2 Q I think you're saying some of this but I'd like to
3 take you back into the transcript of the evidence
4 of Sue Grant, if I may, January 26 again, at page
5 48. And she's speaking of the 2009 return and she
6 started doing that -- and this is a continuation
7 of the evidence that I took you to earlier. But
8 she started and just maybe for a moment, Mr. Lunn,
9 if we could go to the bottom of page 47, you'll
10 see that -- that's fine -- you'll see that it
11 says, "So 2009 we saw 1.3 million." And she goes
12 on. And then over the page, to page 48 and about
13 halfway down at line 17, Ms. Grant says:

14
15 So the forecasts are useful from that
16 perspective, placing the returns in the
17 perspective of what we have seen
18 historically.

19
20 Do you agree with that?

21 A Whether it's a forecast that you're using or just
22 an expectation based on trends with the stock, I
23 guess there are different ways of doing the
24 forecast, if you like. There's some kind of
25 expectation you have to have to compare the
26 returns to what you've seen and your goals for
27 that stock.

28 Q All right. Just while we're here, towards the
29 bottom of that page, at line 36, Ms. Grant says,
30 and this is now speaking to the use that can be
31 made of pre-season forecasts and in particular by
32 managers, I expect. Line 36:

33
34 So for pre-season planning, early in-season
35 forerun, early in-season run size models, I
36 know they --

37
38 She's speaking of managers.

39
40 -- use the pre-season forecasts as a tool to
41 help as a starting point for what we're
42 seeing and what we expect to see. As in-
43 season data becomes more and more available,
44 these pre-season forecasts start dropping off
45 in terms of their usefulness as inputs into
46 the model but they're still useful from a
47 qualitative perspective to place you on the

- 1 map as to where you are. Do you agree with
2 that?
3
- 4 A Yes.
- 5 Q Do you agree that pre-season forecasting has value
6 in terms of showing or giving some early evidence
7 as to fish productivity for that year?
- 8 A Yeah, you're going to derive your pre-season
9 forecast from information you have on
10 productivity. That's one of the models.
- 11 Q All right. Okay. And do you see it as having
12 pre-season forecasting, that is, having value in
13 terms of being able to map out where are the
14 stocks and what is the timing as to them coming
15 back by using the pre-season forecasts as against
16 what you're starting to see as the season unfolds
17 in its early days?
- 18 A Yes.
- 19 Q Really, shortly stated, having some evidence of
20 what you can expect to come at you assists in
21 giving context and perspective to what you, in
22 fact, end up seeing happen?
- 23 A Yeah, we all like to make a prediction like with
24 the playoffs and hopefully it happens, right?
- 25 Q I've concluded that you're a hockey fan.
- 26 A Well, you know, I just imagine it's on some
27 people's minds so it might wake up a few people.
- 28 Q All right. Well, hopefully it'll stay on
29 Vancouver's minds for another couple of months or
30 so, which would mean that they're doing well. Are
31 you aware that the pre-season forecast methodology
32 that's been used and continues to be used by
33 fisheries has been peer-reviewed?
- 34 A Yes.
- 35 Q And it's been given a thumbs-up, right?
- 36 A Yes, by the PSARC or the CSAS method or
37 committees.
- 38 Q In an environment of high uncertainty, which
39 you've spoken to on a number of occasions already
40 in your evidence, but in an environment of high
41 uncertainty to do with Fraser sockeye stocks, do
42 you agree that it makes sense to estimate your
43 pre-season forecast in terms of probability, as
44 opposed to trying to be deterministic?
- 45 A I think it's good for any biologist to express the
46 uncertainty associated with their estimates when
47 they can and they have the data to do it.

- 1 Q But do you agree it's good to put it as a
2 probability as distinct from trying to make a
3 point distribution because you're bound to fail
4 given the high variability if you try to be
5 precise?
- 6 A Yeah, knowing what the point estimate is, is
7 important for a number of parts of the current
8 process that's used, but also an understanding
9 that it is variable and that you're communicating
10 that. Or the uncertainty is there so you're
11 communicating that to the users that don't put a
12 huge amount of faith in the point estimate.
- 13 Q All right. Do you have knowledge of the
14 approximate number of resources that DFO devotes
15 to pre-season forecasting?
- 16 A I know some of their best people that I've worked
17 with in the past, people like Al Cass and others,
18 have allocated significant time preparing papers
19 and pre-season forecasts and models and analysis.
20 I don't know exactly how long that takes for those
21 people to do that and whether they have that
22 streamlined to the point where it's a relatively
23 fast task.
- 24 Q I've been given some information that there's a
25 relatively few people, relatively few biologists,
26 that are devoted to pre-season forecasting. Is
27 that your understanding?
- 28 A I think there's been only a few people that have
29 the full knowledge of these models and the methods
30 so they would tend to rely on those few
31 individuals, yes.
- 32 Q As I understand it, in the information given to
33 me, it's a relatively modest amount of resources
34 that are put into pre-season forecasting in terms
35 of the number of people and it's only a portion of
36 their time that do this. Does that accord with
37 what you understand?
- 38 A Yeah, as I say, I agree that it's probably only a
39 few people. I have no idea how long it takes them
40 to generate these forecasts. Some of these
41 reports and documents are fairly complicated and
42 unless it's been really streamlined, I could see
43 it taking a significant amount of time for some of
44 them to do these and push it through the various
45 approval systems that are in place to officially
46 approve a forecast.
- 47 Q All right. And in doing this work, is it your

- 1 understanding that Fisheries is able to leverage
2 things so that they engage with academics and the
3 Pacific Salmon Commission and, if you like, have
4 synergies and build and feed upon each other so
5 that they can leverage and get greater gains than
6 just the few resources Fisheries puts into it?
- 7 A So you mean getting help with this work from
8 academics and the Salmon Commission sort of thing?
- 9 Q Yes.
- 10 A Yeah, no, I'm sure they engage there wherever they
11 can to get that "free" labour.
- 12 Q Now, at page 64 of your report, in reviewing the
13 pre-season forecasting methods, you cite there the
14 Cass report of 2006. And you mentioned Al Cass a
15 few moments ago. I take it you know of Mr. Cass,
16 do you?
- 17 A Yes, I do.
- 18 Q And that 2006 report that you cite in your paper
19 at page 64 as Exhibit 351 in these proceedings,
20 will you agree with me that it's important to
21 understand the pre-season forecasting and
22 important to evaluate the pre-season forecasting
23 to have regard to all of the papers and
24 publications that are of recent vintage that bear
25 on that topic, not just the one paper that you
26 cite there?
- 27 A Yeah, the focus for our report was clearly to look
28 at the most recent information on forecasting and
29 models because a lot of things have changed in how
30 these things have been done over the years and
31 we're trying to keep our report as few pages as
32 possible, believe it or not, but you know, we
33 didn't want to go back and have to describe all
34 the history of forecasts from 1980 to present.
- 35 Q All right. But going the other direction, that
36 is, moving forward in time from 2006, there's
37 another report I'm going to ask to have you look
38 at, it's Tab 11, to Canada's list of documents.
39 And this is a document, "Pre-Season Run Size
40 Forecast for Fraser Sockeye and Pink in 2007".
41 Are you familiar with that document?
- 42 A Yes, that's also, I think, reference in our --
- 43 Q Oh, is it? All right. Thank you.
- 44 A Yeah, and in the following sentence, we reference
45 the reports for 2006, 7, 9 and 10.
- 46 Q Oh, that's what that's -- I see. I get it. And
47 so one of those references is this report?

1 A I would think that's the 2007 reference unless it
2 was done in a different year. That one probably
3 would be the 2006, the CSAS 2006.

4 Q All right. Well, that's fine. What I wanted
5 to --

6 MS. BAKER: Mr. Commissioner, if I can be of assistance
7 in the list of authorities at the back you'll see
8 these are numbered and these authorities are all
9 listed in the --

10 MR. TAYLOR: Oh, thank you.

11 Q What I wanted to take you to, though, is page 3
12 near the top. And as I understand it, for this
13 year, that is 2007, there was a change made to the
14 Cass 2006 approach where the Larkin model was
15 added in. Is that to your understanding?

16 A Yes.

17 Q And the Larkin model accounts for delay density
18 effects, as it sets out there. Could the paper
19 that I've just referred to, "Pre-Season Run Size
20 Forecast for Fraser Sockeye and Pink for 2007," be
21 the next exhibit, please?

22 THE REGISTRAR: Exhibit Number 724.

23

24 EXHIBIT 724: Pre-Season Run Size Forecast
25 for Fraser Sockeye and Pink Salmon for 2007
26

27

MR. TAYLOR:

28 Q And then there's another paper I want to take you
29 to, Mr. English, and you may point out to me that
30 it, too, is cited in your paper but let me check
31 with you on this. It's Tab 14 to Canada's list of
32 documents. And this is what's commonly called
33 "Sue Grant's 2010 paper". Are you familiar with
34 that?

35 A I'm trying to think of whether I reviewed that one
36 or not. I'm aware of its presence. I'm not sure
37 whether I've actually reviewed it.

38 Q Okay. This is Exhibit 352 in these proceedings.
39 And it sets out, on page 8, towards the bottom --
40 sorry, page 8 at the top, the models that were
41 being used and it's a paper that is amending the
42 approach, as I understand it, that Mr. Cass had
43 put in place in 2006. If you haven't -- if you're
44 not familiar with this paper you may not be able
45 to speak to that. But looking at it now, is this
46 a paper you're familiar with?

47 A We did produce a table in our report, which looked

1 at the different models that had been used in
2 recent time period. I'm just trying to find it
3 here. Seventy-two. But I think the information
4 for 2010 was obtained from the CSAS 2010 report,
5 not from the more detailed report by Sue.
6 Q All right. Will you agree with me, though, that
7 DFO is keeping current and keeps on top of
8 modelling approaches and is using the best model
9 available for pre-season work for the year that
10 they're doing it?
11 A Yes.
12 MR. TAYLOR: Mr. Commissioner, do you want me to stop
13 for the break now or continue on?
14 THE COMMISSIONER: No, that's fine. You can carry on.
15 MR. TAYLOR: All right.
16 Q If I may, and I think this will be the last
17 document I need to take you to, Mr. English, go to
18 Tab 6, if we may, of Canada's list.
19 THE REGISTRAR: Mr. Taylor, did you wish to mark that
20 last document?
21 THE COMMISSIONER: I think it's marked, is it not?
22 MR. TAYLOR: The Sue Grant paper, which I'm going to
23 give the formal name, is Exhibit 352, and that
24 would be the CSAS paper Pre-Season Run Size
25 Forecast for Fraser River Sockeye 2010 by Sue
26 Grant and others.
27 Q If we go to Tab 6 of Canada's documents, this is a
28 paper from I'm not sure what year at the moment
29 but we may find it as we go along, written by
30 MacDonald, Patterson, Hague and Guthrie. Are you
31 familiar with those authors?
32 A Yes.
33 Q And they're reputable scientists in Fisheries, are
34 they?
35 A Most certainly.
36 Q Pardon me?
37 A I say most certainly.
38 Q All right. I thought you said "most of them".
39 Now, I want to go through some of the -- not all
40 of them but just a couple of passages on this
41 first page here. This is a paper, "Modeling the
42 Influence of Environmental Factors on Spawning
43 Migration Mortality for Sockeye Salmon Fisheries
44 Management in the Fraser River". You'll see on
45 the first page there in the body of the paper, not
46 in the abstract, in the first paragraph halfway
47 through that paragraph, there's a sentence

1 beginning "Therefore". And it says:
2

3 Therefore, maintaining spawning populations
4 may depend on our ability to provide a
5 quantitative link between environmental
6 factors and measures affecting productivity,
7 including abundance, fish condition,
8 migration success and spawning success.
9

10 And there's some citations. Do you agree with
11 that statement?

12 A Yes.

13 Q And then in the next paragraph, it says:

14
15 Fisheries management has become more
16 precautionary in recent years, in part
17 because fish abundance has declined and
18 uncertainties in forecasts of abundance are
19 increasingly being recognized.
20

21 What I'm interested in asking if you agree with is
22 that part of the sentence that says "uncertainties
23 in forecasts of abundance are increasingly being
24 recognized".

25 A Definitely, yes.

26 Q And then one more passage in this same paragraph
27 in the right column, about a third down that
28 column, there's a sentence that begins "Given
29 large". Do you see that sentence?

30 A Yes.

31 Q

32 Given large uncertainties in environmental
33 effects on population productivity, rigorous
34 model selection procedures are essential when
35 evaluating empirical relationships and
36 identifying predictive models.
37

38 Do you agree with that statement?

39 A Yes.

40 MR. TAYLOR: As far as I know, this document is not yet
41 an exhibit and I'd ask that it be the next
42 exhibit.

43 THE REGISTRAR: Exhibit 725.

44
45 EXHIBIT 725: Modeling the Influence of
46 Environmental Factors on Spawning Migration
47 Mortality for Sockeye Salmon Fisheries

1 Management in the Fraser River, British
2 Columbia
3

4 MR. TAYLOR:

5 Q Now, I want to ask you some questions about the
6 TAM rule, if I may, Mr. English. DFO uses total
7 allowable mortality, or TAM, in setting spawning
8 escapement targets. As I understand it, you
9 suggest that escapement goals for each run timing
10 group are the route to go; is that right? You're
11 not keen on the TAM rule; you'd rather have what
12 you refer to as escapement goals?

13 A I think it's not an either/or in my mind. It's I
14 think we need to have defined escapement goals.
15 You also need to figure out how you're going to
16 get there and the way you get there may be from
17 using rules that come out of things like the TAM
18 rule. But you need an escapement goal. You need
19 to know what you're striving for.

20 Q All right. So do I take it then that you're
21 accepting of, and maybe you'll go so far as to be
22 in favour of, TAM, but you're wanting something
23 more. Is that what you're saying?

24 A Definitely wanting something more explicit with
25 regard to what the target is, what the escapement
26 goal is. And I think that there are issues
27 associated with the TAM rules that may be resolved
28 as the governments and other parties set these
29 lower and upper benchmarks that are a requirement
30 under the Wild Salmon Policy. But the types of
31 relationships between run size and exploitation
32 rate that the TAM rules is mostly related to are
33 ones that can be effective at getting to ultimate
34 goal of specific escapement for specific stock, as
35 long as that goal is defined.

36 Q All right. You're familiar, are you, with a term
37 that's been called the "cutback point" and there's
38 a graph that that is visually displayed on. I
39 don't have it right at my fingertips but do you
40 know the --

41 A It's in page 104 in our report. So if you looked
42 at that, it should have that.

43 Q Okay. Let's go there. Yes, that's the one. Now,
44 that aims, as I understand it, to provide a
45 structure within which fisheries managers can plan
46 and apply the TAM rules to account for what's
47 happening in-season. Have I got that right?

- 1 A Yeah, it relates the run size to a specific TAM
2 estimate, or total allowable mortality, rate.
- 3 Q And it, in turn, is then allowing them to decide
4 what fishing to allow by reference to what is
5 appropriate or what's needed in order to allow for
6 proper escapement, right?
- 7 A Yeah. Yeah, that's the idea.
- 8 Q And does that not achieve what you have been
9 speaking of when you refer to escapement goals?
- 10 A Not necessarily. Because the escapement goal is
11 not defined by this graph. It defines what you
12 are going to do in terms of allowing harvest at a
13 variable run size.
- 14 Q Aren't we really talking about the same thing
15 coming at it from two different angles? Isn't
16 what you would allow by way of harvest or not
17 allow really the same thing as having an
18 escapement goal because it's the reverse side, if
19 you like? The structure or the chart that you see
20 here is saying when to stop harvest, which does
21 have the effect of allowing escapement to occur.
- 22 A Yeah, if you were managing perfectly and obtained
23 a specific harvest rate that you were targeting
24 for that run, it will tell you what escapement
25 would occur if you do that. It doesn't tell you
26 what your goal is. It just tells you what the
27 escapement will be.
- 28 Q All right. Summing up then, as I understand what
29 you're saying and I invite you to comment on this,
30 you are in agreement with the approach that's
31 taken insofar as the TAM rule exists and is
32 applied but you would like to see in addition to
33 that, and as part of the equation, a goal so you
34 know your end game, if you like?
- 35 A That's correct, yes.
- 36 Q All right. So in other words, you're proposing to
37 add something to what's already there?
- 38 A Yeah.
- 39 Q You're not tearing anything down and rebuilding?
- 40 A Yeah, that's right. And to use a sports analogy,
41 which might be easier, you know, you want to know
42 where that goal line is. That's the thing you've
43 got to cross at the end of the day. You don't
44 want it to be constantly shifting.
- 45 Q All right. Do you agree with me that the TAM rule
46 allows for there to be a proper account taken of
47 less productive stocks and gives the ability to

- 1 protect those less productive stocks?
2 A Yeah, where you put these particular cutback
3 points and no-fishing points will provide greater
4 or less protection for the non-target stocks.
5 Q And you've spoken to some of this already but
6 where you have those less productive stocks
7 running with more productive stocks, applying the
8 TAM rule is going to have the effect of cutting
9 back on fishing for all stocks, right, because of
10 the nature of what you have, that is, you've got
11 mixed stock runs?
12 A Well, that's going to be taken into consideration
13 presumably when the people define these points.
14 The TAM rule will tell you where the no-fishing
15 point is and whether it's completely no fishing or
16 a minimum harvest level, which is what it's
17 evolving to now because there are fisheries -- an
18 expectation that there will be some level of
19 harvest even at low stock sizes due to overlaps.
20 It's important to note that the TAM rules are
21 defined by run timing groups and the run timing
22 groups are not completely distinct. So you have
23 issues with overlap between the run timing groups
24 but then you also have to define at what point you
25 believe it is safe to have your maximum
26 exploitation rate. And depending on what those
27 numbers are, we'll provide more or less protection
28 for the less productive stocks.
29 Q One of the effects of all of this, though, is
30 that, in protecting the less productive stocks,
31 you're going to be cutting back to a great extent
32 on stocks that are more productive than are
33 running with the less productive stocks?
34 A Yes, you're going to have a lower exploitation on
35 those that could, in theory, handle a higher
36 exploitation.
37 Q And that's a trade-off, if you like, that has to
38 be made in order to favour conservation?
39 A Yeah.
40 Q Now, you'll be asked questions by others after me
41 that will come at all of this from a different
42 angle, I'm sure, and we can all see the
43 controversy that can rise up in some quarters over
44 this, but it really comes down to putting
45 conservation of stocks ahead of individual fishing
46 and economic opportunity or the other way around,
47 doesn't it, when you're dealing with the Fraser?

- 1 A Yeah, in any river. Fraser's not unique.
- 2 Q Well, the Fraser has added complexity in part
- 3 because of the mixed stock runs, doesn't it?
- 4 A Well, I think there's no fishery that I'm aware of
- 5 in B.C. that doesn't have some degree of mixture.
- 6 There's ones that have -- none that have as
- 7 complex as the Fraser but whether it's the Skeena,
- 8 Nass or Barkley Sound, they all have a mixture of
- 9 stocks that are being harvested, just fewer
- 10 numbers in some cases. Like Barkley Sound doesn't
- 11 have as many sockeye populations as the Fraser for
- 12 sure, or even the Skeena.
- 13 Q One of your criticisms, as I read your paper, of
- 14 the TAM rule, is that it's hard to communicate
- 15 and, therefore, something clearer should exist?
- 16 A Yes.
- 17 Q Have I read your paper right?
- 18 A That's correct.
- 19 Q But you'll agree with me, will you, that the fact
- 20 that something is hard to communicate is not a
- 21 reason to not do it, if it's the right thing to
- 22 do?
- 23 A No, just it makes it complicated doesn't mean you
- 24 shouldn't do stuff but you should find a way of
- 25 communicating very clearly what your goals are so
- 26 that people understand what the goals are and then
- 27 explain how -- well, I view the TAM rule as a
- 28 means to an end. The end is what I need to have
- 29 defined.
- 30 Q All right. That's a fine way of putting it.
- 31 Thank you. Do you agree with me that the
- 32 methodology used in the TAM rule is a sound one?
- 33 A It's very reasonable, yes.
- 34 Q You're shifting onto en route loss. Your report,
- 35 as I read it, could be read as equating en route
- 36 loss with en route mortality. But whether I've
- 37 read it right or not, will you agree with me that
- 38 such things as measurement errors and biases, for
- 39 example, Mission, and you've talked some of
- 40 Mission, can contribute to what's included in this
- 41 term, "en route loss"?
- 42 A Definitely. And where it's actually referred to
- 43 in our paper, it relates it directly to the
- 44 difference between the estimates of escapement
- 45 past Mission and spawning grounds.
- 46 Q All right. But you agree that en route loss is
- 47 more than just fish dying?

1 A That's correct, yes.

2 Q Now, I'd like to turn to Bristol Bay and the work
3 there vis-à-vis the Fraser. And I realize this is
4 not a part of the report that you wrote but you
5 clearly have good knowledge of what's there. And
6 the report compares in contrast as the approach in
7 Bristol Bay with the Fraser situation. And you've
8 spoken to differences between the two and you've
9 spoken to the greater complexity that exists on
10 the Fraser. But I'd like to drill down a bit and
11 just be sure and see if we can get clarity on some
12 of these differences. And I thank you for what
13 you've said already. But I'm going to try and
14 list them out and see if I've got it right.

15 So I'm going to go through it, item-by-item,
16 if you like, and there's maybe ten or so of these,
17 comparing the Fraser to Bristol Bay. The Fraser
18 fishery is, in part, an international fishery
19 that's governed by the international treaty and
20 the Fraser panel that you spoke of. And
21 Fisheries, as a department, is constrained in what
22 it can do by reference to the treaty versus
23 Bristol Bay where, as you've described, the area
24 biologists are given preliminary authority really
25 to manage their area, as they decide best.

26 A Yes.

27 Q So the difference being there is international
28 aspects with an international treaty on the Fraser
29 and constraints that come from that versus no
30 constraints up at Bristol Bay?

31 A Yeah, no international constraints in Bristol Bay,
32 correct.

33 Q And in terms of the geography and what the fish
34 have to do, on the Fraser, they travel a very long
35 distance towards the Fraser and then a very long
36 distance in the Fraser versus Bristol Bay where
37 they don't actually travel too far by comparison
38 to get to the mouth or the river and they don't
39 travel very far in the river, do they?

40 A Well, the travel to the river, it may not be that
41 -- they don't go maybe as far physically but
42 they're coming from rearing areas in the northeast
43 Pacific and the Bering Sea and then into Bristol
44 Bay. It's just that there aren't a lot of
45 fisheries along those routes that are intercepting
46 them.

47 Q All right. Well, just focusing on that for the

- 1 moment, that is another difference, isn't it, that
2 there are no interception fisheries with regard to
3 Bristol Bay but there are with the Fraser?
- 4 A Yeah, they're really small associated with Bristol
5 Bay, as opposed to the Fraser.
- 6 Q But back to the distance, when you look at the
7 map, you can see that the Bristol Bay sockeye
8 travel to the river, maybe a third at most the
9 distance that the Fraser sockeye travel when
10 they're coming from the Gulf of Alaska?
- 11 A Yeah, assuming they're all rearing in the same
12 place. If you look at the distribution of Bristol
13 Bay sockeye in the northeast Pacific, it could be
14 very much different than Fraser sockeye and it
15 could be coming from areas much farther west than
16 where the Fraser sockeye arrived from.
- 17 Q All right.
- 18 A But my knowledge on those distribution is limited.
- 19 Q All right. And you've spoken to this next point
20 but on the Fraser you've got all the stocks going
21 into one river whereas up at Bristol Bay each
22 stock feeds into its own river; there's nine in
23 total?
- 24 A Yeah, there's a number of stocks. The way it's
25 managed is for these nine major populations.
26 There could be sub-components of those and there
27 no doubt are different lakes. So if you looked at
28 it from the point view how we define CUs,
29 conservation units, for sockeye, there could be
30 multiple ones within one of those particular river
31 systems because there's multiple lakes.
- 32 Q All right. But the fundamental difference being,
33 though, you've got one or a few stocks going into
34 each of the nine rivers up at Bristol Bay, as
35 distinct from all stocks going into one river with
36 the Fraser?
- 37 A Yeah.
- 38 Q Now, this next point, I think is one you haven't
39 spoken to so far but there's many different gear
40 type associated with fishing Fraser sockeye and
41 different user groups as well. As I understand
42 it, though, up by Bristol Bay, there's only two
43 gear type and I think you reference this in your
44 report --
- 45 A Yes.
- 46 Q -- although I don't think it came out in the
47 evidence this morning but have I got it right,

1 there's only two gear type up there?

2 A That's correct.

3 Q And on the Fraser, there's many First Nations. I
4 don't know the number exactly but there's well
5 over a hundred, whereas in Bristol Bay area,
6 there's very few First Nations that are doing
7 fishing, as I understand it?

8 A There are some that harvest both in the --
9 participate in the marine fisheries, in the
10 district fisheries and also in the subsistent
11 fisheries in-river but nowhere near to the same
12 portion of the catch as it can be in the Fraser.

13 Q And the total catch, and you said this, this
14 morning, I think, and it's in your paper, the
15 total catch by First Nations in Bristol Bay is
16 less than 1 percent of the total?

17 A Yeah, that includes subsistence fishing and sport
18 fishing. Subsistence fishing is not necessarily
19 all First Nations in Alaska.

20 Q Yes, as I understand it, and see if I've got this
21 right, subsistence fishing in Alaska is anyone,
22 whether you're First Nation or non-First Nation;
23 is that right?

24 A That's correct, yes.

25 Q And another difference --

26 THE COMMISSIONER: Mr. Taylor, in keeping with your
27 sports theme, could I call a timeout?

28 MR. TAYLOR: Sure.

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

31 THE COMMISSIONER: I think it's ten, Mr. Registrar.

32 THE REGISTRAR: Ten minutes.

33

34 (PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)

35 (PROCEEDINGS RECONVENED)

36

37 THE REGISTRAR: The hearing is now resumed.

38

39 CROSS-EXAMINATION BY MR. TAYLOR, continuing:

40

41 Q Still with Bristol Bay, Mr. English, there's a
42 number of other differences, but I think a lot of
43 them are covered in the paper and people will
44 eventually make submissions on them. I'm only
45 going to go to, as a final point on this, some
46 differences that bear on en route loss, as I
47 understand it, differences between the Fraser and

- 1 Bristol Bay. You've got warmer river temperatures
2 on the Fraser system, and that's not a factor in
3 Bristol Bay, is it?
- 4 A No, it's not been to date, anyway.
- 5 Q All right. And you've got a lot of in-river
6 fisheries in the Fraser, but you don't at Bristol
7 Bay, do you?
- 8 A No, we don't.
- 9 Q And you just have to look at the map, but you've
10 got a much longer freshwater migration on the
11 Fraser system than you do in any of the nine
12 Bristol Bay rivers, correct?
- 13 A Yes. For some of the stocks some have a short
14 migration on the Fraser as well, but a lot of the
15 bigger ones have long migrations.
- 16 Q Quite so. And the significance of that, and
17 there's been some evidence about this, but from
18 the point of hitting the freshwater in the Fraser
19 or the rivers in Bristol Bay, the fish are on a
20 mission to spawn and then die, correct?
- 21 A That's correct.
- 22 Q And the longer they have between entering that
23 freshwater environment and getting to the spawning
24 grounds and spawning, the more chance there is for
25 parasites and any other problems to arise and
26 cause them to die before they get to the spawning
27 ground, correct?
- 28 A That's correct.
- 29 Q I just want to ask a couple of quick questions
30 about tower counts, or the use of towers. That's
31 done in Bristol Bay. As I understand it, and you
32 alluded to this, it's literally a tower that
33 someone stands at the top of and counts the fish?
- 34 A Yes.
- 35 Q And they use a clicker that you would see traffic
36 monitors and so forth use, do they?
- 37 A I think some form of keeping track of the numbers
38 that go by.
- 39 Q Now, as I understand it up on the Bristol Bay --
40 firstly, these towers are at the mouth -- or near
41 the mouths of the river, aren't they?
- 42 A They're very low down, yes. Wherever they can
43 find the right substrate stream with not too much
44 depth so that they can have a good vision into the
45 water column.
- 46 Q All right. And as I understand it, where the
47 towers are the water's shallow and the water's

- 1 clear, is that right?
- 2 A That's the idea, yeah.
- 3 Q And that's quite not what the Fraser is?
- 4 A The Lower Fraser doesn't look at all like that,
5 no.
- 6 Q You can't see a fish in the Fraser like you can up
7 at Bristol Bay?
- 8 A You couldn't see your hand if your elbow was at
9 the surface.
- 10 Q All right. And you allude to this at page 168 of
11 your paper, and I won't take you to it in the
12 interest of time, but do you agree with me that
13 Bristol Bay can afford to have a fixed escapement
14 approach because the variability year to year is
15 much less -- far less than on the Fraser?
- 16 A Yes, much less variability in returns for the
17 different stocks.
- 18 Q Now, one thing that I think we haven't spoken of
19 already is to do with the co-position of the age
20 of fish returning up at Bristol Bay. You know who
21 Mike Lapointe is, chief biologist at PSC, correct?
- 22 A Yes, I know Mike.
- 23 Q He gave evidence earlier, and specifically on
24 January 19th, and we don't need to go to this, but
25 he gave evidence about key biological,
26 geographical and fisheries management's decisions
27 and the differences in comparing them as between
28 Bristol Bay and the Fraser, and he cited that a
29 key fundamental difference is the fact that the
30 portfolio of Bristol Bay sockeye are composed of
31 fish that return at various ages, not just the
32 mostly four-year-olds that come with the Fraser
33 sockeye, and he said that's a key reason why
34 Bristol Bay sockeye returns are more robust and
35 less variable than the Fraser. Do you agree with
36 him on that?
- 37 A Yeah, I think looking at Bristol Bay as a total
38 unit and Fraser as a total unit, that's the
39 reason. If you look within Bristol Bay at
40 specific populations -- I want to make it clear
41 from my previous statement that it's less
42 variable. There's actually more variability
43 within individual populations over a number of
44 years because of the size of the populations in
45 Bristol Bay. You could get from a few -- very few
46 million up to 25 million returns from a single one
47 of these districts.

- 1 Q All right. A couple of quick questions about the
2 Mission hydroacoustics monitoring. You're
3 familiar with the operation there, are you, that
4 the Pacific Salmon Commission runs?
- 5 A Yes, I am.
- 6 Q And while location, location, location can be
7 everything and it is a good location in terms of
8 its position on the map as a geographic layout in
9 the shape of the river basin, it's not very good
10 for hydroacoustics, is it?
- 11 A No, that's what the hydroacoustics people have
12 determined through a number of reviews that I've
13 read.
- 14 Q All right. And does that underline, in your mind,
15 the need for ever improving the technology that's
16 there as new technology becomes available?
- 17 A Yes, and that's what I understand they're doing
18 with using more DIDSON systems, a different type
19 of acoustic system than what they've been using in
20 the past.
- 21 Q All right. And does it also lead to the need for
22 other means of estimating in-season? In other
23 words, to support Mission because Mission, itself,
24 notoriously has got bias in it, high or low, or
25 other errors?
- 26 A Yeah, so your choice is either put together
27 something that's going to replace Mission, be
28 better than Mission, or put in a secondary system,
29 like has been done at Qualark, to help crosscheck
30 Mission.
- 31 Q All right. But anywhere near Mission is going to
32 have the same kind of river basin-shaped problems
33 that Mission has, isn't it?
- 34 A Yeah, you're not going to find any better site for
35 acoustics, probably, in the Mission area, than the
36 one at the current site.
- 37 Q Do you also agree with me that it underlines the
38 need for having pre-season forecasting in place to
39 assist with crosschecking, if I could put it that
40 way?
- 41 A I don't think they're using the pre-season
42 forecast to crosscheck Mission or the test fishery
43 results, because there's more confidence that the
44 test fisheries combined with -- even with the
45 problems at Mission, there's more confidence, at
46 least early in the run, prior to the arrival of
47 late-run fish, there's more confidence that

1 they're going to get closer to the actual returns
2 by doing the in-season test fisheries than they
3 will by relying on pre-season forecasts.

4 Q All right. And almost finally, I want to take you
5 to your recommendations and specifically
6 recommendation 3, and your recommendation there -
7 this is on page 173 - your recommendation there is
8 that:
9

10 The analytical resources currently allocated
11 to preparing pre-season forecasts
12 should be re-allocated to defining a clear
13 set of escapement goals and in-season
14 management models that will assist managers
15 in fisheries planning and the
16 achievement of these goals.
17

18 Now, I'd like to, in light of what you've said in
19 evidence so far, ask if you would consider
20 amending that because, as I understand you, you're
21 not saying to shut down pre-season forecasting,
22 you've got some questions about it, but you see it
23 as a valuable tool, and yet you recommended that
24 it be stopped?

25 A Yeah, it was probably a mistake not to say "some"
26 of the analytical resources, as opposed to "all".

27 Q All right.

28 A Yeah.

29 Q So you're not proposing to shut it down, you're
30 simply questioning how much?

31 A Yeah, it's on a priority basis. The other ones
32 would have as high or higher priority and there
33 may be ways of doing it simpler so that we can use
34 these limited DFO resources and limited people who
35 have these capabilities to -- and Sue Grant, by
36 the way, was the person who prepared the initial
37 submission last fall on setting benchmarks, she
38 and a bunch of others working with her, for Fraser
39 sockeye. So obviously you're relying on the same
40 people for multiple tasks.

41 Q Yes, and I think you're alluding to a paper that
42 has been talked about here that's upcoming in
43 publication, but not yet.

44 With that, and my final questions, if, in
45 fact, the amount of resources put into pre-season
46 forecasting is fairly modest in the scheme of
47 things, then that would bode for leaving that in

Karl English

Cross-exam by Mr. Taylor (CAN)

Cross-exam by Mr. Leadem (CONSERV)

1 place because pre-season forecasting is useful,
2 you wouldn't cut it back to zero, and if it's
3 already modest there wouldn't be much need or room
4 to cut it back then --

5 A Yeah.

6 Q -- would you agree with me on that?

7 A Yeah, if it doesn't amount to much. You're not
8 gaining a lot by stopping it.

9 MR. TAYLOR: Exactly. Thank you, Mr. English.

10 A Sure.

11 MS. BAKER: Thank you. Mr. Commissioner. The next
12 questioner will be Mr. Leadem for the Conservation
13 Coalition.

14 MR. LEADEM: Leadem, initial T., appearing as counsel
15 for the Conservation Coalition.

16

17 CROSS-EXAMINATION BY MR. LEADEM:

18

19 Q I'd like to focus predominantly on your
20 recommendations, Mr. English, and I will ask Mr.
21 Lunn to bring up pages 173 and 174, if he could.

22 The first one I'd like to begin with is
23 actually number 6, in which you advocate that
24 escapement goals be put into place for each
25 indicator stock and run-timing group. And then
26 you go on to suggest that there should be at least
27 two different lower benchmarks and two upper
28 benchmarks for each cyclic stock.

29 So what I'm trying to understand is why you
30 would have the benchmarks -- why you would have
31 two benchmarks. Is that only because the cyclical
32 stock would be that in the good year you would
33 want that to be a different one than it would be
34 in an off year; is that what you're driving at
35 there?

36 A Yes. Yes.

37 Q And I noted that there is some discussion in some
38 of the recommendations that were critiqued by Dr.
39 Sean Cox about this concept, and maybe I can just
40 take you there.

41 A Sure.

42 MR. LEADEM: If we could have Appendix M? and I
43 believe the comments from Dr. Sean Cox would be
44 found at M-32, Mr. Lunn.

45 Q Now, firstly, you are aware that Dr. Sean Cox is a
46 professor at Simon Fraser University; is that
47 correct?

1 A Yes, that's correct.

2 Q And he is a professor in the Fisheries Science and
3 Management Department at SFU; is that not right?

4 A That's correct.

5 Q And his focus is primarily on aquatic conservation
6 and management of human impacts on aquatic
7 ecosystems; are you aware of that?

8 A Yes.

9 Q So he says, there, that:

10

11 I agree that having a clear set of easily
12 understood operating rules would benefit
13 everyone involved in Fraser River sockeye
14 fisheries, including harvesters. However,
15 the authors could be more specific about what
16 they mean and what potential consequences
17 might follow from their recommendations. For
18 example, (1) do they mean stock-specific,
19 fixed escapement goals? (2) how well could
20 those be determined? (3) how would 19 stock-
21 specific escapement goals make it easier to
22 manage fisheries given that many stocks will
23 sometimes have returns below these goals?

24

25 All of which I think are very excellent questions.
26 And then you go on to provide an answer to those
27 comments and the critiques of Dr. Cox, and this is
28 where I'm a little bit confused and perhaps you
29 can help me. You say:

30

31 What we are suggesting is similar to what is
32 proposed under the [Wild Salmon Policy].

33

34 So let me just stop you there. Obviously, you're
35 quite familiar with the Wild Salmon Policy and
36 what it says in terms of establishing benchmarks,
37 lower benchmarks, upper benchmarks, for each of
38 the conservation units; is that correct?

39 A That's correct. Yes.

40 Q And so you go on to say:

41

42 We are recommending that a Limit Reference
43 Point (LRP) and Target Reference Point (TRP)
44 be defined by cycle year for each indicator
45 stock.

46

47 So let me just stop there, because I've seen these

- 1 terms before, LRPs and TRPs. They arise in the
2 context of MSC certification, do they not?
- 3 A That's correct. Yes.
- 4 Q And limit reference points are points at which
5 there's absolutely no fishing occurs. Is that
6 your understanding of what an LRP dictates or how
7 it's to be interpreted?
- 8 A Well, the way it's proposed to be used is that as
9 you approach a limit reference point you start
10 severely curtailing fisheries. If you have runs
11 below that, then you would not have fisheries.
- 12 Q Right. And so are you equating, then, limit
13 reference points, as they're understood in the MSC
14 process, to lower benchmarks as they're understood
15 in the Wild Salmon Policy and as they are defined
16 for conservation units?
- 17 A Yeah, that's -- they could be interpreted that way
18 and that could be a proposal to -- depending on
19 how the lower benchmarks were defined, they could
20 be -- meet the criteria for a limit reference
21 point as defined by MSC.
- 22 Q Right. And you're quite familiar with the MSC
23 process, are you not, because you were one of the
24 scientists that was involved in the certification
25 process for Fraser River sockeye, were you not?
- 26 A I was, and I'm more familiar than I want to be.
- 27 Q All right. I take it by your answer that it was a
28 quite arduous process, was it not?
- 29 A It was very involved. It took over 10 years to
30 get to where we are today, and it's not done yet,
31 because it keeps on going. It's one of those
32 nightmares you keep having again and again.
- 33 Q Well, let's hope that we don't have that nightmare
34 by some of the things that we're going into in the
35 context of this inquiry, although we seem to be
36 repeating patterns of looking at Fraser River
37 sockeye time and time again from -- based upon
38 other inquiries that preceded this one. You're
39 aware of that, are you not?
- 40 A Yeah. No, there's been lots of these.
- 41 Q So what I'm curious about, and this is what's
42 driving me, is how are we going to meld the Wild
43 Salmon Policy and the conservation units into what
44 we see in the existing structure with 19 indicator
45 stocks, and these are the 19 indicator stocks that
46 DFO has defined; is that correct?
- 47 A Yes.

1 Q And we know, for example, that if we look at some
2 of the conservation units that have been defined
3 in the Wild Salmon Policy, at least so far,
4 appears to be anywhere in the range of something
5 like -- I'll have to approximate it, because no
6 one has ever actually come and said there are a
7 definite number of conservation units, but it
8 seems to be around 30 or so. Does that accord
9 with your understanding as well?

10 A Yeah, there are 25 conservation units that are
11 very clear. There is a number of others that
12 there's an ongoing debate about whether they
13 qualify as conservation units, depending on who
14 you talk with, and there could be up to 36, as I'm
15 aware of, as the largest number for conservation
16 units for Fraser sockeye.

17 Q Right. So if you were to actually take your
18 answer there in order to be more accurate, even
19 though we only have the 19 indicator stocks, we
20 really should be focusing upon the actual number
21 of conservation units that are finely defined in
22 the work that's being done by Sue Grant and Carrie
23 Holt and others; is that fair to say?

24 A Well, the focus for setting goals should be one
25 that's based on available information, and there's
26 not much point in pulling a goal out of mid air,
27 because it doesn't do anybody any good to do that.
28 So the stocks where we have good, reliable
29 information are obviously the first place to start
30 in setting these goals.

31 And so what I'm recommending here, and I've
32 said it earlier today, that the key is to find the
33 goals. These limit and target reference points
34 might refer to those goals, in fact, in some
35 places limit reference points are defined in terms
36 of your ultimate goal, your -- and target
37 reference points might be the escapement goal.

38 The reason why I use these terms is because
39 there's a link to a process which is underway
40 through MSC certification and it's approach that
41 has been proposed not just for salmon fisheries
42 but for a variety of fisheries across the world,
43 is specifically stating what your goals are and
44 identifying the point when you are going to, you
45 know, say, "Okay, at this point we're not going to
46 have fisheries."

47 Q Right. And that's what I think everyone in this

1 room is concerned about is some certainly about
2 when can harvesters actually go out and fish and
3 when can they not.

4 A Mm-hmm.

5 Q And from the perspective of my clients, who are
6 conservationists, they want to know when the fish
7 will be saved, when, in other words, when
8 conservation will be the superseding factor, and
9 when will harvesting be allowed to occur. I think
10 all of us are striving for that.

11 So can you help us to see how we can arrive
12 at that point? Is there a methodology that you
13 are proposing here, or elsewhere, that would allow
14 us to get to a stage where everyone in this room,
15 with their disparate interests, would be able to
16 focus upon a finite point and say, "Okay, we're
17 fine with fishing after this point, but if it goes
18 below that point we're not fine with it"?

19 A Mm-hmm.

20 Q Can you help us see how we can arrive there?

21 A I think the problem you referred to at the
22 beginning was that we have multiple stocks and so
23 we have multiple goals, not just one goal we're
24 striving for, for the entire Fraser. But the
25 first place to start is with the information we
26 have on our 19 well-assessed and monitored for a
27 long time period stocks. So define the goals for
28 those very clearly. They're all part of one or
29 another, one of the run-timing groups, so you're
30 going to have to pull those goals together for a
31 specific run-timing group and say, "This is how,
32 when we're managing these stocks together, as long
33 as we have fisheries like we have today, mixed
34 stock fisheries, we're going to have to deal with
35 these multiple goals from within a timing group."

36 And that's the level where you'll have to
37 deal with the trade-off question of you have a
38 goal which says where you want to be. How fast
39 you are going to get there, how strict your
40 fisheries regulations are to protect the fish from
41 harvest will determine the time period it takes
42 you to go from where you are today, which, you
43 know, a number of these stocks that are below what
44 a reasonable goal might be, so you have to
45 increase them, and the speed, so as determined by
46 how strict your fisheries regulations are, but
47 also on productivity, which you've heard a lot

1 about, about how productive the stocks are, how
2 many return in a given year. So if you have a
3 really strong return on one of these populations,
4 then, you know, backing off and not harvesting a
5 lot of it will get you to your goal faster because
6 you've got a lot of fish.

7 In a low abundance year, you could back off
8 for a long, long time, or low abundance, low
9 productivity, and you may not get any closer to
10 your goal.

11 Q Well, one of the solutions to the dilemma that we
12 all are facing, now, would be to somehow try to
13 segregate out the units of concern, the
14 conservation units that are in that red zone or
15 that are endangered or whatever language you may
16 wish to use, trying to segregate those out in some
17 fashion from the actual conservation units that
18 can be harvested and will come back and are
19 sustainable. Isn't that one potential solution to
20 the dilemma that we're in?

21 A Yeah, definitely looking for opportunities where
22 you have a surplus, if you like, a number of fish
23 that can be harvested of a specific stock, that
24 where you can harvest those fish without impacting
25 the other ones you're trying to protect.

26 Q Right. Because if we stick with the mixed stock
27 fishery that we have now, we're going to end up
28 not making anybody happy, because the
29 conservationists are not going to be happy because
30 the conservation units are going to decline,
31 Cultus Lake and other units are going to decline,
32 because there will be incidental catches of those
33 conservation units. And on the other hand, the
34 commercial fisheries are not going to be very
35 happy, because they're not allowed to fish those
36 stocks that are sustainable.

37 So really what we're after is finding some
38 solution to this dilemma, and I can't see how we
39 can continue with the same model of fishery that
40 we've been espousing for decades now and come up
41 with a solution. Am I just completely off base
42 with my reasoning and logic here?

43 A You're correct in that you can't keep doing the
44 same thing and hoping for a different result. I
45 think that's the definition of insanity, right?
46 So, you know, clearly you have to make some
47 changes to how we execute the fisheries in order

1 to get to these goals. But right now, in this
2 point in time, we don't even have the goals
3 defined. And this is a fundamental problem. It's
4 not to say that nobody has a goal or nobody has
5 some idea of what we're striving for, but we
6 haven't explicitly defined these goals for these
7 populations.

8 Q All right. So that's a starting point?

9 A Yeah.

10 MR. LEADEM: Well, this, Mr. Commissioner, since I
11 don't think you don't want to go into overtime, is
12 probably the end point for today.

13 THE COMMISSIONER: Maybe we could just take a minute,
14 Mr. Leadem, to follow up on that last answer, and
15 it might help me, and I'm sure it will help
16 others. I'm still not sure I understand what you
17 mean by "defining goals". I know what goals are.
18 For example, let's say in a corporate setting your
19 company wishes to generate five million dollars in
20 revenue, that's your goal, next year, or in 2011.
21 So you can take action as best you can to achieve
22 that goal.

23 But your report and the evidence of others
24 has brought home to us the complexity of this
25 fishery, both the human dynamic involved as well
26 as the natural dynamic involved. So when you say
27 "setting goals" I may be the only one in the room,
28 sir, that doesn't understand what you're talking
29 about in that limited area; in other words, being
30 able to set a goal for a CU in terms of its
31 sustainability, what we want to get to, versus
32 reacting to nature and how it plays out in terms
33 of the abundance of the fish, as well as all of
34 the human dynamics that are involved in this
35 fishery, be it those who harvest the resource or
36 those who perhaps, through their conduct on the
37 land or in the water, have an impact on the
38 resource.

39 So if you could just explain to me what you
40 mean by, I think you said, "We have to make
41 changes to the model, but we have to explicitly
42 define the goals," I'm not sure what you mean.

43 A In the case of sockeye, and in other salmon
44 species, there are numbers of spawners that we
45 would like to see in the spawning grounds for
46 specific stock, and in the case of sockeye, it
47 could be because there's an estimate of a rearing

1 capacity for a lake. So the lake will support so
2 many juvenile sockeye. And so we'll look at the
3 spawning grounds around the lake and say, "Okay,
4 if we look at average egg to," or, "survivorship
5 from adults to fry, and this many adults will
6 produce this many fry that will then go into the
7 lake," and that will fully seed that habitat.

8 And if that's the goal, is to fully seed the
9 habitat, taking into consideration the other
10 species that may also occupy that habitat, that
11 could be the goal we're talking about here. We
12 want to see this habitat fully seeded, because
13 then it'll produce the maximum amount of fish that
14 that particular lake can produce. Those fish will
15 still be vulnerable to survivorship once they
16 leave the lake, and also within the lake, but, you
17 know, we'll seed the habitat, like a farmer
18 seeding his completing field and not just half of
19 it, and then those fish go out and rear and come
20 back from the ocean and presumably, if we've done
21 a good job of putting the right number of fish on
22 the spawning grounds, we'll get a better return so
23 there'll be more opportunities for harvest.

24 And how you manage the harvest is in terms of
25 how you distribute it. How you have the trade-
26 offs between the productive stocks and the non-
27 productive stocks is the second challenge once you
28 have the fish coming back.

29 And you define them as goals because you're
30 saying, "For each of these populations, this is
31 where we'd like to be." So what actions are you
32 prepared to take to get there?

33 And some populations there may be some cold,
34 hard facts that where this may be where we'd like
35 to be but we can never get there because -- or we
36 can't get there in the current regime because
37 there's just not enough survivorship. So that's
38 where you may have to step in and take other
39 actions, like is being done at Cultus, where you
40 have an enhancement, other habit alterations,
41 predator removal, you know, you have to take other
42 actions to give the fish a better chance at coming
43 back to what your goal is.

44 THE COMMISSIONER: And do I understand you to be saying
45 to me and to the participants that at the present
46 time within the structure of the management of the
47 sockeye fishery in the Fraser, that model that

1 you've just described is not used?

2 A Yeah, it's not explicitly stated that these are
3 the escapement goals for each of these
4 populations.

5 THE COMMISSIONER: You may have a follow-up to that,
6 Mr. Leadem. I'm content to wait a few minutes if
7 you'd like to just follow up to that.

8 MR. LEADEM: Well, I do have one follow-up question to
9 that.

10 Q When you used the terminology "escapement goals",
11 I just want to make clear in my mind that, are you
12 equating that with the setting of benchmarks and
13 the setting of limit reference points and target
14 reference points? Are you defining that in the
15 same way?

16 A Well, it's most similar to a target reference
17 point. It's where you want to be with a
18 particular stock. A limit reference point is
19 going to be at a point much less than your goal in
20 most places, because you recognize that you're not
21 going to get immediately to your goal on every
22 population, and for social reasons you don't want
23 to curtail fisheries entirely until you've reached
24 the goal. The goal is just like in the corporate
25 sense, you know, it's something you strive for
26 over time. You're not instantaneously expecting
27 you're going to achieve your goal.

28 MR. LEADEM: Thank you, Mr. Commissioner.

29 THE COMMISSIONER: Thank you very much.

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

33

34 (PROCEEDINGS ADJOURNED AT 4:07 P.M. UNTIL
35 FRIDAY, APRIL 15, 2011, AT 10:00 A.M.)

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I HEREBY CERTIFY the foregoing to be a
true and accurate transcript of the
evidence recorded on a sound recording

1 apparatus, transcribed to the best of my
2 skill and ability, and in accordance
3 with applicable standards.
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8 Pat Neumann
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10 I HEREBY CERTIFY the foregoing to be a
11 true and accurate transcript of the
12 evidence recorded on a sound recording
13 apparatus, transcribed to the best of my
14 skill and ability, and in accordance
15 with applicable standards.
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20 Irene Lim
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22 I HEREBY CERTIFY the foregoing to be a
23 true and accurate transcript of the
24 evidence recorded on a sound recording
25 apparatus, transcribed to the best of my
26 skill and ability, and in accordance
27 with applicable standards.
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32 Karen Acaster
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34 I HEREBY CERTIFY the foregoing to be a
35 true and accurate transcript of the
36 evidence recorded on a sound recording
37 apparatus, transcribed to the best of my
38 skill and ability, and in accordance
39 with applicable standards.
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42 _____
43 Karen Hefferland
44