

Review of the 2012 Public Comment Draft Report for Marine Stewardship Council Certification of British Columbia Chum Salmon Fisheries

May 17, 2012

Prepared by: Raincoast Conservation Foundation, SkeenaWild
Conservation Trust, David Suzuki Foundation, and
Watershed Watch Salmon Society



EXECUTIVE SUMMARY

This paper provides an evidence-based critique of the Public Certification Draft Report (PCDR) for Marine Stewardship Council (MSC) certification of British Columbia's (BC's) chum salmon fisheries. The PCDR is an assessment of BC's chum salmon fisheries prepared by Intertek Moody Marine for the Canadian Pacific Sustainable Fisheries Society (CPSFS). The CPSFS is seeking MSC certification of BC's chum salmon fisheries.

This paper challenges some of the scores given by the Assessment Team (AT), speaks to the inadequacy of some of the certification conditions proposed by the AT, as well as commitments made by Canada's Department of Fisheries and Oceans (DFO) in their action plan. The authors recommend (1) changes in specific scores and conditions, (2) improvements to the DFO action plan to ensure that conditions are met if certification is granted, and (3) that certification be withheld until fishery performance is improved to the point that passing scores can be justified based on an objective and precautionary interpretation of available information.

Four key sustainability issues with B.C. chum fisheries include:

- By-catch and discards of depleted, threatened, or endangered non-target stocks (e.g. wild chum salmon in fisheries targeting hatchery chum) and non-target species (e.g. steelhead, coho, and sockeye salmon), is exacerbated by a lack of sufficient fishery monitoring resulting in poor catch data. This paper provides evidence that bycatch and discards may be impeding the rebuilding and recovery of depleted salmon stocks; that DFO does not have scientifically defensible estimates of the numbers of salmon of non-target stocks and species caught and killed in commercial chum salmon fisheries; that problems exist with the accurate reporting of bycatch and discards, and that mortality from discards is likely vastly under-estimated with most chum not surviving to spawn.
- Poor mitigation of impacts to wild salmon populations from hatchery programs including the failure to distinguish between hatchery and wild fish in most catch and escapement estimates for BC chum salmon. The current status of wild chum conservation units includes first generation hatchery fish, in contradiction of the Wild Salmon Policy, and straying impacts to the genetic integrity and accuracy of escapement estimates of wild populations are not assessed. Other risks posed to wild salmon from hatchery operations include competition for food, disease, and bycatch in fisheries targeting hatchery populations.
- Distribution of spawning populations within conservation units is not currently assessed by DFO. Conservation units are very large for chum salmon, requiring consideration of distribution within a CU to assess status.

- Fixed exploitation rate targets allow for fishing into escapement goals (a.k.a. overfishing). For example, the Inner South Coast fishery is pursued without adequate in-season run size estimates, which can lead to fishing into escapement goals for Fraser River chum salmon.

TABLE OF CONTENTS

<u>EXECUTIVE SUMMARY</u>	<u>2</u>
<u>TABLE OF CONTENTS</u>	<u>3</u>
<u>GENERAL COMMENTS ON ISSUES IN THE PCDR AND BC CHUM FISHERIES</u>	<u>5</u>
BYCATCH AND INDEPENDENT MONITORING	5
DISTRIBUTION WITHIN CONSERVATION UNITS	5
HATCHERIES	6
DISTRIBUTION WITHIN STOCKS (CONSERVATION UNITS)	7
FLAWS IN ISC FIXED EXPLOITATION RATE APPROACH	8
<u>COMMENTS ON INDIVIDUAL PERFORMANCE INDICATORS</u>	<u>8</u>
PERFORMANCE INDICATOR 1.1.1.4	8
PERFORMANCE INDICATOR 1.1.1.5	10
PERFORMANCE INDICATOR 1.1.2.1	12
PERFORMANCE INDICATOR 1.1.3.1	12
PERFORMANCE INDICATOR 1.1.3.2	13
PERFORMANCE INDICATOR 1.2.1	17
PERFORMANCE INDICATOR 1.2.2	21
PERFORMANCE INDICATOR 2.3.1	27
PERFORMANCE INDICATOR 3.1.1	29
PERFORMANCE INDICATOR 3.1.9	29
PERFORMANCE INDICATOR 3.4.1.2	30
<u>CRITIQUE OF DFO ACTION PLAN TO ADDRESS CERTIFICATION CONDITIONS</u>	<u>32</u>
GENERAL COMMENTS	32
CONDITIONS 1.4, 1.5, 1.7 AND 3.1 (CONDITIONS RELATED TO REFERENCE POINTS)	32
ABILITY OF ACTION PLAN TO MEET CONDITIONS 1.4 AND 1.5	33
ABILITY OF ACTION PLAN TO MEET CONDITION 1.7	33
ABILITY OF ACTION PLAN TO MEET CONDITION 3.1	34
CONDITIONS 1.6, 2.1, 3.4, 3.7 AND 3.8 (CONDITIONS RELATED TO REBUILDING PLANS)	34
ABILITY OF ACTION PLAN TO MEET CONDITIONS 1.6, 2.1, 3.4, 3.7 AND 3.8	34
CONDITIONS 3.6, (CONDITIONS RELATED TO RESEARCH)	35
ABILITY OF ACTION PLAN TO MEET CONDITION 3.6	36
CONDITIONS 1.1, 1.2, 1.3 (CONDITIONS RELATED TO CATCH MONITORING & STOCK COMPOSITION)	36
ABILITY OF ACTION PLAN TO MEET CONDITION 1.1	37

ABILITY OF ACTION PLAN TO MEET CONDITION 1.2	37
CONDITIONS 3.2, 3.3, 3.10 AND 3.11 (CONDITIONS RELATED TO NON-TARGET BYCATCH ESTIMATES)	38
ABILITY OF ACTION PLAN TO MEET CONDITIONS 3.2 AND 3.10	38
ABILITY OF ACTION PLAN TO MEET CONDITIONS 3.3 AND 3.11	40
CONDITIONS 3.5 AND 3.9 (CONDITIONS RELATED FISHERY PERFORMANCE REVIEWS)	40
ABILITY OF ACTION PLAN TO MEET CONDITION 3.5	40
<u>ACKNOWLEDGEMENTS</u>	<u>41</u>
<u>REFERENCES</u>	<u>42</u>
<u>CRITIQUE OF CATCH REPORTING AND COMPLIANCE MONITORING</u>	<u>45</u>
INTRODUCTION	45
EVALUATING BYCATCH AND DISCARDS	45
LIMITATIONS OF LOGBOOKS AND OTHER FISHERY DEPENDENT INFORMATION	47
TOTAL FISHING ASSOCIATED MORTALITY	50
ADDITIONAL INFORMATION ON DISCARDS	52
FAO GUIDANCE	56
FLAWED INFORMATION PROVIDED TO ASSESSMENT TEAM IN REGARDS TO THE IMPACT OF CHUM FISHERIES ON NON-TARGET SPECIES	58
MSC REQUIRES AN ESTIMATION OF TOTAL MORTALITY	63
LACK OF COMPLIANCE WITH CATCH REPORTING	65
CATCH ESTIMATES OF TARGET STOCKS	69
CHANGING POLICY ENVIRONMENT	70
UNVERIFIED CATCH ESTIMATION IS NOT CATCH REPORTING	71
PEER REVIEWER CONCERNS	72
INDIRECT IMPACTS OF CATCH AND RELEASE OF DISCARDS	73
SELECTIVE FISHING POLICY	74
SCORING THE INDICATOR	74
CONCLUSION	75
REFERENCES	76
APPENDIX 1	79
APPENDIX 2	80
APPENDIX 3	80
APPENDIX 4	81

GENERAL COMMENTS ON ISSUES IN THE PCDR AND BC CHUM FISHERIES

Bycatch and independent monitoring

As detailed in the critique provided by Greg Taylor within this submission, and further highlighted by the assessment team in the PCDR, there are substantial outstanding concerns with the impacts of B.C. chum fisheries on both non-target chum, and non-target species such as chinook, coho, sockeye and steelhead. Further, there is a lack of independent and scientifically defensible monitoring of bycatch.

Distribution within conservation units

Chum salmon exhibit less distinct genetic variation across spawning/rearing geography. As a result, the conservation units defined for B.C. chum salmon under the Wild Salmon Policy are large in scope, particularly in relation to the number of spawning streams/watersheds that are captured within a single conservation unit.

The methodology established for assessing the status of conservation units (Holt et al. 2009) includes distribution within a CU as a potentially important contributor to status. Setting abundance-based escapement goals at the CU level will not adequately ensure distribution with a CU is protected. Current chum salmon escapement objectives, although not necessarily managed to explicitly, are sometimes a more refined watershed-level and sometimes at a broad aggregate level. Adequately considering distribution within a CU will require DFO to maintain monitoring of refined, watershed-level escapement where it is measured (e.g., Vancouver Island streams) and increasing monitoring in some systems (e.g., the Fraser watershed) may be required to ensure adequate distribution within a CU.

Given the importance of distribution (i.e., of populated spawning locations) within a CU to chum salmon, both in terms of population status as well as ecosystem contribution, the assessment team should ensure it is captured in conditions intended to address chum stock status.

As a result, at a minimum condition 3-1 should be updated to the following:

Condition 3-1. For all chum salmon UoCs – Certification of all chum salmon fisheries will be conditional until management objectives are clearly defined **that ensure most target chum stocks are maintained above their WSP lower benchmark incorporating abundance and distribution within a conservation unit.** Objectives will be provided to the Certification Body by the second surveillance audit.

Hatcheries

Two substantial omissions from the assessment were (1) consideration of the contribution of first-generation hatchery fish to the status of stocks, and (2) the potential impacts of straying from hatcheries on adjacent chum stocks.

Recent research has demonstrated that straying rates of hatchery salmon are often higher than predicted by management agencies and that impacts may extend to a wide range of stocks adjacent to the area where enhanced salmon are released (Rand et al. 2012).

Brenner et al. (2012) evaluated the prevalence of enhanced pink, chum and sockeye in spawning areas outside of the enhanced system. In some systems up to 63% of chum salmon were hatchery strays, significantly exceeding proposed thresholds of 2-10%. Productivity, genetic diversity and fitness impacts of hatchery strays were highlighted. Grant (2012) reviewed the impacts of hatchery-wild interactions indicating that the loss of adaptive fitness of hatchery salmon, relative to the fitness of wild salmon, can occur rapidly. Earlier versions of these same studies would likely have been available to the certifying body given their work on the Alaskan salmon certification and yearly audits.

The [U.S. Northwest Fisheries Science Center](#) summarizes the risks of wild populations from hatchery fish. The management of hatchery interactions only within the system that is enhanced is insufficient to protect wild populations in systems where straying occurs.

British Columbia has not evaluated the prevalence or impacts of straying from chum salmon enhancement. Given the increasing evidence of straying impacts further efforts are required to understand straying, limit straying and limit its impacts.

Both the assessment team and management agency are well aware of the current science on hatchery impacts in general, and straying in particular. Assessment team members Ray Hilborn and Karl English were both present at a 2010 workshop where the above-mentioned studies were first presented, as were DFO staff from the Salmon Enhancement Program (SEP). For conference proceedings see http://www.stateofthesalmon.org/events/portland_spring2010.html). The studies presented at that workshop are now available as full papers in a special feature of the journal Environmental Biology of Fishes (<http://www.springerlink.com/content/0378-1909/94/1>).

Peer Reviewer 2 highlighted the lack of hatchery chum contribution information, but does not offer a clear recommendation for addressing this concern. A “wild salmon” as defined by Canada’s Wild Salmon Policy, which is the basis of salmon management, conservation unit delineation, and recovery of depleted conservation units, is: Salmon are considered “wild” if they have spent their entire life cycle in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild. As a result of

this definition first generation hatchery fish should not be included in the assessment of status.

The assessment team should re-evaluate status of target/non-target stocks based on this definition. If there is a lack of hatchery contribution information the assessment team should at least ensure there is a condition that requires that hatchery contributions are assessed and status is re-evaluated using only “wild salmon” as defined by the Wild Salmon Policy. For example:

Suggested condition 1-x: For all chum salmon UoCs. Scientifically defensible estimates of hatchery contributions for all target chum stocks will be provided by the first surveillance audits. Status of target chum stocks will be re-assessed considering only the wild contribution and all subsequent conditions/audits will use these status assessments.

Suggested condition 2-x: For all chum salmon UoCs. Scientifically defensible estimates of hatchery contributions for all non-target chum stocks will be provided by the first surveillance audits. Status of non-target chum stocks will be re-assessed considering only the wild contribution and all subsequent conditions/audits will use these status assessments.

Distribution within stocks (conservation units)

Chum salmon exhibit less distinct genetic variation across spawning/rearing geography. As a result, the conservation units defined for B.C. chum salmon under the Wild Salmon Policy are large in scope, particularly in relation to the number of spawning streams/watersheds that are captured within a single conservation unit.

The methodology established for assessing the status of conservation units (Holt et al. 2009) includes distribution within a CU as a potentially important contributor to status. However, current escapement goals do not account for the importance of considering this distribution and DFO has not yet applied distribution methodology to the assignment of status to chum conservation units.

Given the importance of distribution (i.e., of populated spawning locations) within a CU to chum salmon, both in terms of population status as well as ecosystem contribution, the assessment team should ensure it is captured in conditions intended to address chum stock status.

As a result, at a minimum condition 3-1 should be updated to the following:

Suggested condition 3-x. For all chum salmon UoCs – Certification of all chum salmon fisheries will be conditional until management objectives are clearly defined **that ensure most target chum stocks are maintained above their WSP lower benchmark**

incorporating abundance and distribution within a conservation unit. Objectives will be provided to the Certification Body by the second surveillance audit.

Flaws in ISC fixed exploitation rate approach

Although assessment team scoring and proposed conditions should ensure this issue is addressed it is worth noting a key example where in-season monitoring, harvest decision rules and escapement objectives need to be improved.

The ISC fishery uses a combined escapement goal and fixed exploitation rate method. However, due to a lack of early season, independent assessment of stock size, fisheries are often opened before a scientifically defensible estimate of run size is established, and escapement targets are not met even though fisheries have already occurred. To address this concern early fisheries (i.e. in Johnstone Strait) need to be more significantly constrained to ensure an adequate in-season run size estimate is achieved and the escapement goal is not jeopardized. An even better approach would be to implement a fisheries independent test fishery early in the season to support the estimation of in-season run size. This test fishery could dovetail with the late season Georgia/Johnstone Strait sockeye test fisheries.

COMMENTS ON INDIVIDUAL PERFORMANCE INDICATORS

NOTE: Comments on performance indicators 1.1.2.1, 2.1.1, 2.1.3, 2.2.1, 3.1.3, 3.1.5, and 3.2.1 are provided in the appended *Critique of Catch Reporting and Compliance Monitoring*.

Performance Indicator 1.1.1.4

Where indicator stocks are used as the primary source of information for making management decisions on a larger group of stocks in a region, the status of the indicator stocks reflects the status of other stocks within the management unit.

SG 60.2: There is a scientific basis for the indicator stocks used in the management of the fishery.

PARTIAL PASS

SG 80.1: There is general agreement among regional fisheries scientists within the management agency that the status of indicator stocks reflects the status of other stocks within the management unit.

PARTIAL PASS

SG 80.2 There is no scientific disagreement regarding the indicator stocks used by the management agency to formulate management decisions for the fishery.

PARTIAL PASS

Rationale

NCC and ISC:

The term “index” and “indicator” stream are used interchangeably and ambiguously throughout the PCDR, CUP and the MS despite their apparent distinction in use, definition and application.

Page 6 of the chum NCCC CUP states: *“In addition to intensive surveys in these indicator systems, escapement estimates in each statistical area are compiled for fairly stable set of index streams and a variable set of additional streams.”*

Page 6 of the chum NCCC CUP states: *“Indicator stocks tend to be more intensively surveyed, and provide more accurate estimates of local abundance than the visual surveys used for the majority of chum salmon.”*

Page 32 of chum NCCC CUP states, *“index streams are designated as **unenhanced** systems with escapement data for 10 or more years over the period 1950 to 2004.”*

From these statements it would appear there are three stream classifications: index, indicator, and non-indicator. However there is no published or publically available list of these streams despite references to their presence in documents such as English et al. 2006, English et al. 2011, the 2009 chum CUP and the 2012 PCDR.

Further, the method used in the CUP run reconstructions for the NCCC Areas (Figures A1-A11, Chum PCDR Appendix A) is called the **index stream method**, suggesting its value to reflect the health of wild (unenhanced) stocks. The ISC CUP states that index streams are also used for escapement reconstructions (Figures A12-A17, Chum PCDR Appendix A).

However, the above definition is ignored in streams selected for run reconstructions as enhanced runs are used as index streams for run reconstructions in NCCC (see figures, A2 (Area 2E), A7 (Area 6), and A9 (Area 8)) and ISC analysis (Figures 4 (UVI), 5 (Kingcome), 6 (Bond to Knight), 9 (MVI), 11 (Jervis), 12 (LVI), and 14 (Howe/Sunshine) from the ISC).

Based on our replication of these methods for Area 6 specifically, it appears that ‘indicator’ stocks were used, not ‘index’ streams as specified on page 32 and 36 of the NCCC CUP. This includes the use of the Kitimat River total escapement including both wild and hatchery released fish. It is well known that there are many interactions between wild and hatchery fish (eg. Noakes et al 2000), and the inclusion of these enhanced runs in

escapement or abundance trend analysis can mask or confound trends and status of wild salmon runs. The use of these enhanced stocks as “indicator” or “index” stocks cannot therefore be confidently assumed to “reflect the status of other stocks within the management unit”.

Finally, the fact that the stated definition of an index stream used in the CUP differs so markedly from several of the streams used in the run reconstructions in the CUPs and consequently the PCDR implies an absence of scientific agreement as required in the two 80 SGs.

Suggested condition: *Certification is conditional until the management agency clearly identifies the index and indicator streams it uses to estimate chum abundance and completes a peer-reviewed analysis to determine whether the status of indicator stocks reflects the status of other, unenhanced stocks within each management unit.*

Performance Indicator 1.1.1.5

Where stock units are composed of significant numbers of fish from enhancement activities, the management system provides for identification of the enhanced fish and their harvest without adversely impacting the diversity, ecological function or viability of wild stocks.

SG 80.1: In fisheries where both enhanced and wild (un-enhanced) stocks are harvested at the same time, the harvest guidelines are based on the goals and objectives established for the wild (un-enhanced) stocks, and there is sufficient information on stock composition (i.e. hatchery and natural fish) to determine whether those goals are met.

FAIL (NCCC and Fraser); PARTIAL PASS (WCVI and ISC)

SG 80.2: There are adequate data and analyses to determine that the presence of enhanced fish in the management units does not adversely impact the wild (un-enhanced) fish stocks.

FAIL (NCCC and Fraser); PARTIAL PASS (WCVI and ISC)

Rationale

For SG 80.2, there is not “sufficient information on stock composition” to determine whether harvest guidelines based on goals and objectives for wild fish are being met. For example, marking stopped in the Kitimat hatchery in 2004 and no longer occurs for any hatchery chum in the Fraser River, and there are other similar examples in the other UoCs. On all systems where hatchery fish are unmarked, catch statistics and escapements are not separated between wild and enhanced.

The Genetic Stock Identification pointed to by the client under this Indicator is irrelevant as it does not allow differentiation of hatchery and wild fish (and if it did, that would imply

a major risk to the fitness of the wild population). While past mark-recovery studies for Fraser chum may provide some estimation of hatchery chum to overall escapement, they do not allow for reliable ongoing estimation of stock composition (for either catch or escapement) as required in the SG. Wherever hatchery fish are unmarked, there is no way of determining what portion of the total escapement is comprised of wild vs. hatchery fish. Therefore, the Assessment Team's scoring rationale that "exploitation rate targets are set low enough to allow for sufficient wild stock escapement" does not make sense given that there is no way of telling what the wild stock escapement actually is on systems like the Kitimat where hatchery fish are unmarked.

In the case of SG 80.2, there is a lack of scientifically defensible estimates of straying to streams nearby major hatchery operations, and the impacts of straying, in B.C. chum fisheries. Without estimates of straying, as well as reliable estimates of hatchery contribution to total catches and escapements, there is no current evidentiary basis to state that "the presence of enhanced fish in the management units does not adversely impact the wild (un-enhanced) fish stocks." Furthermore, there are multiple lines of evidence indicating that hatchery operations present a suite of risks to wild fish, including chum, through competition for food, disease, and domestication effects. The existence of these risks, and DFO's slow progress in addressing them, was acknowledged by multiple DFO scientists and managers at a Simon Fraser University workshop (Hill and Orr, 2009):

"Monitoring needs also exist across a hierarchy of spatial scales and at present may not be adequately addressed at more local scales where straying and genetic integrity of wild stocks must be tracked [Kim Hyatt, DFO]. While monitoring and research was conducted at these local scales at the outset of [the Salmon Enhancement Program], such activity is now very limited as monitoring and stock assessment have been increasingly limited. Similar concerns exist with the allocation of monitoring effort across sectors and fisheries: Monitoring needs should be addressed across all pertinent fisheries in all sectors."

DFO makes the following commitment in the Wild Salmon Policy: *The risks of hatchery production to wild salmon will be assessed through the development of a biological risk assessment framework* (sidebar on p.36). To date, this framework has not been developed, much less implemented. The failure of DFO to conduct a rigorous biological risk assessment of its hatchery operations indicates failure on SG 80.2 and necessitates a condition requiring them to do so.

Suggested condition: *For all chum salmon UoCs. An external review of the occurrence of straying of enhanced chum salmon to adjacent stocks, and impacts to those stocks, must be completed before the first surveillance audit.*

Suggested condition: *Certification will be conditional until the management agency completes a peer-reviewed biological risk assessment framework for assessing the risk of enhanced fish to unenhanced wild chum populations, and uses the framework in all*

hatchery production planning in all UoCs. To be completed by the second surveillance audit.

Performance Indicator 1.1.2.1

Estimates exist for the removals for each stock unit

SG80.1: Catch estimates are available for all target stocks harvested in the fishery

FAIL

Rationale

Notable discrepancies exist in the harvest rates between sources, which may hamper recovery strategies where they do exist. As an example, the 2009 NCCC Post Season Review reports that the total gillnet catch for Area 6 chum was 29,337 and seine was 350, for a total of 32,687. Yet the exploitation rate is given as 0% by English et al. (2011), the most recent and comprehensive review of exploitation rates using DFOs information.

Further, 72,788 chum were released in the Area 6 pink seine fishery in 2009 and another 131,715 in Areas 3, 4 and 6 pink fisheries in 2011 (in season updates 2009 and 2011), many of which would not have survived to spawn. This information was not recorded in post season reviews or other public documents.

Reconstructed escapement in Area 6 in 2009 was approximately 100,000 chum, resulting in an actual exploitation rate of about 23%, not including mortality from releases. Given that recent returns including enhanced Kitimat River chum are near the LRP of 49,250, an exploitation rate of 23% would be at odds with any effective recovery strategy.

See also the appended Critique of Catch Reporting and Compliance Monitoring by Greg Taylor.

Performance Indicator 1.1.3.1

Limit Reference Points have been set and are appropriate to protect the stocks harvested in the fishery.

SG 80.1: There is some scientific basis for the LRPs for target stocks and these LRPs are defined to protect the stocks harvested by the fisheries

FAIL

SG 80.2: There is no scientific disagreement regarding the LRPs used by the management agency to formulate management decisions for the fishery

FAILED BY ASSESSMENT TEAM

Rationale

Combined with rationale for 1.1.3.2 (below)

Performance Indicator 1.1.3.2

Target Reference Points or operational equivalents have been set

SG 80.1: There is no scientific disagreement regarding the TRPs used by the management agency to formulate management decisions for the fishery

FAIL

SG 80.2: The TRPs for the target stocks take into account variability in the productivity of each component of the target stock and the productivity of non-target stocks

FAILED BY ASSESSMENT TEAM

Combined Rationale for 1.1.3.1 and 1.1.3.2

TRPs and LRPs are being used until benchmarks under the Wild Salmon Policy are developed. The TRP is equivalent to the Management Escapement Goal (MEG) and LRPs have been defined as 25% of the TRP/MEG. While it is fair to claim that not all streams will meet their targets every year (page 52 of NCCC chum CUP), Area-based MEGs as presented in the individual chum CUPs and in the health and trend summaries (Chum PCDR 2011, Appendix A) are substantially lower than the sum of individual indicator stream goals. 25% of the MEGs is a very low level of abundance; even lower than a benchmark at Sgen1. Sgen1 is the suggested lower benchmark proposed by Holt et al (2008) and Holt (2009) and being developed by English et al (2011) and Korman (2012) for benchmarks on the Skeena.

Case study of the use of LRPs and TRPs in Area 6 NCC

Area 6 has more than 150 chum streams with a spectrum of productivity ranging from poor to high. Its most productive stocks are identified in the NCCC Chum CUP as Kemano, Quaal, Foch and the enhanced Kitimat River with an MEG for these four systems totaling 247,000. Over half of this goal is to the Kitimat River. A sum of the escapement goals for streams within the Area 6 Gardner-Douglas Chum CU is approximately 425,000. These streams represent about half the number (but some of the larger producing) of the chum streams within Area 6. The stated MEG in DFO's Post Season Reviews (up to 2011) for all chum streams in Area 6 is 520,000.

Run reconstruction using the Pavg method (Spilsted and Peacock 2010) indicates a historic escapement of 400,000 to upward of one million between 1950 and the early 1970s. Such escapements occurred under heavy exploitation and occurred prior to enhanced chum returning to the Kitimat R. The point of this preamble is to frame the existing MEG of

197,000 with an LRP of 25% of this MEG at 49,250 as an extremely low level of abundance for a Management Escapement Goal (App A Chum PCDR 2012).

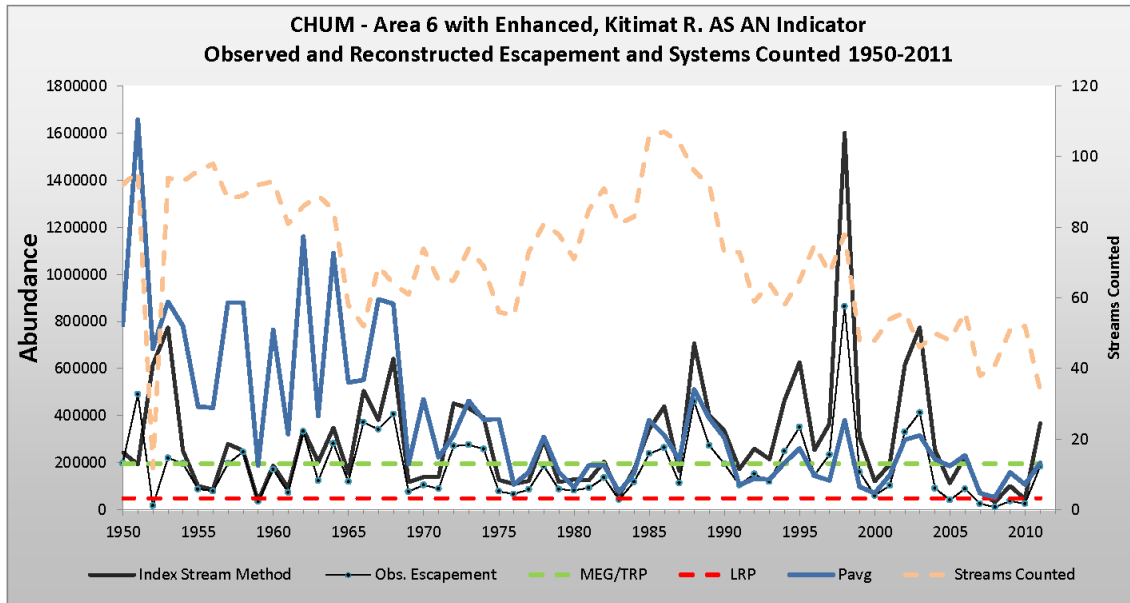


Figure 1. The trend in escapement using the *Pavg* method and *index stream* method for all indicator streams in the Area 6 Management Unit. TRP and LRP are indicated at 197,000 and 49,250 respectively. The period up to the mid 1980s is the trend in wild stocks. Hatchery supplementation began in the mid 1980s after which enhanced fish returned to the Kitimat River. Reconstructions are based on the methods described in Spilsted and Peacock 2010 (*Pavg*) and English et al (*index stream* method, Chum PCDR page 33 Appendix A). The escapement reconstruction included the Kitimat River, but not as an indicator as is consistent with the definition of indicator.

To examine the claim of scientific basis for this LRP we evaluated the LRP (25% MEG) relative to where a potential lower benchmark might be using *Sgen1*. Using the *index stream* method we undertook stock-recruitment analysis according to a simple Ricker model (non-Bayesian). While there is a large amount of uncertainty in such an approach (and we believe it is neither risk averse, ecosystem based, or particularly sound), this approach was advocated by Holt et al (2009), Holt (2009), English et al. (2011) and used by Grant et al (2011) and Korman (2012) on Fraser and Skeena sockeye stocks. The first purpose is to serve as a comparison to evaluate the difference between a lower benchmark at *Sgen1* versus the LRP at 25% of the MEG. *Sgen1* is designed to allow recovery to S_{MSY} in one generation (Holt et al. 2009).

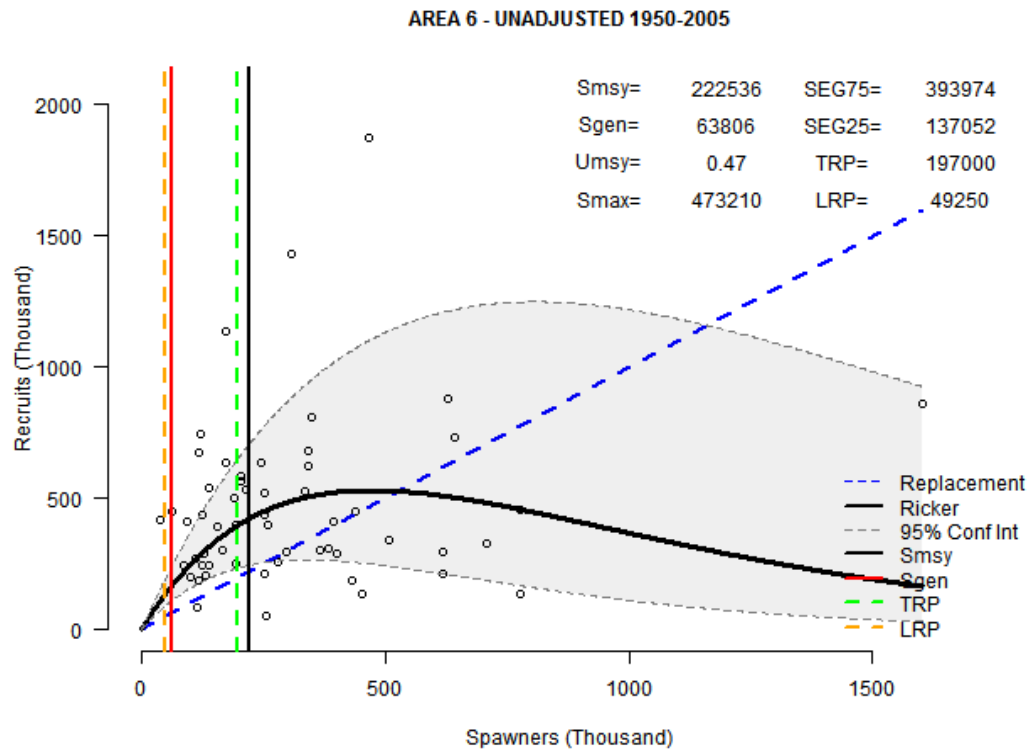


Figure 2. The Stock-Recruitment curve from run reconstructions based on the methods in Korman (2012) for purposes of comparing the benchmark approach to LRP and TRPs. Both the S_{gen} and the S_{MSY} points are higher than the corresponding LRP and TRP, suggesting that recovery to S_{MSY} would not occur in one generation after fishing pressure has been reduced. This figure includes the Kitimat River as an indicator, which by definition, it should not be, due the presence of a large hatchery stock component. SEG 25 and SEG 75 are also presented on this graph for a third comparison (SEG = Sustainable Escapement Goal).

A third approach is comparison with the Sustainable Escapement Goals (SEG) as was used in the Inner South Coast. A SEG is calculated as the 25th and 75th percentile of observed escapement estimates (Otis and Hasbrouck 2004). This also takes into account the contrast (range of escapement values) in streams and management units. SEG can be calculated by determining the 25th and 75th percentiles for each stream, and then summing across the Management Unit. However, for stocks where management is the same for all stocks (i.e. in mixed stock fisheries or tributaries), the SEG should be calculated on the total stock reconstructed escapement time series, and not across individual streams. This invariably leads to a much higher SEG 25, and a much more conservative approach.

Using this method, the SEG 25 for the wild stocks outside of Kitimat River is 137,737 and SEG 25 for all of Area 6 is 137,052. These figures illustrate more precautionary benchmarks than LRP and would give higher limits for the point where management action was deemed necessary.

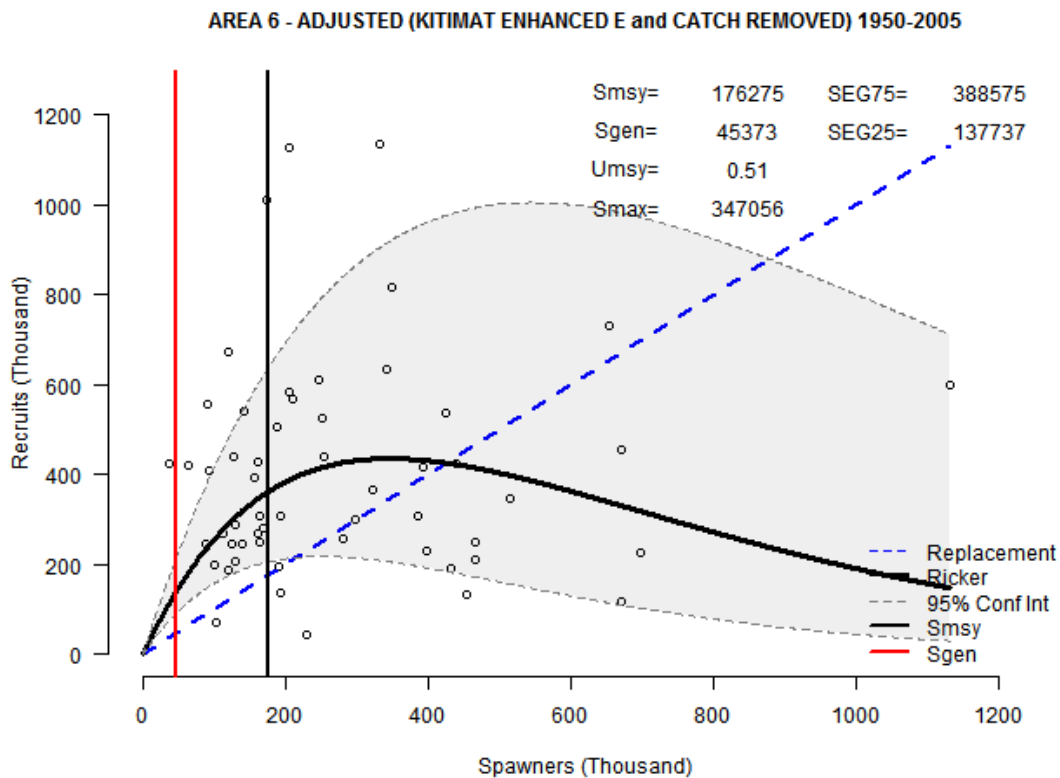


Figure 3. The Stock-Recruitment curve from run reconstructions based on a simple Ricker S-R method for purposes of comparing the benchmark approach to LRPs and TRPs in Area 6 wild runs. These data have the gillnet catch and Kitimat River enhanced returns removed from the analysis. Sgen1 for the indicators in these these wild runs is just over 45,000 with MSY at 176,000. The 25 SEG approach shows a much higher target of 137,000 and 75 SEG at 388,575.

Table 1. Summary of approaches for determining lower and higher reference points

Approach	All of Area 6	Wild runs outside Kitimat River
25% SEG	137,052	137,737
75% of SEG	397,974	388,575
Sgen1	63,806	45,373
80% MSY	178,030	141,020
MSY	222, 536	176,275
LRP/ 25% MEG	49,250	
TRP	197,000	

In addition to the above Area 6 case study, please refer to the historical run reconstruction conducted by Price et al (2012) for Area 4 chum, submitted with this paper.

The existing conditions for this PI (1-4 and 1-5) are adequate.

Performance Indicator 1.2.1

There is a well-defined and effective strategy, and specific recovery plan in place, to promote recovery of the target stock within a reasonable time frame

SG 60.1: In the event of severe depletion, recovery plans are developed and implemented to facilitate the recovery of the depleted stocks within 5 reproductive cycles.

PARTIAL PASS

SG 60.2: Stocks are allowed to recover to more than 125% of the LRP for abundance before any fisheries are permitted that target these stocks

FAIL

Rationale

Area 6 contains chum stocks of concern, as do all UoCs. A closer look at Area 6 and the Douglas-Gardner Conservation Unit provides an example of the lack of recovery planning, the high mortality on stocks of concern and the ongoing, (but inaccurately portrayed) exploitation rates in Area 6 on severely depressed chum stocks. No recovery plan is in place despite a decline in escapement for almost 3 generations.

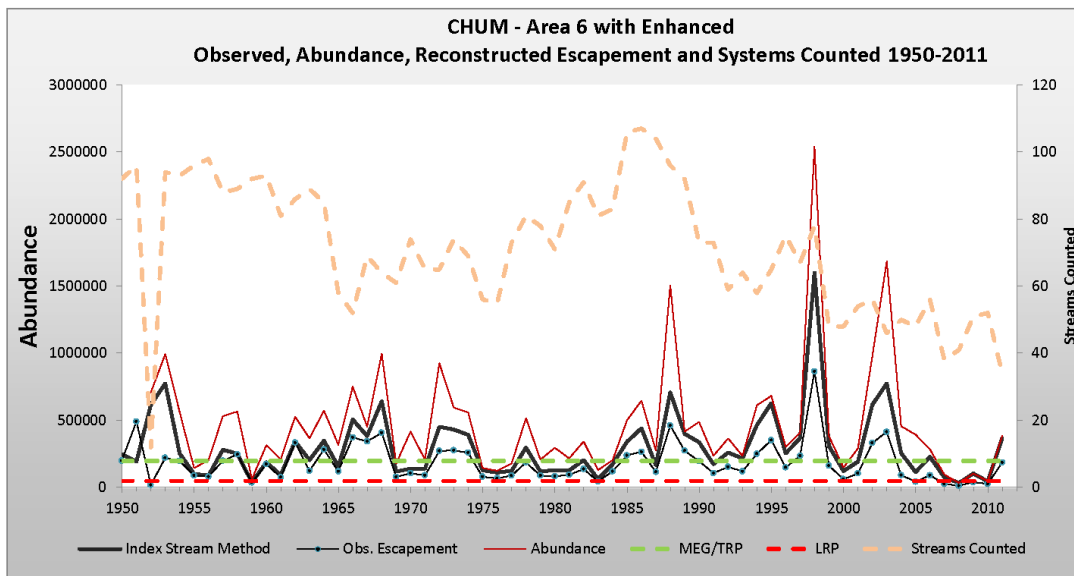


Figure 4. Observed and reconstructed escapement trends and total abundance in Area 6 since 1950. Hatchery supplementation began in the mid 1980s. Despite lowered harvest pressure in recent years, the TRP is not being met and escapements have fallen below the LRP in two out of the last five years (2010 and 2008). While not shown, four out of the last 5 years were below 25% SEG and 3 out of 5 were at or below Sgen (see section 1.1.3.1).

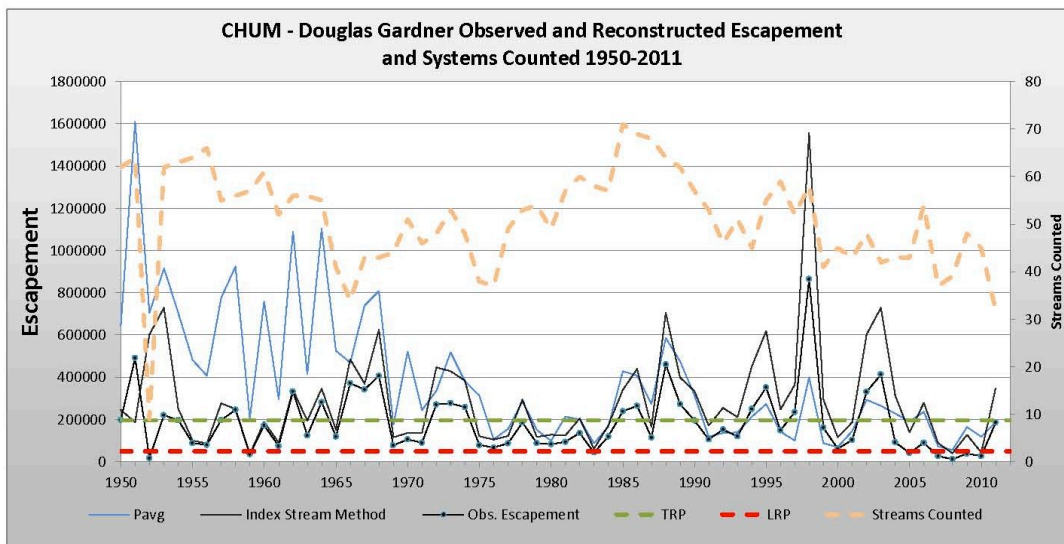


Figure 5. Observed and reconstructed escapement trends in the Douglas-Gardner chum CU since 1950. No benchmark has yet been developed for this CU however Sgen1 would indicate a lower benchmark of 29,210 for wild stocks only (Figure 3c). There has been a declining trend in escapement since 1998 and escapements are at extremely low levels of abundance.

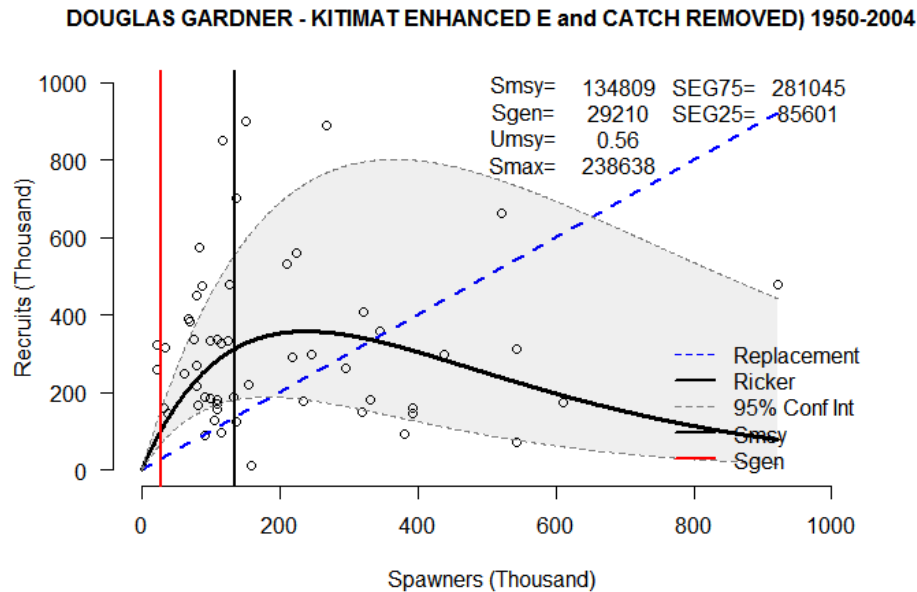


Figure 6. Ricker stock-recruitment relationship for Douglas Gardner CU excluding Kitimat River enhanced escapement contribution and catch. Sgen1 would indicate a lower benchmark of 29,210 for wild stocks only.

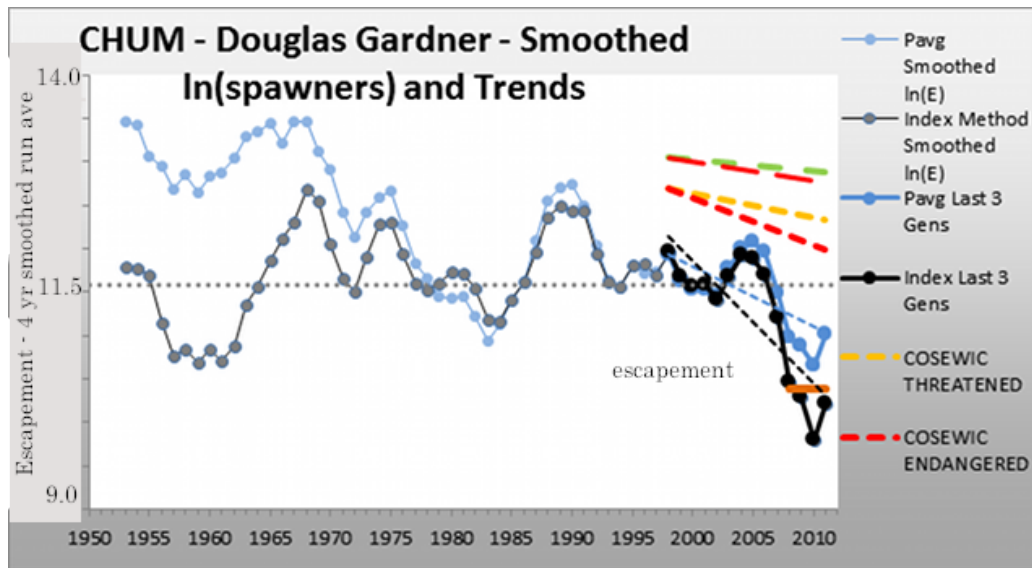


Figure 7. The Douglas-Gardner Conservation Unit with the natural log of a 4 year running average based on index stream and Pavg reconstructed escapement time series. Linear trends were taken for the last 3 generations (1998-2011) to be compared against the 'recent trends in abundance' COSEWIC criteria, using the methodology of Pestal and Cass (2007), Holt et al. (2009) and Grant et al. (2011).

		Pavg		Index Stream Method (Escapement)		Index Stream Method (Abundance)			TOTAL STOCK		SUM OF STREAMS		TOTAL STOCK	COSEWIC STATUS	
Conservation Unit	STREAMS USED	CURRENT TREND	LONG TERM RATIO	CURRENT TREND	LONG TERM RATIO	CURRENT TREND	LONG TERM RATIO	Sgen	SEG 25	SEG 75	SEG 25	SEG 75	Below SEG 25 Last 5 Years	Pavg	Index
Douglas Gardner-Without Enhanced	I	-53%	32%	-90%	32%	-95%	15%	29210	79478	232163	28624	158280	4	E	E
Douglas Gardner-With Enhanced	I	-59%	31%	-94%	33%	-94%	24%		79929	279683	29506	168280	3	E	E
Area 6 - Without Enhanced	I	-31%	43%	-82%	39%	-83%	31%	45373	127053	348152	47776	235901	4	T	E
Area 6 - With Enhanced	I	-36%	42%	-87%	40%	-88%	34%	63806	126333	378213	48658	245901	4	T	E
E=ENDANGERED, T=THREATENED, I=INDICATOR, X=INDEX															

Table 2. Status of chum stocks in the Douglas-Gardner CU and Area 6 based on COSEWIC criteria. In the Douglas-Gardner CU and Area 6, 'without enhanced' is without the Kitimat River enhanced portion and 'with enhanced' includes Kitimat River enhanced portion. Both total abundance and escapement are examined using the index method of escapement reconstructions. Short term and long term trends are identified. Both the Douglas-Gardner chum CU and all of area 6 would trigger COSEWIC listings under endangered status.

Despite severe depletion and substantial concerns for the status of chum stocks in Area 6, an adequate recovery plan has not been implemented and harvest pressures (largely through bycatch) continue on these stocks. Since 2008, the seine pink fishery in Area 6 has operated on non-retention for chum due to its status as a stock of concern, yet this has not reduced mortality and exploitation. Over 70,000 chum were caught and released in both 2009 and 2011 (information provided through in-season updates). New estimates from work done by Donaldson et al (2012) suggest most of these chum would not have survived to spawn. This information was not recorded in post season reviews or other public documents. This under-reporting could be a key consideration in the chronic low abundance and depressed state of chums stocks.

Further, discrepancies in the harvest rates may also hamper recovery efforts where they do exist. As an example, the 2009 NCCC Post Season Review indicates that the catch for Area 6 chum was 32,687 (gillnet 29,337 and seine 350). Yet the exploitation rate is given as 0% by English et al. (2011), the most recent and comprehensive review of exploitation rates using DFO's information. Reconstructed escapement in 2009 was approximately 100,000 chum, resulting in an actual exploitation rate of about 23%, not including mortality from releases. Given that recent returns, including enhanced Kitimat River chum, are near the LRP of 49,250, an exploitation rate of 23% would be at odds with any effective recovery strategy. Recovery of chum stocks to 125% of the LRP would require escapements of 61,562. This level of abundance is still below Sgen1 (63,806) and substantially below SEG 25 (137,000) both of which are more robust LRPs.

Performance Indicator 1.2.2

Target stocks are not depleted and recent stock sizes are assessed to be above appropriate limit reference points (or equivalents) for the target stocks.

SG 60.2 Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapement that approach or are below the LRP in no more than 2 years in a period of the most recent 5 consecutive years, for the majority of the target stocks.

PARTIAL PASS FOR ALL UoCs

Rationale

An assessment by Conservation Unit and Management Area suggests that chum stocks and stock sizes are seriously depleted in several Management Units. Chum stocks in Areas 2, 3, 4, 5, 6 and 7 have been at, near or below their LRPs in recent years and are chronically below their TRPs. Assessed as conservation units, these would not pass the 60 scoring guidepost, however when examined by Management Area many pass. Table

3 shows Conservation Units, many of which are in severe decline, based on COSEWIC's 'recent trend in abundance' metric and the 'long-term trend in abundance' metric. A closer examination of three CUs on the NCC is below.

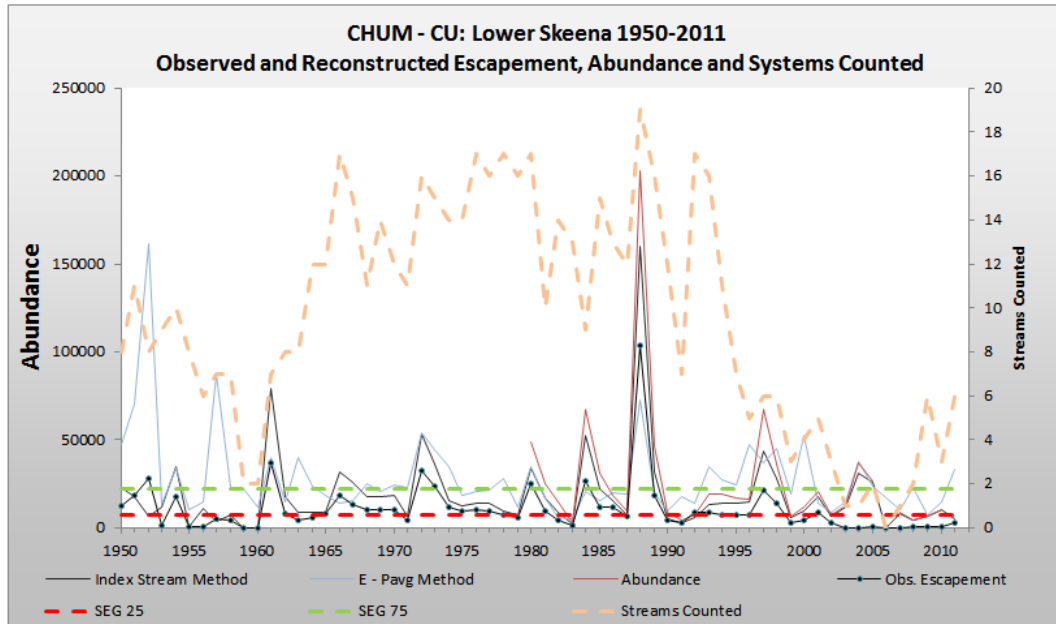


Figure 8. The Lower Skeena Conservation Unit showing observed and reconstructed escapement trends since 1950. Conservation Units do not yet have MEGs. An SEG 25 and 75 are shown. There has been a chronic and severe problem of low abundance for a decade. Lack of monitoring also hinders recovery objectives.

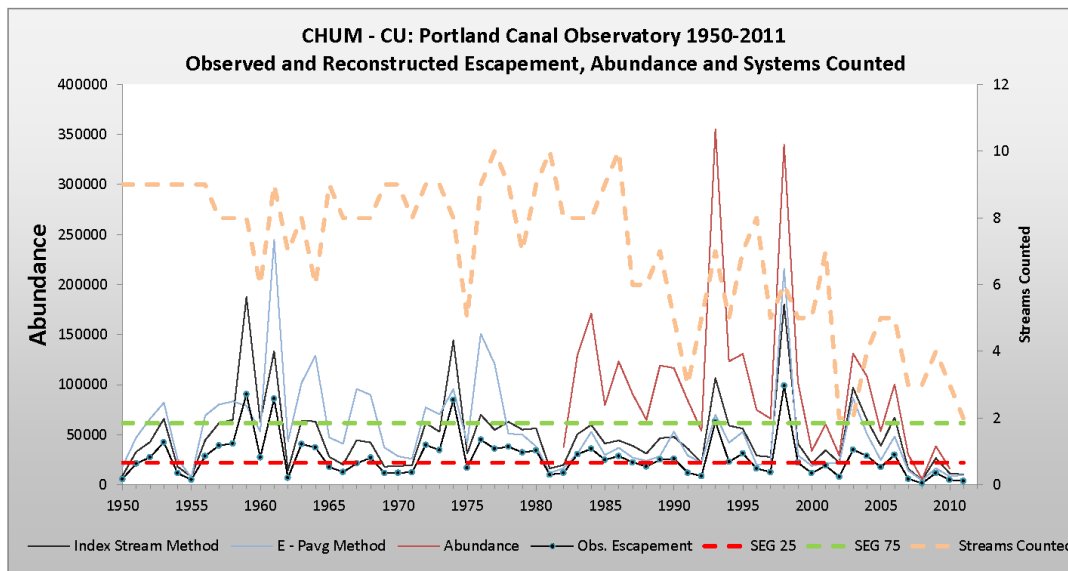


Figure 9. The Portland Canal-Observatory Inlet Conservation Unit showing observed and reconstructed escapement trends since 1950. SEG 25 and SEG 75 are shown in the absence of MEGs. Severe declines in escapement have occurred in recent years.

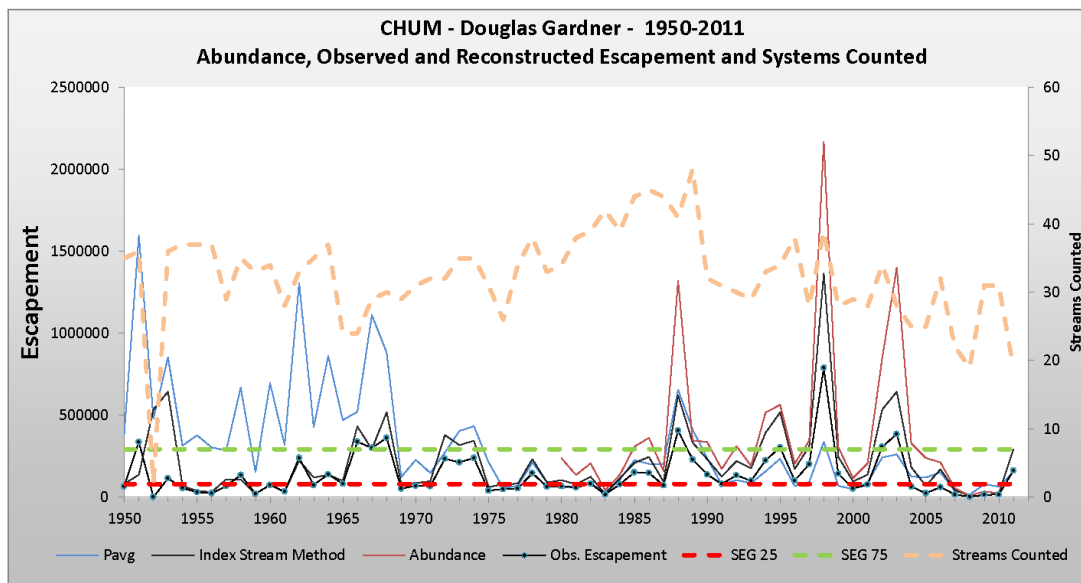


Figure 10. Douglas-Gardner Conservation Unit showing observed and reconstructed escapement trend since 1950. SEG 25 and SEG 75 are shown in the absence of MEGs. Declines and low escapement have been occurring for over a decade. Pavg reconstruction suggests higher historic escapements easily met the 75 SEG.

Figures 7-10: Run reconstructions for Lower Skeena, Portland Canal Observatory and Douglas-Gardner Chum CUs using the Pavg and Index Stream methods (Spilstead and Peacock 2010; Chum PCDR Appendix A). Abundance was based on calculations using Area wide exploitation rates provided in English et al. 2011 for the NCCC from 1980 to 2010 and escapement reconstructions using the index stream method.

Despite management objectives to keep stocks above the LRP and meet the TRP, chum stocks have been consistently over-exploited in the Area 3 pink fishery for over 20 years with no rebuilding or recovery plan. Moreover, in Areas 3 and 4, current generation (2007-2010) chum total exploitation rates were 32% and 23%, respectively. This indicates that fishing is occurring on severely depressed stocks, and even though Canadian exploitation rates are lower, management is not being effective in allowing recovery.

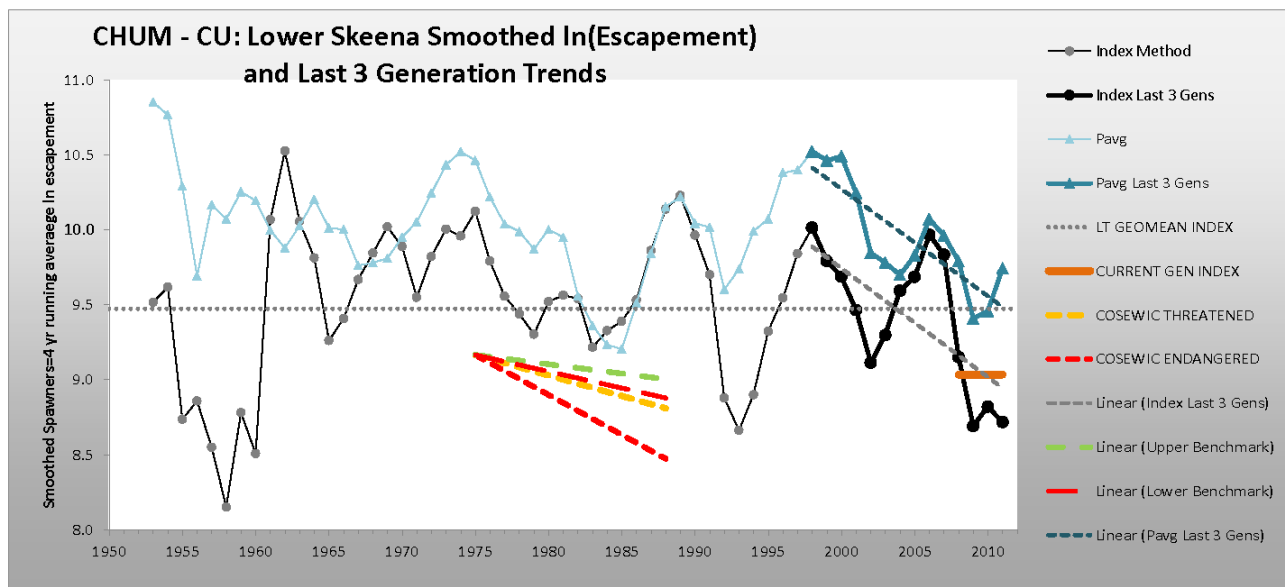


Figure 11. The Lower Skeena Conservation Unit with the natural log of a 4 year running average based on index stream and Pavg reconstructed escapement time series. Linear trends were taken for the last 3 generations (1998-2011) to be compared against the 'recent trends in abundance' COSEWIC criteria. The methodology used follows that in Pestal and Cass (2007), Holt et al. (2009) and Grant et al. (2011).

Table 3. Status of chum CUs on the BC Coast based on COSEWIC criteria A

A). The status suggests that of 15 NCC CUs examined, four are endangered (under both methods), two are endangered/threatened, three are threatened, two cannot be evaluated, and the remaining four are healthy. Immediate recovery plans are necessary for Douglas-Gardner, East QCI, Lower Skeena and Portland Canal Observatory CUs.

B) ISC: Examination of 2 chum CUs on the Inner South Coast shows one healthy and one endangered.

C) WCVI: Examination of the SWVI CU shows its status is threatened.

D) Lower Fraser: Status of the Lower Fraser CU shows its status is endangered.

Methods to evaluate stocks status at a CU level:

Abundance trends were evaluated using methods in Korman (2012) with escapement reconstruction following methods in Spilstead and Peacock (2010, *Pavg*) and methods English et al (PCDR App A, *index stream*). To identify underlying trends in spawner abundances independent of interannual "noise" (e.g., due to cyclic recruitment dynamics, and observation and assessment errors), spawner abundances were log-transformed and then smoothed with a four-year (or one generation) running mean. To capture short term trends in abundance, one possible lower benchmark can be derived from the slope, or rate of change, of the line of best fit over recent years. To align with COSEWIC criteria, the linear trend over the last 3 generations (1998-2011) in smoothed spawners was analyzed. To capture long-term changes in abundances, Pestal and Cass (2007) suggest a metric based on the ratio of the geometric mean of the current generation to the long-term geometric mean. This was also analyzed for some CUs.

Suggested condition: For the NCC chum stocks certification is conditional until DFO implements recovery plans to rebuild Douglas-Gardner, East QCI, Lower Skeena and Portland Canal Observatory CUs and provides evidence that mortality and exploitation in Canadian Fisheries is not impeding the recovery of these Conservation Units.

Suggested condition: For ISC, WCVI and Lower Fraser DFO needs to undertake immediate evaluation of status and develop recovery plans as warranted for stocks that trigger threatened or endangered listing under COSEWIC.

		Pavg		Index Stream Method (Escapement)		Index Stream Method (Abundance)		TOTAL STOCK		SUM OF STREAMS		TOTAL STOCK	COSEWIC STATUS	
Conservation Unit	STREAMS USED	CURRENT TREND	LONG TERM RATIO	CURRENT TREND	LONG TERM RATIO	CURRENT TREND	LONG TERM RATIO	SEG 25	SEG 75	SEG 25	SEG 75	Below SEG 25 Last 5 Years	Pavg	Index
NCCC														
East QCI	I	-35%	44%	-64%	51%	-73%	47%	155450	281117	42444	220030	4	T	E
West QCI	I	68%	115%	8%	115%	-2%	115%	78081	163496	20825	101987	1		
Skidegate	I	-57%	62%	-72%	51%			59120	142521	27128	104233	3	E	E
Lower Skeena	I	-61%	72%	-61%	65%	-69%		7387	24328	5880	20453	3	E	E
Middle Skeena	I	26%	88%	39%	114%	24%		436	3075	1016	3124	1		
Skeena Estuary	I	159%	158%	MISSING ESCAPEMENT DATA - NOT ASSESSA				825	6595	1317	2541	0		
Portland Canal Observatory	I	-76%	35%	-73%	46%	-84%		22122	61738	8693	40942	4	E	E
Portland Inlet	I	79%	97%	-18%	92%	-18%		15478	39795	5767	25234	2		
Lower Nass	NA	MISSING ESCAPEMENT DATA - NOT ASSESSABLE												
Douglas Gardner-Without Enhanced	I	-53%	32%	-90%	32%	-95%	15%	79478	232163	28624	158280	4	E	E
Douglas Gardner-With Enhanced	I	-59%	31%	-94%	33%	-94%	24%						E	E
Spiller-Fitz-Hughe-Burke	I	-14%	81%	-48%	77%			630032	1214874	182897	741593	3		T
Smith Inlet	I	-11%	66%	36%	92%			29525	79051	12412	55329	3		
Rivers Inlet	I	287%	300%	167%	275%			19786	82280	3271	26883	2		
Hecate Lowlands	I	-2%	67%	-31%	82%									T
Mussel-Kynock	I	-48%	81%	-71%	65%			64110	163228	28734	114119	4	T	E
ISC														
Georgia Strait	X	-17%	85%	94%	158%			602786	1282343	257539	781518	0		
Southern Coastal Streams	X	-58%	36%	-71%	30%			48372	137594	29195	148356	5	E	E
WCVI														
SWVI	X	-31%	80%	-30%	77%			474324	975335	150697	669339	3	T	T
FRASER														
Lower Fraser	X	-61%	134%	-54%	156%	NO 2010/2011 COUNT		323885	1197795	168791	696391	0	E	E
E=ENDANGERED, T=THREATENED, I=INDICATOR, X=INDEX														

Table 3. Status of chum CUs on the BC Coast based on COSEWIC criteria A

Performance Indicator 2.3.1

Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

SG 80.4: Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner whether recovery is occurring.

FAIL

SG 60.1: The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.

FAIL

SG 60.2: The management system ensures that the fishery is executed such that the recovery of depleted non-target stocks is likely to occur in a reasonable time period.

FAIL

SG 60.3: The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

FAIL

Condition 2-1: For all chum salmon UoCs. The proposed recovery plans, including a commitment to stock monitoring and assessment must be developed and implemented by the second surveillance audit. These recovery plans must meet the requirements of the scoring elements under the 80SG scoring guidepost.

INADEQUATE CONDITION

Rationale

Regarding SG 60.1; while it is true that DFO does attempt to prevent extirpation of non-target stocks, they do not “have rebuilding plans for the majority of the stocks”. The objectives and action steps of the Wild Salmon Policy do not constitute a rebuilding plan for depleted stocks, as implied by the client. More to the point, the assessment team explicitly acknowledges the lack of rebuilding plans in the scoring rationale!

“The client submissions for each of the UoC lack evidence of recovery plans for depleted non-target stocks that have been identified by DFO as impacted by the chum fisheries in the various districts. Specifically, the

management system lacks elements of a recovery plan such as; the objectives for recovery consider historic stock abundance information (second scoring issue), and analysis to ensure that the fishery is executed such that recovery of depleted non-target stocks is highly likely to occur in a reasonable time period (third scoring issue)."

Regarding SG 80.4, it is not logical to say that monitoring and assessment programs for depleted non-target chum populations exploited in commercial chum fisheries can "determine with a high degree of confidence and in a timely manner whether recovery is occurring" due to the fact that most BC chum hatcheries do not mark their fish. It is impossible to determine in streams with hatchery and wild populations what the wild escapement is, in order to ascertain whether recovery is occurring. This lack of hatchery fish-marking conspires with the lack of hatchery straying studies on wild chum streams adjacent to major hatchery facilities to cast serious doubt on DFO's ability to "determine with a high degree of confidence and in a timely manner whether recovery is occurring" for depleted non-target chum populations. Recent studies from Alaska showing very high straying rates of hatchery fish into nearby unenhanced streams (see discussion of straying under "Hatcheries" section and PI 1.1.1.5 above) further undermine and confidence in monitoring programs that would indicate recovery success for depleted wild chum populations. Again, the assessment team has explicitly acknowledged this point, making the score awarded here rather perplexing:

Also lacking is assurances that would be contained in a recovery plan that monitoring and assessment programs have been established to determine, with a high degree of confidence and in a timely manner that recovery is occurring. A recovery plan is specifically needed for the Skeena and the Nass for chum recovery."

The points made in the above paragraph also apply to SG 60.3. The management system however currently does not have a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks intercepted.

Regarding SG 60.2 and condition 2-1, the client submission and assessment team's scoring rationale in the PCDR make only passing mention of steelhead, and fail to explicitly address the serious problem of bycatch of the severely depleted Thompson River steelhead in fisheries targeting chum salmon in Johnstone Strait and the Fraser River. According to Bison (2011), the rationale to limit fishing mortality in Canadian salmon fisheries has included (1) the acknowledgement that steelhead abundance is at some level of conservation concern and (2) that steelhead abundance is trending downward and (3) that the concurrent fishing mortality rates have yet to stop or reverse the decline in

abundance. The management agency has not demonstrated that chum fisheries intercepting Thompson River steelhead and other similarly timed stocks of concern are “executed such that the recovery of depleted non-target stocks is likely to occur in a reasonable time period.”

Suggested condition modification: For all chum salmon UoCs. The proposed recovery plans, including a commitment to stock monitoring and assessment, *and exploitation rates on depleted non-target stocks low enough to facilitate recovery*, must be developed and implemented by the second surveillance audit. These recovery plans must meet the requirements of the scoring elements under the 80SG scoring guidepost.

Performance Indicator 3.1.1

The management system has a clear and defensible set of objectives for the harvest and escapement for target species and accounts for the non-target species captured in association with, or as a consequence of, fishing for target species.

CONDITIONS INADEQUATE

To ensure the conditions reach passing scoring guideposts conditions 3.2 and 3.3 should be combined into an all units of certification condition, thereby including the Inner South Coast unit, and the words “**fisheries independent**” should be added to “scientifically defensible.”

Performance Indicator 3.1.9

The hatcheries are subjected to regulations that ensure harvest management practices and protocols that sustain the genetic structure and productivity of the natural spawning population are followed and there is coordination between hatchery programs from different agencies/operators.

UNJUSTIFIED EXCLUSION OF NCCC and FRASER UNITS OF CERTIFICATION FROM SCORING

The Assessment Team has erroneously accepted the Client’s contention that “*Hatchery production of chum for the NCCC and Fraser has been substantially reduced in recent years and is no longer a major component of these fisheries*”. This contradicts numerous lines of evidence including (but not limited to) the following from the Client’s submission under PI 1.1.1.5 regarding hatchery chum production in the NCCC: “*Large-scale chum enhancement in the North and Central Coast occurs in Pallant Creek (Area 2 East), Kitimat River (Area 6),*

Kitasoo Creek (Area 7), McLaughlin Bay Creek (Area 7), and the Bella Coola River (Area 8). In addition to these large hatchery programs, chum are also enhanced through several small-scale programs managed by local groups.” In fact, the majority of targeted chum fisheries on the North and Central coasts target hatchery fish (for example, the targeted chum fisheries in front of Kitimat River and Pallant Creek). In the case of the Fraser Unit of Certification, the client cannot make this case with any scientific certainty based on the following from their submission under PI 1.1.1.5: “Chum released from hatcheries are no longer marked in the Fraser River system. It is thus not possible to determine hatchery contribution to returns or to estimate survival, exploitation and distribution parameters.”

Regardless of whether the above argument is convincing, an adjudicator would likely agree that the relative contribution of hatchery chum production to the fisheries in question does not even appear relevant to whether or not individual Certification Units are scored under this indicator. Thus, failure to score the NCCC and Fraser units under this indicator will draw an objection. When these units are scored, they should fail at SG 80.2 and a condition should be added.

SG 80.2 – The hatcheries mark a sufficient proportion of production with coded-wire tags (CWTs) or use other suitable methods such that reliable and meaningful estimates of hatchery composition of the catch and escapement can be estimated.

FAIL (NCCC and Fraser)

Rationale

As stated elsewhere in the PCDR, there are no hatchery marking programs for Fraser hatchery chum and insufficient marking programs for some NCCC chum hatcheries to satisfy this SG.

Recommended condition: For the NCCC and Fraser UoCs, certification will be conditional until the management agencies implements hatchery marking programs that will allow for reliable and meaningful estimates of hatchery composition of the catch and escapement.

Performance Indicator 3.4.1.2

[Management system] provides for restoring depleted target species to specified levels within specified time frames.

SG 60.1: The management system includes measures for restoring the majority of depleted populations of target stock to the TRP or equivalent high level of abundance

PARTIAL PASS

Rationale

There are significant conservation concerns for chum stocks returning to the central coast as evidenced by the COSEWIC analysis, examination of escapement trends and the comparison with Sgen1 benchmarks in selected areas. This status has generally been acknowledged in the PCDR and by DFO biologists in Prince Rupert. Yet, despite the curtailment of several directed fisheries on NCCC chum they are still caught in mixed stock pink fisheries and in some targeted chum fisheries in Areas 2, 6, 7 and 8. Efforts to reduce encounter rates or lower mortality appear to be insufficient to succeed in rebuilding wild (unenhanced) chum escapements and abundance. The fishing induced mortality still remains too high in several areas including 3, 4, and 6 and potentially 2 and 7. More spawners must reach their spawning grounds and mortality must be further reduced.

The primary way to ensure that chum target escapements are being met is to transition pink fisheries to terminal in-river locations and ESSR fisheries and ensure that escapements have been met before these fisheries are opened. Further, mortality on chum caught in pink seine fisheries needs be factored at upwards of 80% until further studies suggest otherwise. This mortality is being drastically under recorded. For example, in 2011, approximately 1.37 million pounds of chum salmon was discarded during the pink fishery. It is likely that non-retention of this magnitude is not a good way to protect chum stocks.

On this point, maximum exploitation rates on chum are likely the best approach to lower mortality and when these ceilings are reached the mixed-stock marine fishery must be closed and remaining pink harvest allowed only in terminal areas where impacts to co-migrating chum will be low or nil. Finally, these and other actions must be identified as part specified action plans designed to recover chum stocks to levels of adequate abundance.

Condition

Certification of the fishery is conditional until recovery plans for chum on the NCC are developed and implemented.

CRITIQUE OF DFO ACTION PLAN TO ADDRESS CERTIFICATION CONDITIONS

General Comments

Lack of Resources: No new resources will be allocated to meet the conditions by DFO: *“It is important to note that implementation of the following action plan assumes there will be no requirement for additional departmental resources.”*

This presents a significant question of whether DFO will have the capacity to meet the conditions required by certification. DFO references WSP implementation as a tool for meeting many of the conditions, yet the department does not have any resources specifically allocated to implementing this policy. Further, the federal government recently announced an \$80 million national budget cut to DFO, which will reduce the department’s capacity over the next 3 years to undertake the activities required by certification.

Lack of specific Commitments: We agree with Peer Reviewer # 1, that there is a lack of specific commitments by the department to meet many of the requirements of conditional certification within the timeframes required:

“It is difficult to comment on several aspects of the Action Plan because it refers to larger frameworks (e.g., Resource Assessment Framework) and plans (e.g., IFMPs) that are also not completed yet. The Action Plan needs to show, specifically, how these plans specifically address the conditions – the current version seems a bit too general in some places (e.g., Research Plans, Cond 3.6).”

Specific comments on lack of specific commitments and comments on how DFO will meet the conditions are provided within our comments related to several of the conditions.

Conditions 1.4, 1.5, 1.7 and 3.1 (Conditions related to reference points)

DFO Action Plan: *“To satisfy these conditions DFO will implement ‘Strategy 1’ of our WSP. ‘Strategy 1’ of the WSP requires standardized monitoring of wild salmon status, including identification of upper and lower benchmarks to represent biological status and guide harvest decisions. Implementing this strategy requires identification of Conservation Units (CUs)² for salmon: the scale at which the WSP aims to maintain biodiversity and at which lower and upper benchmarks (LRPs and TRPs) will be defined. There are various definitions of lower and target reference points in relation to resource management. There is no single rule to use for determination of the lower benchmark. Rather, it will be determined on a case by-case basis, and depend on available information, and the risk tolerance applied....”* The upper benchmark (TRP) will be established to identify whether harvests are greater or less than the level expected to provide, on an average annual basis, the maximum annual catch for a CU, given existing environmental conditions.”

Ability of Action Plan to Meet Conditions 1.4 and 1.5

DFO has not committed in their action plan to peer review (PSARC / CSAP) chum LRP's & TRP's (benchmarks), as required by conditions 1.4 and 1.5.

Target Reference Points are typically defined as MSY (or greater to include ecosystem needs). This approach is consistent with the TRP upper benchmark methodology, which has been applied to Fraser and Skeena sockeye. DFO's statement in the table on pg 6 of the action plan: *"Recognizing Target Benchmarks inherently involve trade-offs, determine Target Benchmarks through participatory decision-making (co-management) – see below"* is inconsistent with the WSP and MSC criteria:

- The WSP states that upper benchmarks (TRP's) *"will be established to identify whether harvests are greater or less than the level expected to provide, on an average annual basis, the maximum annual catch for a CU, given existing environmental conditions."* This is consistent with MSY or greater.
- MSC criteria for setting TRP's state that *"target reference points should be such that the stock is maintained at a level consistent with BMSY or above, or some measure or surrogate with similar intent or outcome"* (MSC Policy Advisory 12 v2, Issued 19 January 2011).

MSC criteria requires that TRPs be set at BMSY or a similar surrogate, and does not involve a complex process to discuss trade-offs, as DFO states in their action plan. Therefore, DFO's commitments to meet condition 1.5 are inconsistent with what is required by conditional certification, and MSC policy.

Ability of Action Plan to Meet Condition 1.7

Condition 1-7 states that the client or management agency *"must attain general agreement that the methods of estimating escapement and exploitation rates for all target stocks are scientifically defensible"*, yet there is no discussion or commitment in the action plan to meet this requirement.

Condition 1.7 also states that *"The management agency must report what actions have been taken to reduce fishing as the target stocks approach the LRP and must demonstrate that fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 5 consecutive years."* Again, there is no discussion or commitment in the action plan to meeting this requirement, just general discussion of WSP implementation, with specific information on implementing LRP's and TRP's.

Ability of Action Plan to Meet Condition 3.1

Although, there is discussion and commitment to implement reference points by the second surveillance audit, there is no discussion or commitment to clearly define maximum harvest rates and escapement goals, as required by condition 3.1.

Conditions 1.6, 2.1, 3.4, 3.7 and 3.8 (Conditions related to rebuilding plans)

DFO Action Plan: *"Specifically, DFO will also define lower benchmarks (LRPs) or their equivalent for NCCC, WCVI, ISC and Fraser River, chum salmon CUs. A rebuilding plan consistent with the WSP will have been developed and implementation initiated within 2 years for stocks harvested in fisheries targeting NCCC, WCVI, ISC, and Fraser River chum salmon that are below their lower benchmarks (LRPs). On the Skeena and Nass Rivers the proposed rebuilding plan will include measures to rebuild chum salmon stocks if they are below their lower benchmark (LRP) contingent upon determining whether harvest pressure is found to have a significant risk for chum rebuilding. This rebuilding plan will demonstrate how the fisheries management strategy will assist in ensuring rebuilding objectives are met. Fishery actions may only be one component of a rebuilding plan and could include enhancement, habitat and other measures to enable rebuilding objectives being met. It must recognize though, that there will be instances that rebuilding is not possible even where the appropriate management actions are implemented. Rebuilding may not be possible due to a variety of events that are beyond our control (e.g. low marine survival, habitat changes, environmental conditions, etc.)"*

Ability of Action Plan to Meet Conditions 1.6, 2.1, 3.4, 3.7 and 3.8

Using stock recruitment information (work completed through the WSP benchmark development process) it is possible to model rebuilding trajectories based on estimates of future ER's and productivity rates. We believe this is a logical approach to meeting the audit team's suggestion "provide the scientific evidence to show that this strategy would lead to rebuilding above the 150% LRP mark."

DFO states that rebuilding plans will be developed and will be consistent with the WSP (for CU's found to be below their LRP). DFO does not commit to developing rebuilding plans that:

- *"develop and implement recovery plans to facilitate the recovery of depleted stocks to the MEG within three cycles given average rate of productivity."*
- *"allow the stocks to recover more than 150% of the defined limit reference point prior to allowing any fishery to target the depleted stocks and the stocks should be*

expected to recover to the MEG under the rebuilding plan." as required by Condition 1-6.

Therefore, DFO's commitment and action plan to meet the requirements of conditions 1-6, 3-7, and 3-8 as required by conditional certification, are inadequate.

Rebuilding plans for Skeena and Nass chum required under the MSC sockeye certification (Conditions) are due for completion in May 2012. It is inconsistent for both the Assessment team, and DFO to now promise these rebuilding plans in May 2014 under the chum certification, requiring them two years after they are due for sockeye certification. Further, DFO has already recognized that Skeena and Nass chum are below their LRP, so there is no reason to delay development and implementation of rebuilding plans for these stocks.

Regardless of whether there are conditions out of DFO's control, they cannot use issues such as low marine survival as justification to allow fishing impacts that will impede recovery. If anything, such environmental conditions require even greater precaution in managing such depressed CU's. Such depressed stocks still require rebuilding plans under MSC Condition.

Conditions 3.6, (Conditions related to research)

DFO Action Plan: *"The requirement to include ecosystem values and objectives in planning process is an element of the WSP. Work is currently underway to develop ecosystem objectives and indicators in order to assess the status of salmon ecosystems, as defined under Strategy 3 of the WSP. In addition, Strategy 4 indicates that information on the status of conservation units, habitats, ecosystems and socio-economic values will inform strategic plans for conservation units.*

Over the next two-three years, DFO will be implementing the revised format for Integrated Fisheries Management Plans (IFMPs). The revised IFMP template is much more fishery specific and requires elements not included in past IFMPs, such as stock status, a socio-economic overview and summary of management issues. Implementation of the new IFMP template will require many of the gaps identified in the conditions to be addressed.

To addresses the need to include other objectives (ecosystem, socio-economic) in the planning process and assess performance against these objectives, we will need to re-align our current reporting and/or re-allocate research resources. DFO has developed a Resource Assessment Framework (RAF) for Fraser River sockeye (CSAP review in May 2008) to help guide assessment priorities based on the biological status and knowledge gaps for each CU. Over the next year DFO will be developing a comprehensive salmon RAF. The RAF will serve as a template for all salmon research and stock assessment planning in the Pacific Region."

Ability of Action Plan to Meet Condition 3.6

DFO does not specifically commit to developing a *“research plan for chum fisheries which incorporates the existing elements under 80SG and address impacts of the fishery on the ecosystem, socioeconomic issues that result from management decisions and is responsive to changes in the fishery.”*

Instead, DFO intends to meet this condition through implementation of WSP strategy 3 & 4 implementation, a revised IFMP template, and a Resource Assessment Framework. WSP strategy 3 (ecosystem) implementation has seen little progress to date, and it is questionable whether implementation of strategy 3 will progress sufficiently over the next two years to understand and develop a *“research plan that addresses concerns related to the impact of the fishery on the ecosystem”* as required by the 80 SG. Development of a Resource Assessment Framework is also mentioned as a strategy to meet this condition, yet its focus is on biological status and knowledge gaps, not ecosystem or socio-economic impacts.

It appears that Condition 3.6 requires a research plan specific to chum that incorporates all of the elements under the 80 scoring guidepost, and DFO is not committed to providing such a research plan, but meeting the condition with strategies unintended to meet such specific requirements.

Nowhere in the action plan does DFO commit to producing *“an evaluation of alternative management approaches to reduce bycatch or determine the survival rate of discarded non-target species for non-retention fisheries.”* Reduction of by-catch and determination of survival rates aren’t even mentioned.

Conditions 1.1, 1.2, 1.3 (Conditions related to catch monitoring & stock composition)

DFO Action Plan (related to condition 1.1): *“Under DFO’s Pacific Integrated Commercial Fisheries Initiative (PICFI) the Enhanced Accountability element has provided further focus and resources to develop and implement a framework to improve the monitoring and catch reporting in Pacific fisheries. Under this framework fisheries information requirements are categorized as requiring low, moderate or enhanced levels of information according to consistent criteria, largely based on evaluating risk to conservation.*

The current and desired monitoring levels for all Pacific salmon fisheries are currently being evaluated utilizing this consistent framework and a report being prepared for release by July 2012. This strategy calls for subsequent updates of the regional evaluation of all salmon fishery monitoring programs every two years.

DFO will provide defensible estimates of exploitation rates for Area 4 chum stocks in Area 3-5 salmon fisheries within 2 years to determine the relative magnitude of the

harvest/mortality of Area 4 chum stocks in these fisheries, as required in the second 80 SG scoring element.”

Ability of Action Plan to Meet Condition 1.1

DFO does not specifically commit to evaluating the reliability of catch estimates required by condition 1.1. The catch monitoring framework will likely provide some important information on prioritizing monitoring and types of monitoring required depending on priority for BC chum fisheries, but the framework does not require that fisheries implement “scientifically defensible” estimates. Yet this is required “to ensure accurate catch reporting and these mechanisms are evaluated at least once every 5 years” as is required by the 80 scoring guidepost (1.1.2.1). Continuing with fishery dependant estimates i.e. logbooks, and hail counts produces known biases, and should not be considered adequate information to meet catch monitoring related conditions (conditions 1.1 and 1.2.)

DFO Action Plan (related to condition 1.2): *“As most of the escapement programs for chum are based on visual enumeration in the ISC Chum region, biological sampling for chum is opportunistic. In recent years with the push to improve the genetic baseline for Southern Chum, increased sampling has taken place but not in a consistent manner.*

A report outlining the rationale for the chum salmon escapement monitoring will be developed and it will include how it meets the management needs for NCCC and ISC chum salmon stocks by May 2014. This report will be supported by a companion report that will outline the over all salmon evaluation framework.”

Ability of Action Plan to Meet Condition 1.2

A “report outlining the rationale for the chum salmon escapement monitoring” as committed to by DFO is not equal to “An escapement monitoring program that is adequate to estimate the status of target stocks harvested in the NCCC and ISC chum salmon fisheries must be implemented by the second surveillance audit” as required by condition 1.2

DFO has not committed to “Fishery independent indicators of abundance for non-target species harvested in these fisheries must be available for each year and area where fisheries are permitted to target chum salmon” in the action plan. The catch monitoring framework they are intending to use to meet catch monitoring related conditions does not ensure fishery independent / scientifically defensible monitoring programs will be implemented by the second surveillance audit, as required to meet the 80 scoring guideposts (1.1.2.1 and 1.1.2.2).

Conditions 3.2, 3.3, 3.10 and 3.11 (Conditions related to non-target bycatch estimates)

DFO Action Plan (related to conditions 3.2 and 3.10): *“Under DFO’s Pacific Integrated Commercial Fisheries Initiative (PICFI) the Enhanced Accountability element has provided further focus and resources to develop and implement a framework to improve the monitoring and catch reporting in Pacific fisheries. Under this framework fisheries information requirements are categorized as requiring low, moderate or enhanced levels of information according to consistent criteria, largely based on evaluating risk to conservation.*

The current and desired monitoring levels for all Pacific salmon fisheries are currently being evaluated utilizing this consistent framework and a report being prepared for release by July 2012. This strategy calls for subsequent updates of the regional evaluation of all salmon fishery monitoring programs every two years.

DFO will provide estimates of non target species by-catch for NCC chum fisheries by May 2013.”

Ability of Action Plan to Meet Conditions 3.2 and 3.10

DFO does not specifically commit to obtaining scientifically defensible estimates of non-target species bycatch for North & Central Coast chum fisheries, required by condition. The catch monitoring framework, will likely provide some important information on prioritizing monitoring and types of monitoring required, depending on priority, for BC chum fisheries, but the framework does not require that fisheries implement *“scientifically defensible estimates of non-target species bycatch are obtained annually”*. Continuing with fishery dependent estimates, i.e. logbooks, and hail counts, produces known biases, and should not be considered adequate information to meet catch monitoring related conditions (conditions 3.2 and 3.10).

DFO does specifically state that they will *“provide estimates of non target species by-catch for NCC chum fisheries by May 2013.”*, but nowhere do they commit to producing scientifically defensible estimates of non-target species bycatch, as required.

There is considerable fishery specific and academic literature that suggest that hail-in and logbook information do not provide scientifically defensible verifiable estimates. This includes the following information from the 2011 Area 3 fishery (for a more lengthy discussion please see the Pacific Salmon Foundations submission to the 2012 surveillance audit).

A scientifically defensible estimate of chum bycatch in commercial fisheries in areas 3 and 6 is unavailable as there are no independent measures of either catch or mortality. Although fishermen are required to both phone in daily catch and release information and record species caught and released in a logbook, fishermen do not necessarily accurately report or record the number of non-target species caught and released. In their recent document, *“Steelhead Bycatch and Mortalities in the Commercial Skeena Net Fisheries of British Columbia from Observer Data: 1989 to 2009*, J.O. Thomas and Associates describe wide variations in catch data provided by fishermen through hails, logbooks and phone-ins compared to what was provided by independent observers. The report states that *“non-retention, non-possession regulations for steelhead for gillnet and seines led to an almost complete reduction of reported catches of steelhead for the remainder of the 1990’s through to the present time”* (J.O.Thomas, 2010, p.5).

In another case, 2010 observer data for chums released in the Area 3 seine fishery was more than double the reported catch (J.O.Thomas, 2010, p.6).

DFO Action Plan: (related to conditions 3.3 and 3.11): *“Programs are in place to estimate the number of sturgeon and steelhead encountered in fisheries directed at Fraser River chum salmon. A mandatory release requirement for both of these species is in effect, therefore, estimates of releases are currently based on unverified reports of releases from fishery participants. In addition, several test-fisheries are conducted in the fishery area, which provide independent data on the presence and scope of any sturgeon and steelhead by-catch issues. Improving estimates of fishery impacts on these species would require the implementation of an on-board observer program to provide direct, validated, observations of encounters of steelhead and sturgeon. With sufficient funding, implementing an observer program would be feasible for fisheries with larger vessels. However, fisheries using smaller vessels (e.g. FN Economic Opportunity fisheries and approximately a third of the commercial fleet) could not accommodate on-board observers. These fisheries could potentially be monitored with on water roving observers, an approach that was piloted in the 2007 Area E chum fishery. The 2007 Area E commercial fisheries also had new census-based catch reporting programs, which should meet the 100% reporting requirement for sturgeon releases.*

For consideration, to address the potential impacts on salmon fisheries on sturgeon, an alternative approach could be to use Albion, Cottonwood and Whonnock sturgeon encounters as a proxy.

To satisfy this condition DFO will develop a program (e.g. modeling, test fishery expansion, census based and/or observer based) to estimate the impact of Fraser River sockeye, pink and chum fisheries on steelhead and sturgeon beginning in 2012. The need for further work will be assessed according to the results of this program. A report summarizing the work will be completed in May 2013 and provided to the Certifier.”

Ability of Action Plan to Meet Conditions 3.3 and 3.11

DFO admits that improving estimates of fishery impacts on sturgeon and steelhead will require an on-board observer program. DFO does not however, commit to implementing such a program, discussing the need for sufficient funding. Since they have not committed to any new funding to meet the conditions, and they are currently receiving a national \$80 million budget cut, it is questionable how DFO will be able to meet conditions 3.3 and 3.11 by the first surveillance audit.

This view is consistent with Peer Reviewer # 1's comments: *"The proposed action stops short of ensuring reliable estimation of steelhead bycatch due to high cost of onboard observers. There are no specifics on what level of precision is possible for alternatives. Gillnet fisheries could implement electronic monitoring (i.e., video) at lower cost than observers."*

Conditions 3.5 and 3.9 (Conditions related fishery performance reviews)

DFO Action Plan (related to condition 3.5): *"DFO will provide a review and provide evidence that DFO has implemented programs in the NCC that create incentives for harvesters not to exceed target catches if there are any fisheries where harvesters exceed target catches."*

Ability of Action Plan to Meet Condition 3.5

DFO commits to providing a review and evidence that they have implemented programs on NCC that have created incentives for harvesters not to exceed target catch, but they do not provide any specific details.

DFO Action Plan (related to condition 3.5): *"External reviews are conducted on an annual basis through the department's Integrated Harvest Planning Committee. This Committee is comprised of representatives from First Nations, and commercial, recreational and environmental organizations. The Terms of Reference for this Committee require a post-season evaluation be conducted and reported on an annual basis."*

DFO considers the MSC process to be the external review process."

Ability of Action Plan to Meet Condition 3.9

There is no commitment by DFO to provide *"external review for chum salmon fisheries management performance completed and there is commitment to conducting a similar review at least once every five years"* as required by condition 3-9.

The IHPC meets three times per year to discuss the annual fishing plan for all salmon fisheries, and all species for the entire province. The IHPC does not have the capacity, nor is it structured to undertake comprehensive reviews of BC chum fisheries. Further, the IHPC is a DFO advisory process designed to garner input on fishing plans from interest / user groups, it is not an external review process. The IHPC is highly positional due to conflicting interests groups vying for access and less restrictions, or pushing for more conservative fisheries. This forum does not provide a proper external review process, and does not meet the intention of guidepost 3.5.2 *“The management system provides for a review of management performance by one or more independent experts at least once every five years.”*

ACKNOWLEDGEMENTS

This document was prepared by Misty MacDuffee (RCF), Andrew Rosenberger (RCF), Greg Knox (SWCT), Jeffery Young (DSF), and Aaron Hill (WWSS), with research assistance from Michael Price (SWCT).

REFERENCES

- Babcock, E.A., E.K. Pikitch and C.G. Hudson. 2003. How much observer coverage is enough to adequately estimate bycatch?
- Bison. 2011. Estimation of Relative Fishing Mortality for the 2010 Fishing Season and an Update of the Fishing Mortality Rate Trend for Thompson River Steelhead. *Robert Bison Ministry of Natural Resource Operations, Fish & Wildlife Branch, Kamloops, BC V2C 5Z5 February 11, 2011*
- Brenner, R. E., S. D. Moffitt, and W. S. Grant. 2012. Straying of hatchery salmon in Prince William Sound, Alaska. *Environmental Biology of Fishes* 94: 179-195.
- COSEWIC, 2006. COSEWIC's Assessment Process and Criteria. Online at:
- Dobson D., D. O'Brien, and G. Pestal . 2009. Certification Unit Profile: West Coast Vancouver Island Chum Salmon. *Can. Man. Rep. Fish. Aquat. Sci.* #####: viii + 45 p.
- Donaldson, M.R. 2012. Using telemetry to determine the post-release survival of sockeye salmon released following fisheries capture. UBC NSERC study, unpublished.
- English, K.K., D. Peacock and B. Spilsted. 2006. North and Central Coast Core Stock Assessment Program for Salmon. Prepared for Pacific Salmon Federation and Fisheries and Oceans Canada. 78p.
- English, K.K., T. Mochizuki and D. Robichaud. 2011. Review of North and Central Coast Salmon Indicator Streams and Estimating Escapement, Catch and Run Size for each Salmon Conservation Unit. LGL Limited. Sidney, BC. 73 pps.
- FAO, 1995. Precautionary approach to fisheries: Part 1 guidelines on the precautionary approach to capture fisheries and species introductions. pp. 34.
- Fisheries and Oceans Canada. 2005. Canada's Policy for the Conservation of Wild Pacific Salmon. pp. 57.
- Grant, S. and G. Pestal. 2009. Certification Unit Profile: Fraser River Chum Salmon. *Can. Man. Rep. Fish. Aquat. Sci.* #####: vii + 40p.
- Grant, S.C.H., B.L. MacDonald, T.E. Cone, C.A. Holt, A. Cass, E.J. Porszt, J.M.B. Hume and L.B. Pon. 2011. Evaluation of Uncertainty in Fraser Sockeye (*Oncorhynchus nerka*) Wild

Salmon Policy Status using Abundance and Trends in Abundance Metrics. DFO. Can. Sci. Advis. Sec. Res. Doc. 2011/087. viii + 183 p.

Grant, W. S. 2012. Understanding the adaptive consequences of hatchery-wild interactions in Alaska salmon. *Environmental Biology of Fishes* 94: 325-342.

Hilborn, R., D. Schmidt, K. English and S. Devit. 2012. British Columbia chum salmon (*Oncorhynchus keta*) fisheries. Public Comment Draft Report. Intertek Moody Marine.

Hill, A. and C. Orr (editors). 2009. Reconciling the conservation of wild salmon and the production of enhanced salmon under Canada's Wild Pacific Salmon Policy: A discussion. February 23-24, 2009. SFU Harbour Centre, Vancouver, BC. Online at: www.sfu.ca/cstudies/science/resources/1273697823.pdf.

Holt, C.A. 2009. Evaluation of benchmarks for Conservation Units in Canada's Wild Salmon Policy: technical documentation. Can. Sci. Advis. Sec. Res. Doc. 2009/059. xii + 50 pp.

Holt, C.A., A. Cass, B. Holtby, and B. Riddell. 2009. Indicators of status and benchmarks for Conservation Units in Canada's Wild Salmon Policy. Can. Sci. Advis. Sec. Res. Doc. 2009/058. vii + 74 pp. Online at: (http://www.dfo-mpo.gc.ca/csas-sccs/publications/resdocs-docrech/2009/2009_058-eng.htm)
http://www.cosewic.gc.ca/eng/sct0/assessment_process_e.cfm

Korman, J. and S. Cox-Rogers. 2012. Summary of Preliminary benchmark analysis for lake sockeye CUs in the Skeena watershed. Memo II, March 22.

Otis, E.O. and J.J. Hasbrouck. 2004. Escapement goals for salmon stocks in Lower Cook Inlet, Alaska. Alaska Department of Fish and Game, Special Publication No. 04-14, Anchorage.

Peacock, D. and B. Spilsted. 2010. Skeena River Chum (*Oncorhynchus keta*) Stock Status. DFO Can. Sci. Advis. Sec. Res. Doc. Working Paper xii + 71 p.

Peacock, D., B. Spilsted, R.C. Bocking and W. Duguid. 2011. Nass Chum (*Oncorhynchus keta*) Stock Status. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/nnn. vii + 57 p.

Pestal, G, B. Spilsted, and D. Dobson. 2009. Management Summary for BC Pink & Chum Fisheries. Can. Man. Rep. Fish. Aquat. Sci. #####: vii + 185p.

Pestal, G. and A. Cass., 2007. Fraser Sockeye Resource Assessment Framework: Using Qualitative Risk Evaluations to Prioritize Resource Assessment Activities for Fraser River Sockeye. Report submitted to Fisheries and Oceans Canada, pp. 74.

Price, M.H.H., Gayeski, N., and Stanford, J. 2012. Historical abundance of chum salmon (*Oncorhynchus keta*) returning to the Skeena River watershed. Extended Abstract intended for the Canadian Journal of Fisheries and Aquatic Sciences.

Rand, P. S., B. A. Berejikian, T. N. Pearsons, and D. L. G. Noakes. 2012. Ecological interactions between wild and hatchery salmonids: an introduction to the special issue. *Environmental Biology of Fishes* 94: 1-6.

Spilsted, S. and G. Pestal. 2009. Certification Unit Profile: North Coast and Central Coast Chum Salmon. *Can. Man. Rep. Fish. Aquat. Sci.*: vii + 65p.

U.S. Northwest Fisheries Science Center website. Online at:
(<http://www.nwfsc.noaa.gov/resources/salmonhatchery/risks.cfm>).

Van Will P. R. Brahniuk, L. Hop Wo and G. Pestal. 2009. Certification Unit Profile: Inner South Coast Chum Salmon (Excluding Fraser River). *Can. Man. Rep. Fish. Aquat. Sci.* ####: vii + 63p.

Critique of Catch Reporting and Compliance Monitoring

by Greg Taylor
Pacific Salmon Foundation

Introduction

As detailed in this critique, and further highlighted by the assessment team, there are substantial outstanding concerns with the impacts of B.C. chum fisheries on both non-target chum, and non-target species such as chinook, coho, sockeye and steelhead. Further, there is a lack of independent and scientifically defensible monitoring of bycatch.

This section presents significant new information that the Assessment Team did not consider when scoring the following Performance Indicators:

Indicator 1.1.2.1 Reliable estimates of removals

Indicator 2.1.1 Impacts on ecosystem processes can be identified

Indicator 2.1.3 Sufficient research on ecosystem impacts

Indicator 2.2.1 Information on biological diversity used by managers

Indicator 3.1.3 Identify the impact of fishing on the ecosystem

Indicator 3.1.5 Responses to new information are timely and adaptive

Indicator 3.2.1 Research plan for target and non-target species

The Assessment Team primarily relied on DFO's Management Strategies (MS) and Certification Unit Profile (CUP) evaluations of its own performance. MSC requires an independent third party evaluation of the fishery. It is therefore incumbent upon the Assessment Team to consider additional sources of information as required by MSC's Certification Requirements Vo. 2. Also, some of the information provided in the MS and CUP has been superseded by new international, National, and Regional guidance and policy. Finally, there is new and ongoing research on bycatch and discards that was not available when the MS and CUP were prepared and the Performance Indicators (PIs) scored. For these reasons we request that the Performance Indicators above be re-evaluated using the information provided in this report.

It is also requested that the Assessment Team accept the report prepared by the Pacific Salmon Foundation on catch reporting and compliance monitoring for the 2012 Surveillance Audit when re-evaluating the above PIs.

Evaluating Bycatch and Discards

Bycatch is defined by MSC as *"species in the catch that are not retained and that are discarded, as well as those that die because of unobserved fishing mortality."* Discards can be defined as the throwing away or slipping of dead fish and fish that may not survive after live release. In general, discards are considered a waste of resources and contradictory to responsible fisheries. Discards are often very difficult to estimate, leading to under-estimation of fishing mortality, which impacts fishery management and long-term sustainability. (FAO, 2010)

<http://www.fao.org/docrep/013/i2024e/i2024e00.pdf>

International “best practices” are moving to reduce discards and provide incentives for fishers to:

- Minimize the capture and mortality of species and sizes which are not going to be used in a manner that is consistent with the Code.
- Provide guidance on measures that contribute towards more effective management of bycatch and reduction of discards.
- Improve reporting and the accounting of all components of the catch, of which bycatch and discards are subsets.

The FAO (2010) recommends States identify and assess fisheries where bycatch and discards occur and specify the requirements for management actions. Such assessments should, where feasible, include *inter alia*:

Information on the type(s) of fishing conducted or considered, including the vessels and gear types, fishing areas, levels of fishing effort, duration of fishing, target and bycatch species and their sizes, and in particular, threatened, endangered, or protected species.

- A risk assessment to identify the specific nature and extent of bycatch and discard problems in the fishery as a basis for prioritization and planning.
- A review of the effectiveness of existing initiatives to address the bycatch and discard problems identified in the risk assessment.
- A review of the potential effectiveness of alternative methods to address the bycatch and discard problems identified in the risk assessment.

An assessment of the impacts of bycatch management and discard reduction measures on fishing operations and, in the case of States, on livelihoods to ascertain the potential effects of their implementation and the support necessary to facilitate their uptake.

A review of the systems for the regular monitoring of the effectiveness of measures for bycatch management and reduction of discards, assessed against the management goals.

A regular assessment of plans and management measures for adjustment, as appropriate.

Canada’s pacific salmon fisheries have been slow to embrace international “best practices” on bycatch and discard management. In fact, there have been significant measures in place to *encourage* bycatch and discard fisheries, including:

Regulatory discards whereby fishers are told they must discard non-target salmon and steelhead even when, in the case of chums, they have significant economic value.

Bycatch and discard reporting remains largely unverified.

The use of uninformed bycatch and discard mortality rates.

Compliance with selective fishing regulations is largely unmonitored and unenforced.

Little attempt to assess long-term mortality of salmon and steelhead discarded in commercial fisheries.

Canada, as a contributor to the FAO document, is beginning to address these shortcomings through new National and Pacific Region policies. In fact, in some fisheries, Canada is well ahead of international “best practices” and FAO guidance. B.C.’s groundfish and halibut fisheries are recognized as world leaders in catch reporting and compliance monitoring. DFO is completing a

new policy to address shortcomings in catch reporting and compliance monitoring in BC's salmon fisheries. The new policy - Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries – provides a framework by which to analyze fisheries management practices and determine whether additional measures are required. The presence of a policy is insufficient unto itself to address MSC's Principles & Criteria (P&C) for sustainable fisheries or ensure that the 80SGs for any of the above PIs are met and conditions addressed. The Wild salmon Policy was completed in 2005 but sat dormant through endless consultations that were going nowhere until the sockeye fishery was certified in 2010. Only then did the specific strategies contained in the policy begin to be implemented. The same is true of the new catch reporting and compliance monitoring policies. It cannot be assumed that they will be implemented without MSC requiring it to ensure Canada's pacific salmon fisheries meet MSC's P&C for sustainable fisheries and international "best practices".

New research into long term mortality of pacific salmon released from fisheries is suggesting that the mortality rates employed by DFO may be too optimistic. Research and experiments are ongoing but early results suggest that Canada should be more precautionary in this regard.

MSC assessments of B.C.'s salmon fisheries have fallen behind what is required by international "best practices," Canada's international commitments and Canadian and Regional Policy. New policy, research, and international "best practices" need to be incorporated into the assessment.

Currently, the main source of bycatch data is fishery dependent logbook data. The use of logbooks has limitations as described in "Audit of Management Control Framework Supporting Statistical Information on Fisheries" Project # 2006-6B012 Advisory Report, December 19, 2006.
<http://www.dfo-mpo.gc.ca/ae-ve/audits-verifications/06-07/6b012-eng.htm>.

Limitations of Logbooks and other Fishery Dependent Information

The limitations of fishery dependent data are discussed in DFO's draft policies on Catch Reporting and Compliance Monitoring (attached), (Colin Masson, pers. comm.). DFO states in its draft national policy on discards that that has been provided to the Assessment Team by DFO:

"Fisher dependent techniques rely on individual harvesters or groups of harvesters to monitor and report on their own catch. In reality, no one is better positioned to monitor the fishery and associated catches than the participants themselves. Given positive engagement, adequate training and the appropriate reporting technologies, this type of information gathering can be very cost-effective.

On the other hand, a fisher dependent approach has limitations. For example, it can be hindered by non-compliance, a lack of key information (e.g., releases, bycatch) and unreliable data communication. Independent verification can remove or reduce many of these problems."

The limitations of unverified fishery dependent logbook data are also found in FAO, 2010, *TECHNICAL CONSULTATION TO DEVELOP INTERNATIONAL GUIDELINES ON BYCATCH MANAGEMENT AND REDUCTION OF DISCARDS*. FAO, 2010 provides the following outline for collecting data on discards and bycatch in commercial fisheries:

5. DATA COLLECTION AND BYCATCH ASSESSMENTS

5.1. Data collection, reporting, and assessment

5.1.1. As part of bycatch management planning, States and RFMO/As should, to the extent possible and taking into account the scale and type of the fisheries:

(i) establish appropriate and reliable monitoring and assessment techniques to:

(a) determine how bycatch and discards affect living aquatic resources and

(b) evaluate and refine the performance of measures for bycatch management and reductions of discards;

(ii) implement data collection procedures and protocols appropriate to the scale and type of fishery and taking into account the results of the risk assessment referred to in paragraph 4.1.2 of these Guidelines, including the use of observers, standardized logbooks and vessel position monitoring systems; (iii) consider the use of national and regional training programmes for fishers, resource managers and scientific observers to improve bycatch identification, data collection and reporting; and

(iv) ensure that data collection programs include socio-economic surveys on, inter alia, the value of landings and employment in harvesting sectors and the social and economic impacts of regulatory measures.

5.1.2. States and RFMO/As should develop strategies for the long-term collection of accurate data appropriate to the scale and type of fishery taking into account the importance to management of fishery-specific and species-specific estimates of total catch, size distributions of catch, discards, as well as spatial and temporal variability in bycatch and discard mortality.

5.1.3. Where necessary, States and RFMO/As should strive to achieve a level and scope of observer programs sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.

5.1.4. To standardize the collection of bycatch and discard data, States and RFMO/As should:

(i) establish research and management priorities on a fishery-by-fishery basis;

(ii) solicit the input of fishers, scientists, industry, resources managers, IGOs, NGOs and other relevant stakeholders on standards for bycatch and discard data collection;

(iii) design and test sampling protocols to provide the desired precision and accuracy of data at the lowest cost;

(iv) evaluate the accuracy and precision of the data and their usefulness in estimating the magnitude and characteristics of the bycatch and discards; and

(v) integrate the collection of economic and social information (e.g. operating costs, fleet size, and vessel characteristics) with the collection of oceanographic and biological information.

5.1.5. States and RFMO/As should identify the type and quality of the information that currently exists including considering the availability of expertise and information from participants in the fisheries, conservation groups, and other stakeholders and ensure all appropriate information sources are used fully in the risk assessment referred to in paragraph 4.1.2 of these Guidelines as well as in assessments of the impacts of bycatch and discard mortalities.

5.1.6. Subsequently, States and RFMO/As should assess the impacts of bycatch and discards as well as the biological and economic impacts of bycatch management and discard reduction measures.

5.1.7. States and RFMO/As should give due consideration to the fact that since bycatch management and the reduction of discards often requires different types of data from many sources, improved integrated systems may be required to aggregate, manage and analyze this data. Consideration should be given to making bycatch and discard data publicly available to promote transparency in bycatch management.

5.1.8. States and RFMO/As should recognize that in some multispecies, multigear fisheries, reporting the full species composition of catches may not be practical. Consequently, alternative meth such as reporting on indicator species or other suitable proxies may be necessary.

DFO is responding and has stated that they will require greater verification of discards in 2012. However, industry remains resistant to change (see *Commercial Salmon Advisory Board (CSAB) Catch Monitoring Working Group January 17, 2012*). It is unclear how much progress will be achieved. It is therefore important that the Assessment Team ensures that DFO and the Client make progress against the condition. The presence of a draft policy, and promises that it will be implemented, are insufficient. Strategy 1 of the Wild Salmon Policy was not being implemented until MSC Certifications forced DFO and the Client to put the policy into operation.

Fishery dependent logbook information as the sole source of discard information is not scientifically defensible. DFO has introduced observer programs in some fisheries but neither the methodology nor the results have been peer reviewed. Nor have the assumptions and uncertainties inherent in regards to their application in specific fisheries been evaluated.

DFO has identified that they have significant concerns with the usefulness of logbook and other fishery dependent catch reporting information in recent consultations with the CSAB (see the series of reports supplied to CAB by Carole Eros). These concerns include:

1. Challenges with logbook information have been identified for inaccurate or incomplete information on discard/release at sea information.
2. Management rules (e.g. for stocks of concern) may lead to misreporting or underreporting
3. Start fishing report compliance (for gillnets) is low (e.g. approx. 60%) o Catch reporting has also been very low (less than half vessels fishing in some cases) In some cases, not getting sufficient sample to make catch estimate, particularly for Subareas or estimates are delayed while waiting for additional reports.
4. No current verification of at sea catch/releases. (Noted that only very limited coverage in B and H ITQ fisheries)
5. Sales slips useful for retained species only
6. No independent verification of landed catch
7. Information is not suitable for in-season decision making
8. Phone-in logbook estimates not timely enough
9. Catch estimates vulnerable to further cuts in government funding
10. Observer data is biased No fishery independent observations of at-sea releases
11. Unverified releases of chinook and steelhead a major problem
12. Currently no estimates of discards in Area E.
13. Critical to assess/quantify impacts on co-migrating species

14. Logbooks provide potentially biased information C&P presence is important but is vulnerable to expected budget cuts.

What should be of most concern to MSC is that while the problems have been identified and a policy is evolving to address them, there is no clear commitment that catch and discards will be independently verified in a reasonable time frame. Furthermore, DFO has expressed concerns about continued funding. Industry and DFO are working on the issues but it is clear from the presentations that there is a significant gap between what DFO says is required, what industry says it is prepared to do, and what Ottawa is prepared to fund.

Scoring any of the above PIs at, or above, the 80 level would not conform to MSC Certification Requirements until these concerns are addressed. Conditions should be included in the PCDR that specifically address these and a number of additional concerns raised by DFO. These conditions must require the management agency to have fishery independent catch and discard verification at levels that will provide scientifically defensible, peer reviewed, catch estimates of both landed catch and discards.

The issues raised by DFO confirm the concerns that have been raised by eNGO. They also mirror concerns raised by one of the peer reviewers. Failing to effectively address concerns raised by DFO, stakeholders, and a peer reviewer and scoring the following SGs above 80 will draw an objection:

1. The first two 80SG in PI 1.1.2.1
2. The two 80SG in PI 2.1.1
3. The second 80SG in PI 3.1.7 (DFO expressed concerns about the lack of verifiable information throughout the Gap analysis submitted by Carole Eros)
4. The first SG80 in PI 3.4.2.1 (DFO has identified compliance as being a problem in several of the documents provided to the CAB. We will provide quotes from the documents if requested to do so)
5. The two 80SG in PI 3.4.2.2 (DFO confirms – in the numerous documents presented on Catch Reporting and Compliance Monitoring – that the concerns expressed in this submission, the Peer Reviewers comments, and the PSF submission to the pink audit that there is not sufficient monitoring of fisheries in BC's salmon fisheries.
6. The three 80SG in 3.6.1 (BC's salmon fisheries are currently being conducted in contravention to Canada's commitments to FAO's policy on discards (2010). DFO agrees and is trying to resolve this dilemma but it is unclear that it will be able to, and in what time frame.

Total Fishing Associated Mortality

MSC Guidance on discards is that it involves more than just catch. It involves the impact upon the bycatch species and whether it might hinder recovery. This requires estimates of the mortality associated with discarding. MSC's guidance on this is as follows:

GCB3.8.1 Guidance to Annex CB clause CB3.8.1.

"The outcome PISG requirement levels are similar to those for retained species. SG60 may rely on measures and practices that make it unlikely that this fishery could seriously deplete the population

or hinder recovery (e.g. practices expected to result in very low fishing mortality), even if the status of the species is very uncertain.”

and

GCB 3.7.1I

“Information on observed fishing mortality (including discards and slippage) and unobserved mortality arising from fishing is required to be estimated sufficiently to undertake the assessment of status and inform the management.”

DFO does not include scientifically defensible estimates of short or long term survival of chum, coho, or late run sockeye caught in marine or in-river fisheries. Their mortality estimates have not been derived through a scientifically credible process, nor have they been peer reviewed. There is, however, a growing amount of literature which describes unaccounted for mortality due to discarding. They include:

Underwood, Tevis, et al, 2004. Evidence of Handling Mortality of Adult Chum Salmon Caused by Fish Wheel Capture in the Yukon River, Alaska. North American Journal of Fisheries Management 24:237–243, 2004

Donaldson et al, 2011. The consequences of angling, beach seining, and confinement on the physiology, post-release behavior and survival of adult sockeye salmon during upriver migration. Fisheries Research 108 (1): 133-141.

Baker, Mathew R. and Schindler, Daniel, 2009 Unaccounted mortality in salmon fisheries: non-retention in gillnets and effects on estimates of spawners. Journal of Applied Ecology 46: 752–761.

Raby, Graham et al, 2012. Validation of reflex indicators for measuring vitality and predicting the delayed mortality of wild coho salmon bycatch released from fishing gears. Journal of Applied Ecology 49: 90–98.

Furthermore, DFO assumes that once a salmon is caught and discarded, it is not caught again. There has been no consideration of cumulative impacts. It was once assumed, for instance, that once a salmon was discarded it tended to “sound” and recover thereby tending to avoid recapture. Research has raised questions about this assumption. It was found in C&R research in Johnstone Straits, that, *“Chinook salmon that survived spent between 57–64% of the next 24 h at depths less than 50 m where they were vulnerable to recapture by commercial purse-seine gear”*.

Candy, J.R., et al. 1996. Adult Chinook Salmon Behavior and Survival after Catch and Release from Purse-Seine Vessels in Johnstone Strait, British Columbia. North American Journal of Fisheries Management 16: 521-529

Recent unpublished research by the Cooke Lab has recorded released sockeye returning to their closest school upon being discarded. (see notes below).

The first two 80SG under PI 2.1.3 should have been failed. In order to conform to MSC Certification requirements total mortality associated with the catch and discarding of bycatch species needs to be evaluated.

The Assessment Team cannot sustain the argument that there are currently scientifically defensible estimates of discards and their associated mortality in BC salmon fisheries. Current methodology, data collection, lack of peer review, reluctance to address assumptions and uncertainties all point to a discard management process driven by politics rather than science.

PI 2.1.3 should have a Condition which requires DFO to initiate studies to estimate both the short and long term survival of salmon caught and discarded in commercial chum salmon fisheries. Raby, 2012 discusses the potential for RAMP scores as a cost effective method for assessing catch and release impacts on commercially caught fish. Further collaboration with Raby and other researchers could help address this issue. As Raby argues in his paper, developing a rapid assessment tool could allow fishers and managers adjust fishing to minimize impacts on discarded salmon.

These papers, and others like them, have been released subsequent to the scoring of this PI. The Assessment Team is urged to contact Scott Hinch, Graham Raby, or Stephen Cooke to discuss this further. It is also recommended that the Assessment Team read my notes (below) from a recent NSERC workshop when many of the initial findings were presented.

Additional Information on Discards

It should be noted that discards may not always be underestimated. Industry has raised legitimate concerns whether discards are overestimated in Area 20 fisheries thereby limiting their access to sockeye and pinks. Furthermore, regulatory discards, while easy for DFO to impose, may cost industry both opportunity and by imposing unnecessary cost. Species such as chum, of which industry discarded almost \$1.4 million worth in 2011, may not all have to be discarded (see Pacific Salmon Foundation submission to the 2012 audit). There are opportunities to harvest enhanced Alaskan chum in Area 3. There are other fisheries, such as the Area 4 sockeye fishery, where the discarded species – steelhead – is not a conservation concern and need not be discarded. But industry will have to absorb the considerable costs to produce scientifically defensible estimates of the catch. If steelhead were retained these costs could be largely avoided.

It is interesting to note that Gislason (2007) describes salmon as somewhat unique in BC's commercial fisheries. Most other fisheries have moved to scientifically defensible catch reporting and compliance management. BC's salmon fisheries are less complex than many other fisheries such as the groundfish or halibut fisheries. Yet these fisheries have incorporated international best practices in their management of discards. DFO has made a conscious choice not to integrate scientifically defensible methods into the management of discards. Allowing this to continue will place the integrity of MSC in jeopardy.

Gislason, Gordon. 2007. COMMERCIAL CATCH MONITORING: GATEKEEPER TO SUSTAINABILITY AND PUBLIC CONFIDENCE IN PACIFIC CANADA. Paper Presented to 5th International Observer Conference, Victoria, British Columbia, Canada, 15-18 May 2007

Catch Reporting of Non-target species and stocks

MSC defines catch data as in their Certification Requirements as:

“Total TAC established for the fishery in the most recent fishing year.

*Unit of **Certification** share of the total TAC established for the fishery in the most recent fishing year.*

***Client** share of the total TAC established for the fishery in the most recent fishing year*

*Total **green weight** catch taken by the **client group** in the two most recent calendar years.”*

It is clear that the intent is for the client to provide verifiable catch data. Currently, most discard data is fishery dependent and is not verified.

MSC argues that:

CB2.7.3 The teams shall also consider the veracity of information.

This is further defined in MSC’s Certification Guidance as:

GCB2.7.3 Information is required:

- a) To undertake assessment of stock status.
- b) To inform the design of a harvest strategy and effective HCRs.
- c) For the effective operation of harvest control tools.

MSC speaks to the “risk” of unverified or “qualitative” data:

GCB3.2.8 Guidance to Annex CB clause CB3.2.2.

Direct observations and quantitative analysis are often limited in P2 components and so there may be a greater reliance on qualitative interpretations. Achieving an 80 score through qualitative assessment would typically require the risk to be very low and for there to be ongoing monitoring in place to provide measurement of continued performance. A long history of stability or continuity in the fishery when monitored and managed on the basis of qualitative assessments or expert judgements can provide good evidence for sustainability of the fishery

Most salmon species discarded in the course of salmon fisheries are of conservation concern. This is because DFO employs regulated discards as a conservation tool but then fails to adequately assess the catch or mortality associated with the practise. Regulated discards include depressed chum stocks in the north and central coasts, some northern coho stocks, upper Fraser sockeye, certain Fraser sockeye stocks, Thompson River steelhead.

MSC requires the following under all relevant 80SGs in P2 (information and Monitoring) for bycatch in MSC's Certification Requirements Vol. 2.:

- a) **Qualitative information and some quantitative information** are available on the amount of main retained species taken by the fishery.
- b) Information is **sufficient** to estimate outcome status with respect to biologically based limits.
- c) Information is adequate to support a **partial strategy** to manage **main** retained species
- d) Sufficient data continue to be collected to detect any **increase in risk level** (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy)

This provides the Assessment Team with guidance on how to evaluate the two 80SG in PI 1.2.1.1

MSC states that species recognized by national legislation as being threatened or endangered will be more vigorously monitored:

CB3.11.1 The team shall define ETP (endangered, threatened or protected) species as follows:

- a. Species that are recognised by national ETP legislation;
- b. Species listed in the binding international agreements given below:
 - i. Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered.

Interior Fraser River coho and Cultus Lake sockeye should be assessed under the ETP provisions as these populations are listed as *endangered* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). It could be reasonably argued that those species that fall within the "critical" or "red" zone in the Wild Salmon Policy should also be assessed as ETP species.

Monitoring of ETP species under the 80SG should reflect the following:

- a) **Sufficient information is** available to allow fishery related mortality and the impact of fishing to be **quantitatively** estimated for ETP species
- b) Information is **sufficient** to **determine whether the fishery may be a threat** to protection and recovery of the ETP species.
- c) Information is sufficient to measure trends and support a full **strategy** to manage impacts on ETP species

MSC in its Guidance states that bycatch should be monitored through:

GCB 3.7.1 Information on observed fishing mortality (including discards and slippage) and unobserved mortality arising from fishing is required to be estimated sufficiently to undertake the assessment of status and inform the management.

Discards may be estimated through:

- Observer programmes,
- Interviews with fishers,
- Research programmes
- Electronic monitoring,
- Other technologies such as cameras,
- Logbooks
- Inspection of fishing vessels and gear prior to the commencement of fishing operations,
- Co-management and community-based management.

It should be noted that logbooks are the only fishery dependent monitoring activity mentioned whereas in BC salmon fisheries it is the primary way fisheries are monitored.

It is critical to understand that MSC requires that all sources of mortality be considered when determining impact of non-target species caught and discarded in chum fisheries:

GCB3.1.5 *The consideration of the impact of the fishery on all components in P2 may include unobserved mortality, in addition to observed mortality and impacts, where these are appreciable. It is a direct copy of the Certification requirements. It is crossed out in the Requirements Vol. 2*

Guidance to ACB3.1.2. The total impact of the fishery on all components in P2 needs to include observed and unobserved fishing mortality:

- a. Observed mortality:***
 - catches*
 - discards including slippage*
- b. Unobserved fishing mortality, which is the the sum of all individual mortalities in a fishery resulting directly from capture or indirectly from contact with or avoidance of fishing gear can include, but is not limited to:***
 - i. Illegal fishing and/or unregulated catches***
 - ii. Drop out mortality***
 - iii. Fish and/or shellfish that are injured and subsequently die as result of coming in contact with fishing gear.***
 - iv. Ghost fishing***
 - v. Fish that are stressed and die as a result of attempting to avoid being caught by fishing gear.***

This often-overlooked issue is of obvious importance as the impacts on a non-target stock cannot be estimated without an understanding of total mortality caused by the fishery.

In summary, in order to conform to MSC methodology, catch estimates for non-target stocks must be scientifically defensible (as described in the pink certification). This requires the acquisition of information that is verifiable and includes estimates for all associated mortality.

FAO Guidance

The centerpiece of MSC is FAO guidance. This includes FAO's 1995 Guidance for Responsible Fishing and more recent FAO guidance including the 2010 guidance on discards.

FAO Code of Conduct for Responsible Fishing states:

12.4 States should collect reliable and accurate data which are required to assess the status of fisheries and ecosystems, including data on bycatch, discards and waste. Where appropriate, this data should be provided, at an appropriate time and level of aggregation, to relevant States and sub-regional, regional and global fisheries organisations.

FAO (2010) recommends States identify and assess fisheries where bycatch and discards occur and specify the requirements for management actions. Such assessments should, where feasible, include *inter alia*:

1. *Information on the type(s) of fishing conducted or considered, including the vessels and gear types, fishing areas, levels of fishing effort, duration of fishing, target and bycatch species and their sizes, and in particular, threatened, endangered, or protected species.*
2. *A risk assessment to identify the specific nature and extent of bycatch and discard problems in the fishery as a basis for prioritization and planning.*
3. *A review of the effectiveness of existing initiatives to address the bycatch and discard problems identified in the risk assessment.*
4. *A review of the potential effectiveness of alternative methods to address the bycatch and discard problems identified in the risk assessment.*
5. *An assessment of the impacts of bycatch management and discard reduction measures on fishing operations and, in the case of States, on livelihoods to ascertain the potential effects of their implementation and the support necessary to facilitate their uptake.*
6. *A review of the systems for the regular monitoring of the effectiveness of measures for bycatch management and reduction of discards, assessed against the management goals.*
7. *A regular assessment of plans and management measures for adjustment, as appropriate.*

In terms of information and monitoring FAO, 2010 states:

5. DATA COLLECTION AND BYCATCH ASSESSMENTS

5.1. Data collection, reporting, and assessment

5.1.1. As part of bycatch management planning, States and RFMO/As should, to the extent possible and taking into account the scale and type of the fisheries:

- (i) establish appropriate and reliable monitoring and assessment techniques to:

 - (a) determine how bycatch and discards affect living aquatic resources and*
 - (b) evaluate and refine the performance of measures for bycatch management and reductions of discards;**
- (ii) implement data collection procedures and protocols appropriate to the scale and type of fishery and taking into account the results of the risk assessment referred to in paragraph 4.1.2 of these Guidelines, including the use of observers, standardized logbooks and vessel position monitoring systems;*
- (iii) consider the use of national and regional training programmes for fishers, resource managers and scientific observers to improve bycatch identification, data collection and reporting; and*
- (iv) ensure that data collection programs include socio-economic surveys on, inter alia, the value of landings and employment in harvesting sectors and the social and economic impacts of regulatory measures.*

5.1.2. States and RFMO/As should develop strategies for the long-term collection of accurate data appropriate to the scale and type of fishery taking into account the importance to management of fishery-specific and species-specific estimates of total catch, size distributions of catch, discards, as well as spatial and temporal variability in bycatch and discard mortality.

5.1.3. Where necessary, States and RFMO/As should strive to achieve a level and scope of observer programs sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.

5.1.4. To standardize the collection of bycatch and discard data, States and RFMO/As should:

- (i) establish research and management priorities on a fishery-by-fishery basis;*
- (ii) solicit the input of fishers, scientists, industry, resources managers, IGOs, NGOs and other relevant stakeholders on standards for bycatch and discard data collection;*
- (iii) design and test sampling protocols to provide the desired precision and accuracy of data at the lowest cost;*
- (iv) evaluate the accuracy and precision of the data and their usefulness in estimating the magnitude and characteristics of the bycatch and discards; and*
- (v) integrate the collection of economic and social information (e.g. operating costs, fleet size, and vessel characteristics) with the collection of oceanographic and biological information.*

5.1.5. States and RFMO/As should identify the type and quality of the information that currently exists including considering the availability of expertise and information from participants in the fisheries, conservation groups, and other stakeholders and ensure all appropriate information sources are used fully in the risk assessment referred to in paragraph 4.1.2 of these Guidelines as well as in assessments of the impacts of bycatch and discard mortalities.

5.1.6. Subsequently, States and RFMO/As should assess the impacts of bycatch and discards as well as the biological and economic impacts of bycatch management and discard reduction measures.

5.1.7. States and RFMO/As should give due consideration to the fact that since bycatch management and the reduction of discards often requires different types of data from many sources, improved integrated systems may be required to aggregate, manage and analyze this data. Consideration should be given to making bycatch and discard data publicly available to promote transparency in bycatch management.

5.1.8. States and RFMO/As should recognize that in some multispecies, multigear fisheries, reporting the full species composition of catches may not be practical. Consequently, alternative meth such as reporting on indicator species or other suitable proxies may be necessary.

<http://www.fao.org/docrep/013/i1672e/i1672e00.pdf>

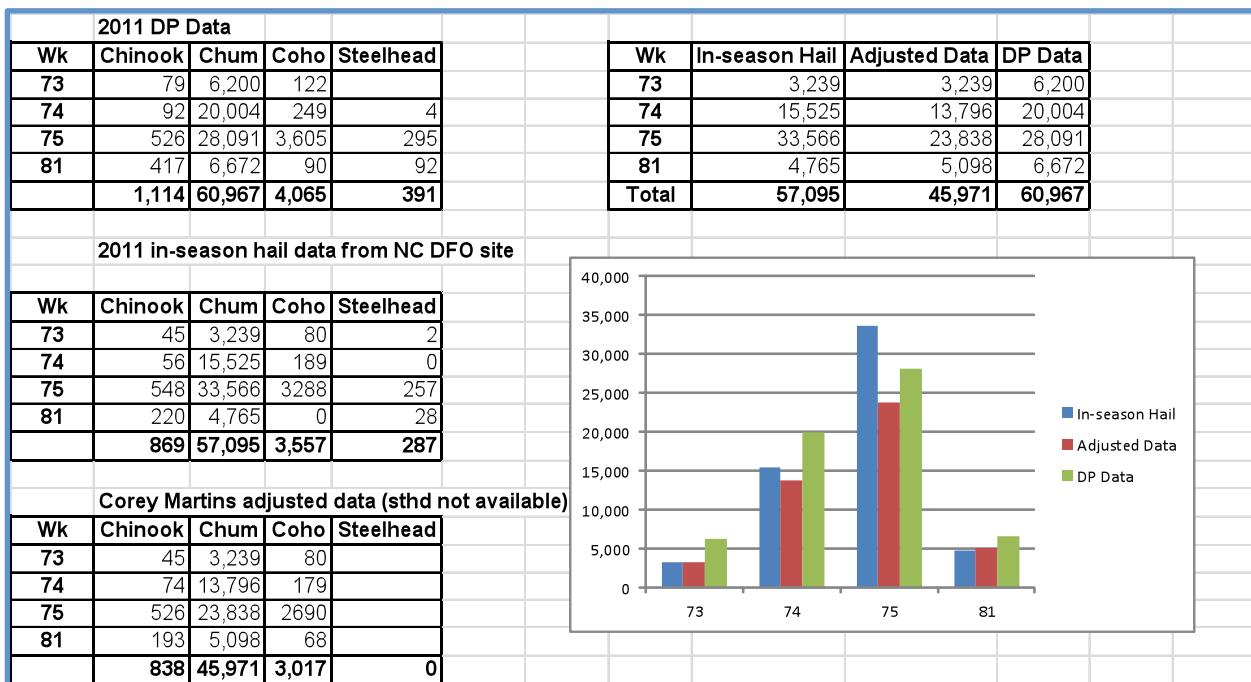
MSC is currently engaging in consultations to upgrade MSC methodology to reflect FAO standards. The Assessment Team should ensure that the PCDR reflects both past and present FAO standards for bycatch management. Accepting unverified fishery dependent catch information does not meet this important test.

Flawed Information Provided to Assessment Team in regards to the impact of chum fisheries on Non-Target Species

The MS and CUP state that DFO provides estimates of non-target stocks caught and discarded in chum fisheries. This is true to a point. DFO has refused to release south coast dockside validation reports even though they are readily available (Jim Thomas, J.O. Thomas and Associates Ltd., pers. comm.)

DFO does produce estimates. But the Assessment Team should be ascertaining whether these estimates meet MSC's Principles and Criteria for Sustainable Fishing. MSC requires that the Assessment Team be highly confident in the accuracy of the catch data. This is difficult as the data is fishery dependent and unverified. There are also no scientifically defensible estimates of how many discarded species survive to spawn.

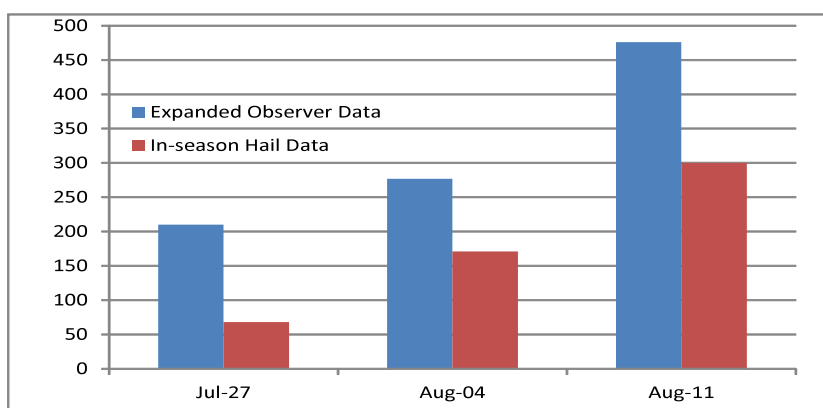
There is considerable fishery specific and academic literature that suggest that hail-in and logbook information do not provide scientifically defensible verifiable estimates. This includes the following information from the 2011 Area 3 fishery (for a more lengthy discussion please see the Pacific Salmon Foundation's submission to the 2012 surveillance audits for BC pink and sockeye salmon).



In the above figure, “DP data” is from Dave Peacock’s (DFO North Coast stock assessment Area Chief) “scaled” logbook data. There is significant discrepancy between in-season hails, post-season adjusted hails, and scaled logbook data. It should be noted that the latter two are useless for in-season management. The second was produced two months after the conclusion of the fishery and the DP data eight months after.

Furthermore, the obvious question that needs to be asked, considering that they all stem from the same fishery dependent information, is why the wide variance? It is not possible to determine which value is the “best” estimate.

Another example is from the 2011 Area 4 fishery where a significant discrepancy is seen between in-season hail data and “scaled” logbook data.



For a full discussion of this information see the PSF’s submission to the 2012 surveillance audits for BC pink and sockeye salmon.

This situation is not isolated to 2011. The same results were found in 2009. There was a significant discrepancy in the 2009 Area 6 discard data. The bycatch of chum hailed in to charter patrolmen was 71,693, compared to the 61,713 fishermen phoned in or reported in their logbooks. A similar discrepancy exists for coho (see tables below). Both of these data sets were not independently verified as there were no observers present. It is therefore impossible to know if either of them provides a reasonable estimate of chum bycatch and discards in Area 6.

Hailed Reports		
	Area 3	Area 6
Coho kept	Not Provided	15,914
Coho Released		65,175
Chum Kept		350
Chum Released		71,693

Phone-in Reports		
	Area 3	Area 6
Coho Kept	Not Provided	11,521
Coho Released		47,223
Chum Kept		350
Chum Released		61,713

A scientifically defensible estimate of chum bycatch in commercial fisheries in areas 3 and 6 is unavailable as there are no independent measures of either catch or mortality. Although fishermen are required to both phone in daily catch and release information and record species caught and released in a logbook, fishermen do not necessarily accurately report or record the number of non-target species caught and released. In their recent document, *“Steelhead Bycatch and Mortalities in the Commercial Skeena Net Fisheries of British Columbia from Observer Data: 1989 to 2009, J.O. Thomas and Associates* describe wide variations in catch data provided by fishermen through hails, logbooks and phone-ins compared to what was provided by independent observers. The report states that *“non-retention, non-possession regulations for steelhead for gillnet and seines led to an almost complete reduction of reported catches of steelhead for the remainder of the 1990’s through to the present time”* (J.O.Thomas, 2010, p.5). In yet another example, 2010 observer data for chums released in the Area 3 seine fishery was more than double the reported catch (J.O.Thomas, 2010, p.6).

The problem of misreporting or underreporting is not a recent one, or confined to northern fisheries. Discrepancies between observed catches and the catch reported by fishermen ranged up to 51% for non-target species in southern fisheries (Bijterveld et al *“Comparison of Catch Reporting Systems for Commercial Salmon Fisheries in British Columbia”, Canadian manuscript Report of Fisheries and Aquatic Sciences 2626, 2002*). Velez-Espino et al. (2010) also detail persistent underreporting of bycatch in BC troll fisheries: *“Statistical analyses of data reported by observer and logbook programs in West Coast Vancouver Island (WCVI) troll fishery for the period 1998-2008 demonstrated that there is a consistent underreporting of released Chinook in retention periods in logbooks when trollers are allowed to keep only legal size fish.”*

DFO has also published Observer Reports from 1998 to 2003 on its website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/fisheries-peches/stats-donnees-eng.htm>. Failure to closely scrutinize available observer data and summary reports is a major shortcoming in the PCDR.

The difference between the expanded observer data and the expanded fishermen's logbook data for the species subject to non-retention, non-possession conditions in Area B (southern seine) fisheries is as follows:

Species	1998	2000	2001	2002	2003	Average
Coho	-20%	-18%	-38%	-47%	-20%	-29%
Chinook	-52%	-37%	-50%	-45%	-58%	-48%
Steelhead	-50%	-22%	-35%	-10%	-40%	-31%

But the problem of under reporting or misreporting bycatch is not limited to salmon fisheries or to BC. In the 1990's DFO was unable to obtain accurate bycatch information from groundfish and halibut fishermen. In each of these fisheries, fishermen knew that the accurate reporting of bycatch and bycatch mortality would likely limit their access to the target species. There was little upside and an enormous downside to accurate reporting. Hence, there was rampant misreporting of bycatch and discards in both fisheries. DFO responded with a three-step approach: logbooks, 100% at-sea monitoring and dockside validation (Grafton et al, 2005).

But the veracity of logbook information is also questioned by senior DFO personnel. The following is from the Cohen Inquiry:

"Where a logbook program is in place, each fisher is required to record their catch in a logbook purchased from a particular logbook manufacturer, and, for many salmon fisheries, to deliver their logbook to a contracted service provider by January 31 of the year following the fishery.⁷⁴ Information from logbooks is not used for in-season management purposes. Rather, the primary purpose of the logbook program is to provide an alternate catch estimate for caught and released catch.⁷⁵ The logbook program is 100% industry funded and is therefore very cost effective for DFO.⁷⁶ However, it is difficult to verify logbook data, the data is not received in-season, and some fishers may forget to submit their logbooks.⁷⁷ The accuracy of logbook information depends on fisher cooperation and ability to estimate catch.

And

"Hail counts are typically verbal reports by fishers of fishing intentions, effort and catch information that are provided to charter patrol vessels, Aboriginal fishery monitors, DFO fishery monitors or contracted service providers. Hails are typically phoned in, or collected during patrol interviews. This information can be used for mid-opening catch estimates, or to verify reported catch following the close of the fishery.⁷² Hails provide timely information and allow for estimates of total catch prior to landing. However, accuracy depends on the fisher's cooperation and ability to estimate catch numbers. There may be incentives for inaccurate reporting where fisheries are closed following reports of by-catch of at-risk species⁷³ or where catch is allocated in a share-based manner."

Senior DFO staff had concluded:

“The Pacific Fisheries Reform Initiative noted that a fishery of the future would require improved monitoring and catch reporting practices.

However, during a meeting of the Pacific Region Strategic Directions Committee, fisheries managers identified that catch data was unavailable, inconsistent, inaccurate and untimely for reporting purposes and for managing fisheries to achieve conservation and other departmental or public objectives. 112 Data was collected from various sources and not effectively synthesized or shared. The system was insufficient to support their needs, and there was no single authority to oversee regional catch data because the scope and responsibility for fishery monitoring was unclear. In addition, they felt that an improved estimate of unauthorized catch was required.”

It was recommended that in this document that for fisheries with by-catch estimated to be in the “yellow zone” around 20% fishery independent information is required. For by-catch which is in the “red-zone” or listed as threatened or endangered much higher levels of verification are required.

Policy and Practice Report. Fishery Monitoring and Catch Reporting for Commercial and Aboriginal Fraser River Sockeye Salmon Fisheries, March 17, 2011 p.23

<http://www.cohencommission.ca/en/pdf/PPR/PPR12FisheriesMonitoringCatchReporting.pdf#zoom=100>

The above coincides with the recommendations in the following paper:

HOW MUCH OBSERVER COVERAGE IS ENOUGH TO ADEQUATELY ESTIMATE BYCATCH? Elizabeth A. Babcock and Ellen K. Pikitch, 2003

The authors suggest 20% for fisheries with discards of moderate concern and 50% plus for fisheries with high risk discards.

<http://oceana.org/sites/default/files/o/uploads/BabcockPikitchGray2003FinalReport.pdf>

For a broad review of DFO perspectives on the limitations of the current methodology DFO employs to collect catch data on non-target species the Assessment Team should request that DFO supply them with:

“Developing a Commercial salmon Monitoring Plan: 2012 and Beyond. October 26 and 27, 2011”

This was a DFO workshop that addressed DFO concerns over the current monitoring program. It should join the MS and CUP in the PCDR as part of the information provided on this condition. The information provided in it, along with the several documents, minutes, reports, and analysis supplied by Carole Eros and DFO should substantially replace the information provided in the MS

and CUP. The most recent information should be reflected by rewriting the “Client Submission” and “Scoring rationale” in

- PI 1.1.2.1 Reliable estimates of removals
- PI 2.1.1 Impacts on ecosystem processes can be identified
- PI 2.1.3 Sufficient research on ecosystem impacts
- PI 2.2.1 Information on biological diversity used by managers
- PI 3.1.3 Identify the impact of fishing on the ecosystem
- PI 3.1.5 Responses to new information are timely and adaptive
- PI 3.2.1 Research plan for target and non-target species
- PI 3.7.1 Avoid catch and minimize mortality of non-target species
- PI 3.4.2.2 Monitoring provisions
- PI 3.6.1 Compliance with international agreements

People outside of DFO have also criticised DFO’s reliance on unverified fishery dependent information to monitor bycatch and discards. These include the following paper by Gordon Gislason. Mr. Gislason is an informed observer of Pacific fisheries. He is often hired by DFO as a consultant on commercial fishing matters.

Gislason, Gordon. 2007. COMMERCIAL CATCH MONITORING: GATEKEEPER TO SUSTAINABILITY AND PUBLIC CONFIDENCE IN PACIFIC CANADA. Paper Presented to 5th International Observer Conference, Victoria, British Columbia, Canada, 15-18 May 2007

There is no doubt that the information presented in the PCDR is sometimes inaccurate; does not reflect current departmental policy; fails to capture the concerns expressed by the people in DFO who are responsible for catch reporting and compliance; and does not consider the criticisms from outside and academic observers of the fishery.

MSC Requires an Estimation of Total Mortality

The Performance Indicator requires that estimates of removal from target and non-target stocks be provided. This wording is deliberate as it conforms to MSC’s requirement that *all* mortality associated with fishing be included in the estimates. The Assessment team must be assuming that “catch” equals “removal”. This is, of course, incorrect for discards. The proper equation for non-target species that are discarded is catch mortality, plus mortality associated with catch and discarding, equals mortality.

Canada’s National draft policy, *Policy Framework on Managing Bycatch and Discards*, that is part of Canada’s *Sustainable Fisheries Framework* states:

“When evaluating the impact of a fishery on a discarded species, unless survival rates of discards have been adequately documented according to established processes (such as risk assessments or peer review), it should be assumed that all discards die. Where estimates of discard mortality are not available, plans may need to be developed to acquire the information.”

There are no scientifically defensible risk assessments or peer reviewed documents that provide estimates of survival rates on stocks discarded in Canada's Pacific salmon fisheries.

There is some very interesting work being undertaken in this regard by the Cooke Lab at the University of British Columbia. Some of the papers were referenced in the introduction. I took the following notes at a recent presentation by researchers at the Cooke Lab describing some of their initial results from their 2011 work and sent to the Marine Conservation Caucus.

Notes from NSERC Presentations.

These are my notes taken at the recent NSERC workshop on salmon migrations, climate change, and capture/release fisheries. I have just typed out my notes in point form. Please see this site for more information on the actual papers.

<http://www3.carleton.ca/fecpl/index.html>

Look under "Research" and "Papers"

1. Fraser temperatures have increased by 2 degrees C since 1950's
2. Predict that there will be at least a further 2 degree increase by the end of the century
3. Predict that Quesnel and Stellako and Late Stuart will decline by 15%
4. Late timing stocks will likely only suffer a 1% decrease. Late runs that return early will decline by 16%
5. Impacts of climate change will be stock specific
6. Marine C&R of sockeye. Sockeye seemed to prefer 10-25 meter depths and 11 degree water. Sockeye had frequent vertical migrations. There was significant predation by seals on C&R sockeye. Did the seals hear the sonic tags or did they recognize a released fish? In tracking the fish they would often see a fish go into violent gyrations and then lose track of them. Only in a few cases did they see seals actually eating a released fish. But they inferred that's what they thought might be happening. What was a surprise is that they thought that the fish would "sound" after being released. Instead, the sockeye found refuge in a nearby school. Calls into question the assumption that all C&R fish "sound and recover" after release. May be a concern for released schooling fish like chums?
7. Sockeye angling is growing in the Fraser: between 2004 and 2006 200k were caught and 100k were released. There were 200k caught and 100k released in the big year of 2010. Management estimates survival very high. Short term results promising: beach seine 95.5% survival, angling 96.9 and fish held in net pen 80.6%. But survival to spawning grounds was Beach seine 52.2%, angling 36.3%, and fish held in net pens 2.9% (yes, the 2.9% is correct). Mortality for air exposed angled fish was 50% higher than for fish that weren't held up. After taking into account tagging and natural mortality it was felt that survival for C&R sockeye was reduced between 20 and 35% depending on handling.
8. Experiments on Harrison and Weaver sockeye showed very high long term mortality for both tangle tooth and simulated GN caught fish. Harrison showed 17.9% survival and Weaver 34.2%. Tangle tooth caught fish did not survive at appreciably higher rates than traditional GN caught fish. What was interesting was that there was a significant difference between Harrison and Weaver fish. Harrison had a 17.9% survival whereas Weaver was 34.2%. Not clear what the difference was. They only simulated GN impacts in that they handled the fish for 10-30 seconds wrapping and scarring them in mesh.. Not clear whether

- injury or stress had the largest impact. Only monitored fish to their spawning grounds. They did not monitor through the spawning period. They mention that Schindler study says significant additional mortality of gillnet injured fish could be expected.*
- 9. The studies on what we call “blue boxes” or Fraser Laminar Flow Revival boxes” showed that they do not increase survival of C&R sockeye. In this study they simulated capture by chasing the fish around in a net pen for 3 minutes and then exposed them to the air for 1 minute. The tests that held the fish in net pen for 33 days showed very low survival after 21 days for the control group, those that had assisted recovery and those that did not. Studies that radio tagged fish indicated that 46% of control group (Harrison) survived being caught and released; 11% of those that experienced simulated capture by a gillnet and did not go into a revival box survived; only 6% of simulated capture sockeye that went into the revival box survived.*
 - 10. Similar revival experiments were done for Thompson coho that were angled. Coho that were caught and released in the water had a 70% survival. Those angled and held in the air had a 65% survival, and those angled, held in the air and revived had a 57% survival rate.*
 - 11. Coho released from beach seines: survival upon release 97%, within 24 hours 85%, after 4 days 75%, and at the spawning grounds 61%. Did not track coho through spawning event. It has to be remembered that no all this mortality is due to the C&R event as there is a natural 20% mortality on coho migrating upstream. They used RAMP scores. RAMP scores increased with release time. Injury was more “lethal” than stress.*

These results are preliminary but they indicate, and the researchers said as much, that current DFO estimates of commercial fishery mortality rates on salmon are woefully inaccurate. Much of this work was done “in-river”. It is therefore an important contribution as “in-river” selective economic opportunity fisheries are increasing.

It is critical that the Assessment Team address this shortcoming in the assessment. Focusing on catch instead of removals (catch plus associated mortality) does not conform to MSC P&C for sustainable fishing, MSC Certification Requirements, FAO guidance, and DFO policy.

Lack of Compliance with Catch Reporting

The PCDR presents the information on Catch reporting as if there was a consensus amongst DFO and other observers that the data collected through fishery dependent means is accurate. DFO’s Conservation and Protection Branch has noted in successive years that catch reporting and compliance with filling out logbooks is an ongoing problem.

The contention in the Client’s submission that commercial hail-in data are occasionally verified is, at best, misleading. There has been no consistent, scientifically defensible, independent measure of non-target bycatch, discard, and compliance for most open access commercial net fisheries. There was, at one time, dock-side monitoring of north coast open access fisheries. But this has been discontinued. Enforcement is limited due to capacity constraints. There are no consistent observer programs that meet international standards and compliance patrols are limited due to lack of resources. A reading of DFO’s North Coast Post-Season reviews over the past few years does not describe any scientifically defensible, consistent, fishery independent monitoring that would lead one to conclude that the inaccuracy of catch and discard data concerns identified in the J.O.Thomas and DFO reports is not continuing.

Furthermore, the AT's acceptance of the status quo means that the issues are unlikely to be addressed and that MSC would be certifying a fishery that does not meet international standards for the monitoring, control, and surveillance (MCS) of bycatch and discards (FAO, 2000), FAO, 2010, or Canada's Sustainable Fisheries Framework.

It is unclear what the Client means in its submission under PI 1.2.1.1 when it states regulatory discards are "occasionally" verified. It is not clear what value this would be, even if it were true. But, the fact is, contrary to what is reported in the PCDR, there is no ongoing on-grounds verification program. Nor is there any current dockside validation of open access fisheries. The AT's acceptance of the Client's submission on this point would mean that MSC would be certifying a fishery that does not meet global best practices, or even for that matter, practices embraced by other BC fisheries such as groundfish and halibut. The Assessment Team should ask for examples where there has been a scientifically defensible level of fishery independent monitoring for open access fisheries. The team is required to:

"27.10.1 After the team has compiled and analysed all relevant information (including technical, written and anecdotal sources) they shall score the fishery against the PISGs in the final tree. "

It is insufficient to consider just the MS and CUP prepared by the management agency. This is akin to a Global Trust certification. MSC requires the assessment of fishery performance not just an assessment of what the management agency says it does or intends to do.

The PCDR also points to CUP 4 as evidence that there are accurate catch estimates for bycatch and discards. Unfortunately, CUP 4.2.3.1 makes three key misstatements:

Daily inspections by enforcement patrol staff surveying harvest information and monitoring compliance to all fishery restrictions and management guidelines (e.g. use of revival boxes when mandatory). This data is recorded in the fishery managers Record of Management Strategies (RMS).

Post season reports produced by DFO Enforcement Staff make it clear that this is not done, nor do they have the resources should they want to (North Coast Post- season: 2007, 2008, 2009, 2010). For example, DFO Conservation and Protection staff state that they have only checked between 3.0% and 7% of the total commercial effort between 2006 -2009, and much of this was directed at the commercial **sockeye** fishery. (DFO Post-Season Reports 2007- 2009).

Commercial hail-in data are verified occasionally by on-water inspections of catch by Fishery Officers, dock-side monitoring and auditing of sales slip data. Nearly all commercial harvesters submit catch information to DFO.

There is no evidence that there is a useful amount of on-water inspections by Fishery Officers: they spend relatively little time in the field during commercial fishing openings.

Catch monitoring programs also track by-catch and monitor compliance with conservation restrictions to assess impacts of fishing on non-target species for use in determining conservation measures on stocks of concern. For example, post-season estimates of

steelhead by-catch are derived from in-season monitoring by charter patrol boats, weekly call-in by individual harvesters, log book data, and sales slip data.

Evidence has already been provided that most fishery dependent data is not independently verified. And there is no evidence that there is a systematic on-grounds program to monitor compliance. Furthermore, J.O.Thomas (2010) shows that DFO is not able to produce scientifically defensible estimates of steelhead discards.

Comparisons between logbook and expanded observer estimates for south coast salmon fisheries from 1998-2003 are available at the following DFO website:
<http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/fisheries-peches/stats-donnees-eng.htm>. These reports show clear and consistent discrepancies between observed, logbook, and manager's data. Specifically, they show consistent underreporting of bycatch species.

An analysis of the variances between logbook and observer data in the south coast troll fishery that is available for the years 1998-2008 shows that logbook data consistently underreports discards. It concludes that, "an independent source of catch and release data such as the one provided by the observer program seems to be irreplaceable to monitor fishing dynamics and potential changes in reporting biases" (Velez-Espino, 2010).

This problem continued in 2011. C&P states in the 2011 North Coast post-season report:

"The management of most of the detachment's fisheries has become increasingly more complex in recent years. This has resulted in an inability to address many issues/fisheries, i.e. proper auditing and enforcement actions regarding logbook/fish slip compliance in salmon gillnet fisheries."

"Laundering of non-commercially caught salmon into the commercial gillnet fishery continues to be a compliance issue. The detachment carried out work plans in 2011 to address this issue"

"An increase of non-compliance in the commercial seine and gillnet fisheries was observed in 2011. This included non use of revival boxes, retaining prohibited species, using illegal gear, long net / long soak time violations, and providing false information on fish slips."

The PCDR states that:

Accuracy of catch reporting (i.e. as assessed through the hail-in/logbook program) is determined through a number of mechanisms. These include:

- *Observer programs;*
- *Charter Patrols;*
- *Compliance Patrols;*
- *PAL Surveillance Over-flights;*
- *Dockside sampling or monitoring;*
- *Processing plant sampling or monitoring.*

This was the reality in 2011:

- The only comprehensive observer program on the coast was for the Area B sockeye and pink share-based fisheries. Chum fisheries are "open" competitive fisheries and do not

require observer coverage. The north coast observer program had 4% coverage in 2011. (see PSF 2012 audit submission)

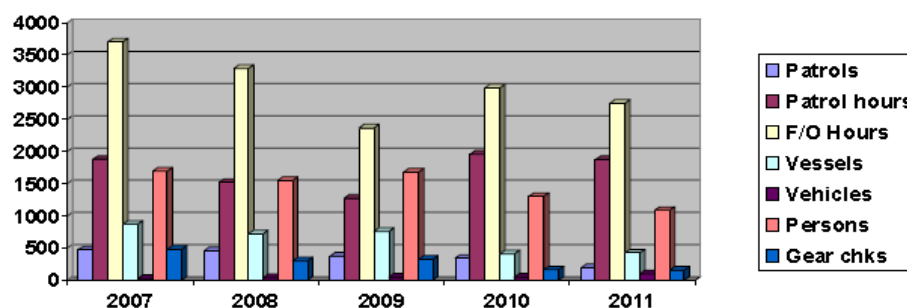
- DFO charter patrolmen faced further cutbacks in 2011. This has become a serious concern for managers (Dan Wagner, DFO North Coast, pers. comm.)
- Conservation and Protection branch (C&P) have stated in successive north coast post-season reviews that they do not have the capacity to effectively monitor and enforce fisheries. They also say that when they do have a vessel monitoring a commercial fishery is typically only one. The challenge with this is once an infraction is identified the boat must spend a good part of it's remaining time getting the vessel out of the fishery, issuing the citation, and doing the paperwork, effectively removing it from monitoring the fishery for most of the rest of the day (C&P, pers. comm.) The following table is from the 2011 North Coast Review; it describes C&P activities.
- Over-flights are not relevant in terms of enforcing and monitoring commercial salmon fisheries. The only over flights are conducted at the start of the fishery for gear counts. C&P officers are not present on the flight.
- Dockside sampling or monitoring is only conducted for share based fisheries. Chum fisheries, being competitive fisheries, do not require dockside validation
- C&P sometimes visit processing plants, but they come in uniform. My experience as Vice President and then Fisheries Manager at Ocean Fisheries until 2011 is that when C & P officers are on-scene fishermen and shoreworkers ensure that prohibited species are absent. In the plant, I managed to ask C&P each winter if he could give the thousands of pounds of prohibited species stored in the freezer to the local wildlife center and food bank.

Prince Rupert Detachment Statistical Summary

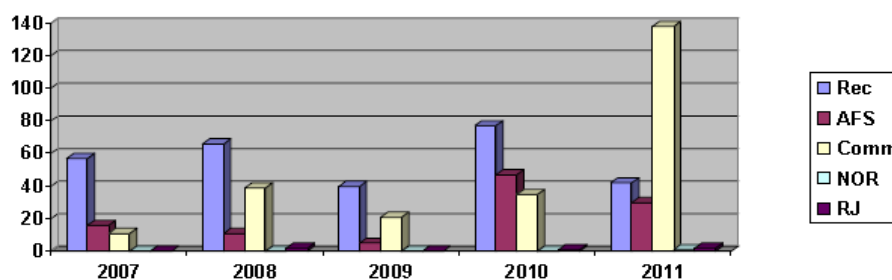
Table 1: Comparison of FEATS data for 2007 to 2011

Year	Patrols	Patrol hours	FO hours	Vessels Checked	Vehicles Checked	Persons Checked	Gear Checks
2011	192	1875	2750	427	98	1090	158
2010	336	1956.0	2987.75	409	53	1304	165
2009	374	1272.75	2366.75	755	47	1681	324
2008	457	1521.5	3293.25	721	40	1553	303
2007	477	1879.25	3704.25	874	26	1696	485

Graph 1: Comparison of FEATS data for 2007 to 2011



Graph 2: Summary of charges by fishery 2007 to 2011.



Catch Estimates of Target Stocks

It is well known that sales slip data does not capture all catch. DFO reported to the NPAFC in October, 2006:

“Tracking landings of commercial catch in Canada’s Pacific Region is difficult, for various reasons, including large fleet size and number of offloading sites, including on-water (‘packer’) offloads, public marinas and commercial plants. Further, during the last decade, it has become increasingly common for fishers to sell directly to the public, and for sales to occur well after a fishery. Due in part to these complexities, enforcement of the requirement for sale slips to be generated and submitted for all sales has been insufficient to ensure high

compliance. Therefore, commercial catch estimates probably underestimate total commercial catch, substantially in some cases.”

[http://www.npafc.org/new/publications/Documents/PDF%202006/979\(Canada\).pdf](http://www.npafc.org/new/publications/Documents/PDF%202006/979(Canada).pdf)

Attempts were made to address this failure in the subsequent report by adjusting the catch data using various adjustment factors. The same authors concluded they were able to improve the precision but unable to say by how much. Furthermore, these adjustments were for the benefit of the NPAFC and are not employed by fisheries management.

[http://www.npafc.org/new/publications/Documents/PDF%202008/1120\(Canada\).pdf](http://www.npafc.org/new/publications/Documents/PDF%202008/1120(Canada).pdf)

This is not news to anyone with any experience in the salmon fishery. Last year I retired as vice-president of a major BC fishing company where I was responsible for buying chums from various south coast fisheries. It was always very difficult to plan for tenders as processors are typically unable to purchase significant quantities of gillnet fish when the run is relatively large. Many fishermen have their own markets for chums and chum roe and only begin selling to the major processors once these markets became saturated. Processors also had to change their chum pricing. Instead of paying one price for chums, whether male or female, they had to pay differential prices. Otherwise, fishermen tended to deliver only males to the processor and all their females went to alternative markets. Some of these alternative markets are smaller processors that do issue fish tickets. But just as often the fishermen have local markets or are self-processing their fish or roe.

This problem is increasing as fleets continue to decrease; fishermen gain experience marketing their own product; and local and regional markets for salmon increase. This is of particular concern on the south coast. We request that the Assessment Team discuss this issue with DFO's Conservation and Protection Branch.

The PCDR states:

“The NCC chum CUP states that catch estimates are available for all target stocks harvested in the fishery. Non-target stocks do not represent a significant component of the stock.”

It is convenient that the PCDR does not record the same for South Coast chum fisheries. This is a significant failing as most chum fisheries occur on the south coast. One can only assume that the PCDR does not record the same for south coast fisheries is that *accurate* catch estimates are unavailable for all south coast fisheries.

Changing Policy Environment

The information in the MS and CUP provided to the Assessment Team and used as the basis for scoring the PIs does not reflect the current policy environment. Canada has endorsed the guidelines (see below) proposed in FAO's 2010 *“TECHNICAL CONSULTATION TO DEVELOP INTERNATIONAL GUIDELINES ON BYCATCH MANAGEMENT AND REDUCTION OF DISCARDS”*. This is not reflected in either the MS or CUP. Furthermore, Canada is in the final stages of consulting on a National bycatch

strategy “Policy Framework on Managing Bycatch and Discards” as part of its Sustainable Fisheries Framework. DFO’s Pacific Region is in the final stages of consulting on a policy for Pacific salmon Fisheries (see below). This new policy sets out new catch reporting and compliance monitoring guidelines that will begin to be put in place in 2012. (see attached).

None of the above is reflected in the MS or CUP. It is like the Assessment Team is studying how to control Vancouver’s current traffic patterns based on decade old information and policy.

All the above, however, remains policy. It has not been implemented and it is not clear that it will be. There is considerable opposition from the fleet (see the several sets of CSAB minutes supplied to the Assessment Team including the one cited earlier in this report), the costs will be borne by the fleet and not DFO so DFO cannot control implementation, and much of the work on improved catch reporting and compliance monitoring was funded by PICFI which has now sunsetted

MSC is not Global Trust. Global Trust certifies whether the management agency has policies in place that reflect FAO guidance. MSC certifies whether fishery performance reflects MSC criteria, the management agency’s policies, FAO guidance, and international best practices.

The Assessment Team should broaden the information used to score the Performance Indicators by incorporating the information provided in the following policy documents.

http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2012/03_05-07-eng.html

http://www.curra.ca/documents/future_of_fisheries_DFO_doc_EN.pdf

<http://www.cohencommission.ca/en/pdf/PPR/PPR12-FisheriesMonitoringCatchReporting.pdf>

The Assessment Team should then do what it did for the sockeye and pink certifications. It required – through the establishment of conditions – that the management agency implement Strategy 1 of Canada’s Wild Salmon Policy. This has been a very important incentive for DFO to proceed with the implementation of the WSP and aligns well with MSC’s requirements for the development of scientifically defensible Limit and Target Reference Points.

Unverified Catch Estimation is not Catch Reporting

The Assessment Team reported the following as a justification for having passed the second 80SG in PI 1.2.1.1.

“All certification units meet the first 80SG scoring element through the basic catch information system described under the 60SG. All certification units partially meet the third 80 SG scoring element because reviews have taken place, but fail to fully meet it because there is no program of systematic review of the catch monitoring system. The WCVI, ISC and Fraser CU meet the 2nd 80SG through the tagging and GSI work that has been done (see the

CUP's for each). Until recently there were no estimates of Area 4 chum catch in the Area 3 chum fishery available and this by-catch of Area 4 chums could constitute a significant fraction of the stock of Area 4 chums entering Canadian waters. However, the November 2011 report by LGL Ltd. "Review of North and Central Coast Salmon Indicator Streams and Estimating Escapement, Catch and Run Size for each Salmon Conservation Unit" provides such estimates and thus the quality of data for the NCC is comparable to the other CU's and we have scored the NCC the same as the other CU's."

This does not conform to MSC Certification Requirements Vol. 2 pp. 78 – 85 and will draw an Objection. MSC is quite specific about what is required in terms of information to estimate bycatch and discards. The information discussed above does not meet MSC criteria. Furthermore, MSC also requires an estimation of total mortality. This information cannot provide it.

The report by the lead of the Assessment Team has not been peer reviewed. The assumptions employed may be so flawed that the uncertainty surrounding the estimates would not meet MSC standards. For instance, the use of old catch/effort relationships and sockeye/bycatch ratios in Area 3 to model seine bycatch estimates do not reflect either the changes that have occurred in the fishery over time or how the fishery operates. And employing this methodology to assess bycatch in Area 6 is completely unfounded. I have bought salmon commercially in these areas for 30 years and believe the assumptions employed in LGL's methodology do not accurately reflect how the fishery operates.

Peer Reviewer Concerns

The first Peer Reviewer had serious concerns with the bycatch and discard provisions of the PCDR which have not been addressed. The review stated, amongst other things, that:

*"2. Monitoring non-target species bycatch does not appear to measure up to standards required in other types of BC fisheries such as groundfish. Chum fisheries intercept several species/stocks that appear on various levels of Species-at-Risk (SARA) and COSEWIC listing. Concern about similarly listed groundfish species (e.g., *Sebastes* spp), in combination with IVQ management schemes, recently prompted detailed electronic monitoring 100% of all commercial groundfish activity. It is therefore unclear why DFO's monitoring standards are not applied consistently across fisheries. The assessment team has clearly identified this monitoring gap, which seems to reoccur within all three MSC principles."*

In regards to PI 2.1.1 the Peer Reviewer states:

Too much emphasis on policies here and not enough on what is actually being done in this fishery.

The two SG80 issues are:

- *A monitoring program exists that provides estimates of bycatch.*
- *In known problem areas of high bycatch, there is an ongoing monitoring program.*

Other parts of the report indicate a lack of bycatch monitoring and, in fact, place conditions to create these programs. At best, I would say the existing programs are partial and not particularly reliable.

The team's response was:

The team interpreted these SG80 guidelines as policy, as opposed to the details of the quality of the fishery. Bycatch monitoring does exist, through the log book program, as defined in Conditions of License (see response in Peer Review 1 comments). We will need to interpret the guidelines where it states "estimates of bycatch" as "scientifically defensible estimates of bycatch and mortality". If we wish to go this way, then the conditions provided for other Principles would apply here. Since a "condition of license" requires recording bycatch, it is difficult to say the programs are partial.

If we are going into the "quality" of the program, then we can repeat the condition previously provided under Principle 1. In our original scoring, we chose not to address this issue and stuck to the literal language of the scoring guidelines, which in my opinion, the language of the two SG80 guideposts are met. Modification of the scores and applying conditions would be an effort in redundancy and I'm not sure it is warranted.

The Team's response does conform to either the intent or content of MSC's Certification requirements or MSC's Certification Guidance. **If this PI is not rescored and a condition issued, it will draw an objection.** MSC has spent a great deal of time as of late distinguishing itself from Global Trust. Global Trust certifies – as had the Assessment Team in this case – whether a policy might be in place; whereas MSC certifies whether the policy has been implemented: what the Assessment Team calls, *"the details of the quality of the fishery"*. This reasoning exposes the MSC to a significant liability.

Furthermore, the Assessment Team is stating that it agrees with the peer reviewer that the quality of the discard data is unreliable but chose to pass the PI in any case. This disregard of objective evidence that discards are not accurately reported along with the peer reviewer's comments is unfathomable.

Indirect Impacts of Catch and Release of Discards

The Assessment Team's response in the PCDR does not conform to MSC's Certification requirements. The Assessment Team defines bycatch thusly: *"The definition of bycatch is the harvest of non-target species or stocks, therefore, the catch data do not include statistics for non-target species which are released as a condition on license"*.

This is incorrect. MSC defines bycatch as, *"Bycatch Species Organisms that have been taken incidentally and are not retained"* (MSC's Certification Requirements Vol. 2). This document further defines bycatch on page 78, *"CB3.8.1 The team shall interpret bycatch species to be species in the catch that are not retained and that are discarded as well as those that die because of unobserved fishing mortality where those species have not already been assessed under P1 as target species or under the other components in P2 (see clause CB3.1.1)"*.

The Assessment Team goes on to argue that, “the rigor and cross checking of data are limited with test fisheries or other observer programs is essential to provide reliable estimates of fish caught and discarded”. This makes little sense. The Assessment team states that the rigour and cross checking of data is limited and that test fisheries or other observer programs are essential to cross check logbook information, yet it is known that there are no scientifically defensible observer programs in place for chum fisheries and test fisheries are not employed by managers to cross-check discard information. I looked for scientifically defensible observer programs in place for chum fisheries. I could not find any. I challenge the Assessment Team to look for themselves.

Selective Fishing Policy

The discussion of the previous indicator provides objective evidence of why this PI has been improperly scored.

The additional justification the Assessment Team uses to score this PI is the presence of the Selective Fishing Policy. The Selective Fishing Policy has nothing to do with evaluating this PI or the two 80SG. The Selective Fishing Policy, which has not been fully implemented, is about reducing bycatch; it says little or nothing in regards to the two 80SGs in question.

Further questions have been raised about the value of the policy and program:

“The aim to develop selective fishing standards, with respect to encounter rates and total mortality for non-target by-catch in the fisheries, and have them in place to prolong the effects of the Program after funding ended was not fully achieved other than in a the [sic.] scale of temporary area planning. The objectives were lacking a measurable aspect regarding how; for example, observed conservation outcomes (such as the early trend of increase in abundance) would be attributed to selective gear use. Indicators and performance measurement information were needed to provide the data that would link the research and experimental work to the long term effects of the Program”

These concerns are recorded in DFO’s evaluation of the Selective Fishing Policy.

<http://www.dfo-mpo.gc.ca/ae-ve/evaluations/04-05/salmon-saumon-eng.htm#n50>

Scoring the Indicator

The PI requires that the Assessment Team have “high confidence”. MSC’s Certification Requirements provide the following guidance for this phrase:

CB3.2.3 *The team shall note that the terms “likely”, “highly likely” and “high degree of certainty” are different to the values assigned under P1. To put the P2 values into probabilistic context:*

CB3.2.3.1 *‘Likely’ means greater than or equal to the 60th percentile in the distribution (i.e. there shall be at least a 60% probability that the true status of the component is within biologically based limits).*

CB3.2.3. 2 'Highly likely' means greater than or equal to the 70th percentile in the distribution.

CB3.2.3. 3 'High degree of certainty' means greater than or equal to the 80th percentile in the distribution.

MSC's Certification Guidance provides additional clarity:

Confidence and risk

GCB3.2.6 Increasing scores require increasing confidence in the assessment of outcome status and adequacy of management measures or strategies. For most components:

- a. The 60 SG is 'likely' to be.*
- b. The 80 SG is 'highly likely' to be.*
- c. The 100 SG has a 'high degree of certainty' of being within biologically based limits.*

GCB3.2.7 These terms may be interpretable either qualitatively (e.g. through analogy with similar situations, plausible argument, empirical observation of sustainability and qualitative risk assessment) or quantitatively (e.g. through measured data from the relevant fishery, statistical analysis, quantitative risk assessment and quantitative modelling).

The Assessment Team, in order to conform with MSC Certification Requirements, needs to describe how they believe they have a high confidence that the 80SG are met considering the evidence that has thus far been provided in this paper. Most of the evidence presented challenges the information provided by DFO. MSC Certification Requirements require the Assessment Team to consider and evaluate this information and provide a scoring rationale that meets the test of "high confidence".

Conclusion

The information in this report provides ample reason and evidence for the Assessment Team to re-evaluate the PIs listed in the introduction. MSC, Canada, and FAO consider the accurate assessment of bycatch and discards an important element that should be reflected in a modern sustainable fishery. It is important that the Assessment Team reflect this in its assessment of BC's chum salmon fishery.

References

"Best Practices" for Fisheries Management, Baltic Sea 2020, 2010

<http://www.stockholmresilience.org/download/18.244c2fbe120dce4c6af800014399/bestpracticesreport.pdf>

Babcock, E.A., E. K. Pikitch and C.G. Hudson. 2003. How much observer coverage is enough to adequately estimate bycatch? Report of the Pew Institute for Ocean Science, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL. On-line version:

http://na.oceana.org/sites/default/files/o/fileadmin/oceana/uploads/dirty_fishing/How_Many_Eyes_Do_We_Need_on_the_Ocean_Final.pdf

Bijsterveld I., S. Di Novo, A. Fedorenko, and L. Hop Wo. 2002 Comparison of Catch Reporting Systems for Commercial Salmon Fisheries in British Columbia. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2626

Branch T. A., Hilborn R., Haynie A. C., Fay G., Flynn L., Griffiths J., Marshall K. N., et al. Fleet dynamics and fishermen behavior: lessons for fisheries managers. Canadian Journal of Fisheries and Aquatic Sciences 2006;63:1647-1668

Candy, J.R. et al, 1996. Adult Chinook Salmon Behavior and Survival after Catch and Release from Purse-Seine Vessels in Johnstone Strait, British Columbia. *North American Journal of Fisheries Management* 1996; 16: 521-529

DFO. North Coast Post-Season Review 2007 available from DFO

DFO. North Coast Post-Season Review 2008 available from DFO

DFO. North Coast Post-Season Review 2009

http://www.pac.dfo-mpo.gc.ca/northcoast/post-seasonreview/docs/2009/2009_Area_1-6_PSR.pdf

DFO. North Coast Post-Season Review 2010 http://www.pac.dfo-mpo.gc.ca/northcoast/post-seasonreview/docs/2010/2010_Salmon_Post_Season_Review.pdf

http://www.pac.dfo-mpo.gc.ca/northcoast/post-seasonreview/docs/2010/2010_Salmon_Post_Season_Review.pdf

DFO. 2011 Salmon Outlook:

[http://www.gulftrollers.com/news/IHPC/2011%20Outlook%20Nov%2024%202010%20\(IHPC\).pdf](http://www.gulftrollers.com/news/IHPC/2011%20Outlook%20Nov%2024%202010%20(IHPC).pdf)

DFO. North Coast Post-Season Review 2011

http://www.pac.dfo-mpo.gc.ca/northcoast/post-seasonreview/docs/2011/2011-Salmon_Post_Season_Review.pdf

Davies, Sandy L 2003. Guidelines for Developing an at-Sea Fishery Observer Programme. FAO Fisheries Technical Paper 414

Department of Fisheries and Ocean's. 2010 Draft Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries.

<http://www.gulftrollers.com/news/IHPC/IPHC%20presentation%20Nov%2025%202010.pdf>

Dobson A, Foufopoulos J (2001) Emerging infectious pathogens of wildlife. Phil Trans R Soc Lon B 356: 1001–1012.

FAO (1995) Code of Conduct for Responsible Fisheries. Food and Agriculture Organization of the United Nations, Rome, 41 pp.

FAO. Code of Conduct for Responsible Fisheries <http://www.fao.org/fishery/ccrf/en>

FAO. Monitoring, Control, and Surveillance <http://www.fao.org/fishery/topic/3021/en>

FAO. Technical Consultation to Develop International Guidelines on Bycatch Management and Reduction of Discards <http://www.fao.org/docrep/013/i2024e/i2024e00.pdf>

Grafton RQ, Arnason R, Bjørndal T et al (2005) Incentive-based approaches to sustainable fisheries. Can J Fish Aquat Sci 63(3):699-710

DFO Supplied Documents used in the Preparation of this Submission

Developing a commercial salmon monitoring plan: 2012 and beyond
October 26-27, 2011 • Vancouver, BC

CSAB Catch Monitoring WG Meeting • February 21, 2012 • DRAFT Minutes

CSAB Catch Monitoring Working Group meeting • May 1, 2012 • Vancouver

Commercial Salmon Advisory Board Catch Monitoring Working Group
Terms of Reference

DRAFT Minutes: CSAB Catch Monitoring WG • April 4-5, 2012 • Vancouver

Commercial Salmon Advisory Board (CSAB) Catch Monitoring Working Group
January 17, 2012

Commercial & First Nations Inland Demonstration Fisheries
2011 Technical Summary Report

Strategic Framework for Fishery Monitoring and Catch Reporting Final March 2012

SUBMISSION IN RESPONSE TO FULFILL CONDITIONS 35C AND 36B OF THE MSC CERTIFICATION OF
THE BC COMMERCIAL SOCKEYE SALMON FISHERY, Peter Hall

ECOTRUST CANADA REPORT FOR 2011 AREA 3 & 4 SEINE AND GILLNET BIOLOGICAL SAMPLING AND
CATCH MONITORING PROGRAM

Raw North Coast Observer Data supplied by DFO North Coast Office.

Excel Spreadsheet by DFO on minimum standards submitted to the Assessment Team

Risk Assessment to Determine the Required Level of Fisheries Monitoring

Policy and Practice Report Fishery Monitoring and Catch Reporting for Commercial and Aboriginal Fraser River Sockeye Salmon Fisheries March 17, 2011 (Submission to Cohen Inquiry)

Cohen Transcripts: Panel 35

Appendix 1

2011 North Coast Discards: Pieces, Pounds, and Estimated value

Area	Gear	Sockeye	Sockeye Rel	Coho	Coho Rel	Pinks	Pink Rel	Chum	Chum Rel	Springs	Spring Rel	Sthd Rel
3	GN	63,518		1,364	186	28,609	154	0	5,130	1,037	296	349
3	SN	61,426	3,033	2,885	3,557	298,470			57,095	0	869	287
4	GN	248,445	57	2,511	1,306	94,433	315		2,564	1,666	92	1,681
4	SN	59,623	35	3,910	277	91,657			2,121		532	0
5	GN	1,610			56	1,181		186				
5	GN	734		87		3,631		18,383		3	1	1
6	SN	25,903		10,886	9,183	706,139			72,499		600	50
		461,259	3,125	21,643	14,565	1,224,120	469	18,569	139,409	2,706	2,390	2,368
Avg Lbs.		5.2	5.6	8.0	8.0	3.3	3.3	10.0	10.0	15.0	15.0	14.0
		2,398,547	17,500	173,144	116,520	4,039,596	1,548	185,690	1,394,090	40,590	35,850	33,152
Average Price		\$1.75	\$1.75	\$0.80	\$0.80	\$0.45	\$0.45	\$1.00	\$1.00	\$1.75	\$1.75	\$0.00
Value		\$4,197,457	\$30,625	\$138,515	\$93,216	\$1,817,818	\$696	\$185,690	\$1,394,090	\$71,033	\$62,738	\$0

Retained Pcs		1,728,297
Discarded Pcs		162,326
Percent		8.6%
Retained Lbs		6,837,567
Discarded Lbs.		1,598,660
		18.9%

Retained Value		\$6,410,513
Discarded Value		\$1,581,365
		19.8%

Appendix 2

2011 DP Data				
Wk	Chinook	Chum	Coho	Steelhead
73	79	6,200	122	
74	92	20,004	249	4
75	526	28,091	3,605	295
81	417	6,672	90	92
	1,114	60,967	4,065	391

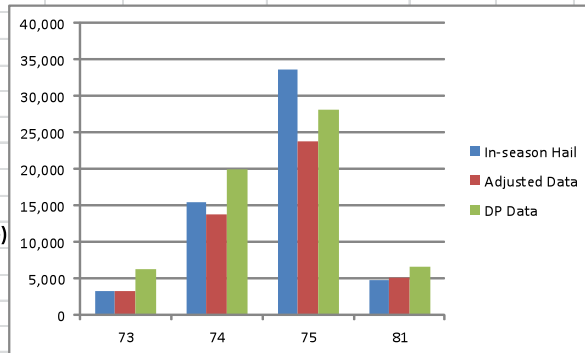
Wk	In-season Hail	Adjusted Data	DP Data
73	3,239	3,239	6,200
74	15,525	13,796	20,004
75	33,566	23,838	28,091
81	4,765	5,098	6,672
Total	57,095	45,971	60,967

2011 in-season hail data from NC DFO site

Wk	Chinook	Chum	Coho	Steelhead
73	45	3,239	80	2
74	56	15,525	189	0
75	548	33,566	3288	257
81	220	4,765	0	28
	869	57,095	3,557	287

Corey Martins adjusted data (sthd not available)

Wk	Chinook	Chum	Coho	Steelhead
73	45	3,239	80	
74	74	13,796	179	
75	526	23,838	2690	
81	193	5,098	68	
	838	45,971	3,017	0

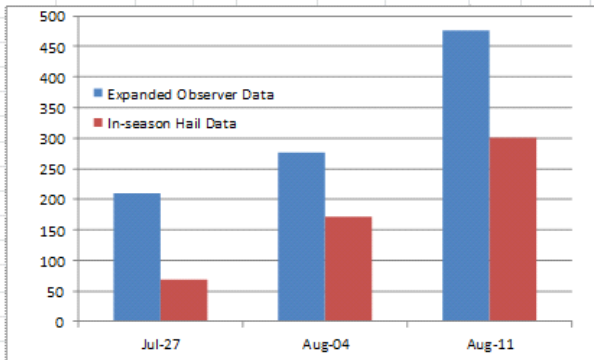


Appendix 3

Using 2011 Observer Data to estimate steelhead catch in the Area 4 fishery. The reasons for the wide discrepancy between estimated and hailed data are unknown. It could be due to the extremely low and inconsistent observer coverage, under hailing, observer bias, or a number of other factors. What is clear is that until there is a scientifically defensible level of observer coverage the questions will not be addressed.

Sub-Area																
Date	Sets	Sockeye	Steelhead	Total	Proportion	Estimated	Sockeye per	Steelhead	Boats	Fleet	Percent of	Sthd per	Estimated	Hailed	GP	
Fishing	Observed	Caught	Caught	Sockeye	Observed	Steelhead	Steelhead	Hailed	Fishing	Size	Fleet	Boat	Sthd	Sthd	LogBook	
27-Jul-11	20	107	2	5,212	2.05%	57	54		58	233	24.0%	1.7	97	29		
27-Jul-11	21	1,059	6	24,023	4.41%	113	212		74	293	31.3%	1.5	113	38		
4-Aug-11	18	100	1	3,192	3.22%	31	100		28	233	11.2%	1.2	31	11		
4-Aug-11	20	228	1	5,368	4.27%	23	228		46	214	21.0%	0.5	23	48		
4-Aug-11	40	220	4	6,289	3.50%	114	55		82	214	28.0%	1.8	114	48		
4-Aug-11	27	185	2	10,026	1.96%	198	93		81	214	37.9%	1.3	198	84		
11-Aug-11	20	112	4	3,977	3.84%	110	28		34	143	23.8%	3.2	110	81		
11-Aug-11	26	250	14	8,642	3.82%	368	18		81	143	42.7%	8.0	368	218		
27-Jul-11	87	28														
27-Jul-11	113	38		Jul-27	210	58										
4-Aug-11	31	11		Aug-04	277	171										
4-Aug-11	23	48		Aug-11	476	300										
4-Aug-11	114	48														
4-Aug-11	108	84														
11-Aug-11	110	81														
11-Aug-11	368	218														

Date	Expanded Observer Data	In-season Hail Data
Jul-27	210	75
Aug-04	277	171
Aug-11	476	300



Appendix 4

