

**CRITICAL REVIEW OF THE MARINE STEWARDSHIP COUNCIL DRAFT  
ASSESSMENT OF SKEENA AND NASS RIVER SOCKEYE FISHERIES**

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## INTRODUCTION

### *Background and purpose*

The purpose of this document is to provide critical analyses of the Marine Stewardship Council (MSC) draft assessments for the Skeena and Nass sockeye fisheries, and also to provide recommendations to the MSC assessment team based on those analyses. This review was commissioned by the Watershed Watch Salmon Society as part of a Marine Conservation Caucus initiative.

The Skeena and Nass watersheds are adjacent, their associated marine fisheries interceptions overlap substantially, and both fisheries are managed by DFO North Coast; therefore many issues discussed in this review are common to both fisheries. Initial reviews of the 2004 DFO self-evaluations, the 2005 independent reviews commissioned by the Sierra Club of Canada's BC Chapter (SCBC), and the August 2007 MSC Draft Assessment<sup>1</sup>, and consultations with regional experts, led to the conclusion that conditional certification was likely warranted for the Nass fishery, but not the Skeena fishery. Therefore, given limited time and resources, the MSC Draft Assessment of the Skeena fishery received much more scrutiny in this review than that of the Nass fishery.

### *Approach taken in reviewing the Assessment*

The 2005 independent reviews of the DFO self-evaluations commissioned by the Sierra Club formed the basis for this review<sup>2,3</sup>, and this review focuses only on apparent deficiencies in the Draft Assessment – mostly scores that appeared to be unjustifiably high and conditions that appeared inadequate. For each indicator the scores suggested<sup>4</sup> by the SCBC reports were compared to the scores assigned by the assessment team. In the majority of cases for the Skeena assessment, indicators were only scrutinized if it was determined that at least one 60 Scoring Guidepost may be not met or partially met. For the Nass assessment, indicators were scrutinized where the evidence (or lack thereof) suggested that the score assigned by the assessment team was unjustifiably high and a more appropriate score would necessitate an additional condition or modification of the existing condition(s).

There is clearly an element of subjectivity inherent in determining whether Guideposts have been met or whether assigned conditions are appropriate. I endeavoured to strictly

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<sup>1</sup> All documents available at: [http://www.msc.org/html/content\\_493.htm](http://www.msc.org/html/content_493.htm)

<sup>2</sup> Bocking, R. 2005. Review of MSC Certification Evaluation of Skeena Sockeye Stocks. Prepared by Robert Bocking, LGL Ltd.; prepared for Sierra Club of Canada, BC Chapter; April 21, 2005.

<sup>3</sup> Levy, D. 2005. Independent Review of Nass River Sockeye Fishery Performance Measures, Prepared by David Levy, Levy Research Services Ltd.; prepared for Sierra Club of Canada, BC Chapter; April 2005.

<sup>4</sup> In the case of the Levy (2005) independent review it was often necessary to infer a suggested score from the author's comments.

adhere to a precautionary approach in my own determinations regarding deficiencies in the DFO submissions and the Draft Assessment. As such, failure on the part of DFO or the assessment team to provide or point to reasonable evidence that a particular Guidepost had been fully met was considered sufficient grounds for considering that Guidepost not met or partially met. Wherever possible, I have cited the existing studies, data, personal communications, and other sources that informed my arguments and suggestions.

### *The MSC scoring process*

This review assumes that the reader has an understanding of the MSC scoring process. A detailed description of the scoring process can be found in the Draft Assessment<sup>5</sup>, and a brief synopsis is also presented here:

- The fundamental scoring units in the MSC certification are the Scoring Guideposts (SG), and they fall under the following hierarchy:
  - Principles → Criteria → Indicators → SGs.
- SGs are separated into 3 ranked categories: 100, 80, and 60.
  - The 100 Guidepost is the highest mark any fishery could be expected to receive.
  - The 80 Guidepost indicates the MSC level of acceptable performance.
  - The 60 Guidepost indicates the minimum threshold allowable in an MSC evaluation.
- In the Draft Assessment, the SGs were assessed as met, partially met, or not met.
- Conditions were imposed on the certification if one or more 80 SGs was not fully met under a particular indicator.

In this review, colour codes are used to indicate the score received in the Draft Assessment for the Guidepost under discussion:

- Green = SG requirements have been met
- Orange = SG requirements have been partially met
- Red = SG requirements have not been met
- Black = the SG requirements are not applicable to the fishery being assessed

Headings for each Indicator being critiqued in this review were colour-coded as follows:

Grey: 80 or 100 Scoring Guidepost not or partially met

Yellow: 60 Scoring Guidepost partially met

Red: 60 Scoring Guidepost not met

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<sup>5</sup> [http://www.msc.org/html/content\\_493.htm](http://www.msc.org/html/content_493.htm)

### *Summary of findings*

For the Skeena there were numerous cases where the score suggested by the SCBC reviewer (Bocking 2005) was substantially lower than that assigned by the assessment team. Such cases were less frequent for the Nass. For both fisheries there were several cases where the scores suggested by the both the assessment team and the SCBC reviewer were considered to be too lenient, often because new or additional information was being considered. It should be noted that the timeframe in which the SCBC reports were prepared was much shorter than the timeframe for this report.

In general the DFO self-evaluations for both fisheries contained numerous unsubstantiated claims, yet the majority of the resulting self-assigned scores were adopted by the assessment team. I did not find any of the Indicator scores assigned by the assessment team for either fishery to be unjustifiably low.

**Given the high number of 60 and 80 Scoring guideposts that I found were not met or partially met (27 of each) I conclude that the Skeena sockeye fishery is not currently being managed in a sustainable manner, and therefore should not be certified as such. I argue that any assumption that existing or additional certification conditions could be met in a timely manner would be unfounded and unrealistic.**

Major problems in the management of the Skeena sockeye fishery are as follows:

- Numerous sockeye stocks are fluctuating at low levels of abundance, and are being considered for “endangered” or “critically endangered” listings by the IUCN.
- Non-target stocks subject to bycatch in the sockeye fishery are fluctuating at low levels of abundance.
- Insufficient status data and assessment procedures for several target and non-target stocks.
- Interceptions of weak target and non-target stocks in the mixed-stock marine fishery are continuing at rates too high to allow for the recovery of those stocks.
- Limit reference points are not defined or effectively implemented for the majority of stocks exploited in the fishery.
- Management model is not robust to increasing ecological variability as a result of climate change.
- Narrow and unprecautionary approach to ecosystem-based management and failure to implement ecosystem-based management provisions of the Wild Salmon Policy in a timely or meaningful manner.
- Inability to enforce fleet compliance with selective fishing measures, bycatch reporting requirements, and other conditions of license.
- General lack of management control in the marine component of the fishery due to derby-style fishery openings.
- Disintegrating relationships with numerous First Nations, as evidenced by active lawsuits.

**While serious flaws in the management of the Nass fishery were identified in this review, they appeared to be realistically manageable through the use of certification conditions.**

Major problems in the management of the Nass sockeye fishery are as follows:

- Numerous sockeye stocks are fluctuating at low levels of abundance or declining and the Nass sockeye aggregate is being considered for a “vulnerable” listing by the IUCN.
- Non-target stocks subject to bycatch in the sockeye fishery are fluctuating at low levels of abundance.
- Insufficient status data for several target and non-target stocks.
- Interceptions of weak target and non-target stocks in the mixed-stock marine fishery are continuing at rates too high to allow for the recovery of those stocks.
- Limit reference points are not defined or effectively implemented for the majority of stocks exploited in the fishery.
- Some components of the management model are not robust to increasing ecological variability as a result of climate change.
- Narrow and unprecautionary approach to ecosystem-based management and failure to implement ecosystem-based management provisions of the Wild Salmon Policy in a timely or meaningful manner.
- Inability to enforce fleet compliance with selective fishing measures, bycatch reporting requirements, and other conditions of license.
- Lack of management control in the marine component of the fishery due to derby-style fishery openings

## **COMPARING THE SKEENA AND NASS FISHERIES AND ASSESSMENTS**

The main obstacle to sustainability in both fisheries is the threat to biodiversity posed by the continual interception of weak stocks and non-target species in the mixed-stock marine fisheries. Gillnets and seines are inherently unselective and gillnet bycatch mortality rates are not demonstrably less than 40-50% for all species under normal (uncontrolled) fishing scenarios.<sup>6</sup> And in 2006 DFO demonstrated a lack of commitment to require and enforce selective fishing measures set out in the North Coast Integrated Fisheries Management Plan (IMFP). Moreover, there are no empirical studies to support the notion that fish released live from gillnet or seine hauls do not suffer significant reductions in spawning success.<sup>7</sup> Both watersheds have multiple stocks from multiple species that are either declining or fluctuating at low levels of abundance and will likely not recover if they are continually subjected to recent exploitation rates in mixed-stock

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<sup>6</sup> Cox-Rogers. 2007. A brief comment on the structure of the current SKEENA management MODEL and some of its key inputs. *DFO Memorandum*, June 20, 2007.

<sup>7</sup> Cox-Rogers. 2007. A brief comment on the structure of the current SKEENA management MODEL and some of its key inputs. *DFO Memorandum*, June 20, 2007.

fisheries (*i.e.* above estimated maximum sustainable yield (MSY)). This is reflected in the *proposed* listings for Nass and Skeena subpopulations in the latest draft IUCN report on sockeye: the single Nass subpopulation is deemed “vulnerable” and of the 5 Skeena subpopulations two are deemed “critically endangered”, one is deemed “endangered”, one is “data deficient”, and one is of “least concern”.<sup>8</sup>

The definition of ‘target stock’ used in the Skeena assessment was problematic in that it only included the enhanced Babine stock. The point is made several times in this review that all Skeena sockeye stocks that are exploited in the marine commercial fishery are *de facto* target stocks. The certification could easily fail under some of the Principle 1 Indicators if a more precautionary definition of ‘target stocks’ was adopted. In the case of the Nass assessment the ‘target stocks’ appear to be all Nass sockeye stocks exploited in the commercial fishery, not just the much larger and better-studied Meziadin stock. The scoring and conditions for the Nass assessment thus reflect the poor status of stock assessments for the smaller sockeye stocks (e.g. Indicator 1.1.2.2). No explanation for the apparent inconsistency between the ‘target stock’ designations for the two fisheries is provided in the draft assessment.

Substantial differences exist between the Nass and Skeena fisheries. Stock assessment procedures on the Nass are far ahead of those on the Skeena in the scope and quality of data they provide to managers. In terms of functional relationships between First Nations, DFO’s situations on the Skeena and Nass are vastly different. The Nisga’a have a treaty, they are active participants in the management of the fishery, and it appears that their legal and customary rights and needs are being met by DFO. On the Skeena, no First Nations have signed treaties, and some are actively involved in various legal disputes with the Federal Government over management issues in the commercial sockeye fishery.<sup>9, 10</sup> The successful use of multiple fishwheels on the Nass allows for significant fishing effort to be moved upriver where selectivity is much easier to achieve. Selective in-river fisheries have not yet achieved sustained or widespread commercial success on the Skeena.

The fact that Skeena-bound salmon are intercepted in the Nass Management Area (Area 3)<sup>11</sup> could present a problem from a certification perspective. This review indicates that the assessment team would be justified in granting conditional certification for the Nass fishery and withholding certification for the Skeena fishery. Even if conditional certification is granted to both fisheries, it seems that certification could easily be revoked for the Skeena fishery at a later date given the number and scope of the conditions compared to the Nass certification, and the resources that would be required to meet all of the conditions in a timely manner. If either scenario were to unfold, would all sockeye

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<sup>8</sup> Classifications are based on decline rates in multiple stocks over 3 generations (12 years) of trend data – Salmonid Specialist Group of the Species Survival Commission of IUCN World Conservation Union. 2007. IUCN Red List Assessment for Sockeye Salmon *Oncorhynchus nerka*. DRAFT – Nov.26, 2007.

<sup>9</sup> Personal communication with Gerald Wesley, Chief Negotiator, Tsimshian First Nations Treaty Society.

<sup>10</sup> Luba, F. 2007. First nation sues DFO over sockeye fishery. *The Province*, July 27, 2007.

<sup>11</sup> English *et al.* 2005. *Assessment of the Canadian and Alaskan Sockeye Stocks Harvested in the Northern Boundary Fisheries using Run Reconstruction Techniques, 2002-03*. Prepared for: Pacific Salmon Commission, DFO, and ADFG, Dec.31, 2005.

retained or offloaded in Area 3 still be considered MSC-certified? If so, what are the Chain-of-Custody implications? And what is to stop DFO from shifting fishing effort from Areas 4 and 5 to Area 3 in order to maximize interception of MSC-certified fish? Certification for the Nass fishery could provide justification for maintaining or increasing harvest rates in Area 3 while lack of certification for the Skeena fishery could provide motivation to reduce harvest rates in Areas 4 and 5. If the Nass fishery ends up being certified while the Skeena fishery is not, the assessment team should consider restricting the certification to those sub-areas and times where fisheries would be least likely to intercept Skeena-bound sockeye.

Guideposts not met or partially met for each fishery are as follows:

	80 Guideposts not fully met	60 Guideposts not fully met
Skeena:	27	27
Nass:	22	11

## **SKEENA CRITIQUE**

### **MSC PRINCIPLE 1**

Principle: *“A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.”*

Intent: *“The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.”*

### **General comments and concerns**

The MSC evaluation of the Skeena sockeye fishery is strongly weighted towards the performance of the Department in their management of the so-called target stock – the Babine Lake stock that is enhanced through the Pinkut Creek and Fulton River spawning channels. A more precautionary definition of ‘target stock’ would include any stock of the target species that has an estimated average harvest rate in the fishery above some reasonable pre-determined threshold. Indeed, the Principle (above) explicitly refers to “the exploited populations”, not the *intended* populations. Certainly from a production standpoint the target (Babine) stock itself is sustainably managed. However, the fundamental and as yet insurmountable obstacle to the ecological sustainability of the Skeena commercial sockeye fishery is its continual interception of weak and non-target stocks due to the similar run timing of various species and stocks.

## Indicator concerns and criticisms

### 1.1.1.3 – Geographic distribution known

SG 100.1, 80.3, 60.1

Assessment team and Bocking (2005) are NOT in agreement.

SG 80.3: The information available on the geographic range for harvest of non-target stocks is sufficient to prevent the over-harvesting of these stocks.

SG 60.1: The information available on the geographic range for harvests of target or non-target stocks is sufficient to prevent the over-harvesting for the majority of the stocks within each stock unit.

Bocking (2005) argues that these guideposts have only been partially met due to the fact that no information was provided on pink, chum, or chinook. Geographic distributions of steelhead harvests are poorly understood in commercial and First Nations' marine and in-river fisheries alike.<sup>12</sup> It is not clear why Bocking's recommended scoring of SGs 80.3 and 60.1 was rejected by the assessment team.

### 1.1.1.5 – Enhanced stocks

All Scoring Guideposts

Assessment team and Bocking (2005) are in *general* agreement. However, I argue that several guideposts here are not met or partially met, especially the following:

SG 100.2: Times and areas have been identified where the majority of enhanced fish migrate through the general fishery.

SG 60.1: There is general scientific agreement within the management agency regarding the impacts of enhanced fish on the resultant harvest rates or escapements of un-enhanced fish stocks

SG 60.2: Managers have some scientific basis for assuring that harvest rates for enhanced stocks are not adversely affecting the majority of un-enhanced stocks within each stock unit.

The scoring for SG 100.2 should be reconsidered given the anomalous run timing and age-size distribution that occurred in 2006 and the resulting management crisis. Variability in run timing and composition will likely become greater as increasingly erratic weather patterns associated with global climate change affect freshwater flow regimes and oceanic productivity patterns. Based on the information provided in the DFO submission and the Draft Assessment it is not clear that DFO science programs provide

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<sup>12</sup> Personal communication with Mark Beere, Senior Fisheries Biologist, BC Ministry of Environment – Skeena Region.

sufficiently robust data for local stock assessment biologists to make adequate predictions of run timing, strength, and age-size distribution in a changing climate. The Tye test fishery does not provide ideal in-season information in this regard as it samples the run after it has passed through the gauntlet fishery<sup>13</sup> and the calibration of the sockeye index does not occur in-season as the Babine River fence counts begin near the end or after the completion of the commercial sockeye fishery. Thus the predictive models used to manage the fishery fall apart when run timings deviate significantly from previously calculated averages. It should be noted that such predictive models would be much less necessary if the bulk of the fishing effort was moved to terminal fisheries.

Moreover, given the high fishing pressure in 2006 and 2007 despite the extremely poor performance of several wild sockeye stocks in recent years<sup>14</sup> (e.g. Lakelse, Kitwanga, Bulkley-Maxan, Morice) it could now be argued that none of the Scoring Guideposts under this indicator have been fully met, most notably SG 60.2 (above).

The majority of weak sockeye stocks are routinely fished at exploitation rates above their estimated MSY, yet reliable stock status information does not exist for approximately 1/3 of them.<sup>15,16</sup> Fishery openings occur long before Limit Reference Point (LRP) or equivalent escapements have been reached for unenhanced stocks, many of which are not enumerated on an annual basis. Even in most cases of unenhanced stocks that receive rigorous annual enumerations, DFO managers do not know that these stocks have been “adversely affected” until after the fishery has been conducted and after the spawner density has peaked, at which point it would of course be impossible to adjust the harvest rate. At best, SG 60.2 has been partially met.

SG 60.1 is also only partially met. The Skeena sockeye aggregate abundance, stock composition, and timing is extremely complex and at present is barely understood, and therefore difficult to manage for in a sustainable manner. Also, the mortality estimates used by DFO for seine and gillnet bycatch mortalities are based on studies of short-term (i.e. > 24 hr.) mortality, not escapement, and certainly not spawning success. If there is general agreement among Department scientists on this matter it likely does not have an empirical basis.

#### 1.1.2.1 – Reliable estimates of removals

SG 100.2, 80.3, 60.3

Assessment team and Bocking (2005) are NOT in agreement on SG 100.1 and 100.2. I concur and argue that SG 80.3 and 60.3 have also not been met.

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<sup>13</sup> Personal communication with Carl Walters, Professor, UBC Fisheries Centre.

<sup>14</sup> e.g. Kitwanga, Morice, Lakelse, Bulkley-Maxan; from Gottesfeld and Rabnett. 2007. *Skeena Fish Populations and Their Habitats*. Skeena Fisheries Commission, Hazelton, BC.

<sup>15</sup> Personal communication with Dave Peacock, North Coast Stock Assessment Area Chief, DFO.

<sup>16</sup> Cox-Rogers *et al.* 2004. Stock status and lake based production relationships for wild Skeena River sockeye salmon. *CSAS Research Document* 2004/010.

SG 100.2: Mortality rates for the fish released or discarded during the fishery are available.

SG 80.3: Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 5 years.

SG 60.3: Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 10 years.

Bocking (2005) disagreed with DFO that “mortality rates for the fish released or discarded during the fishery are available” (SG 100.2). Indeed, long-term mortality rates on released bycatch are notoriously difficult to estimate and in fact these have not been established.

DFO asserts that “catch reporting systems are closely scrutinized because of the catch accounting requirements of the Nisga’a Treaty and the Pacific Salmon Treaty” but provides no substantiating information. Exactly what are these mechanisms and how are these mechanisms evaluated?

As of November 2007, the Pacific Region catch monitoring framework that is cited multiple times in the DFO self-evaluation has not yet led to a draft public document for catch reporting standards in commercial salmon fisheries.<sup>17</sup>

It is widely speculated that many commercial fishers engage in ‘token reporting’ and personal retention of non-target bycatch. In fact, DFO and BC MOE stock assessment biologists consider reported steelhead catches to be of little value and do not use them for predictive modelling.<sup>18</sup> The accuracy of catch reporting, especially hail-ins, could theoretically be estimated by comparing hail data between boats with and without on-board fisheries observers, or by comparing observer and hail catch data within fisheries. Apparently such comparisons have never been made or at least have not been made publicly available. Given the importance of accurate catch data in estimating exploitation rates for non-target species SG 80.3 and 60.3 should be considered not met until DFO provides explicit proof to the contrary.

#### **1.1.2.2 – Reliable estimates of escapement**

SG 80.1, 60.2

Assessment team and Bocking (2005) are NOT in full agreement.

Bocking (2005) argues that SG 60.2 is only partially met and that 80.1 is met “if one does not factor in whether or not the escapement estimates are reliable.” I concur and interpret this to mean that SG 80.1 is only partially met.

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<sup>17</sup> Personal communication with Bert Ionson, DFO.

<sup>18</sup> Personal communication with Dave Peacock, North Coast Stock Assessment Area Chief, DFO and personal communication with Mark Beere, Senior Fisheries Biologist, Ministry of Environment – Skeena Region..

**SG 60.2: Escapement estimates for target stocks are available, where escapement estimates are necessary to protect the target stock from overexploitation.**

As argued elsewhere in this document, any sockeye stock subject to harvest in the commercial fishery is a *de facto* target stock. And I assume that some form of regular escapement estimate (*e.g.* every 1-3 years) or minimally, some form of juvenile survey is nearly always necessary to provide the information necessary to protect individual stocks from over-exploitation.

The non-Babine aggregate contains several stocks of concern, no non-Babine sockeye stocks are at or above target escapements<sup>19</sup>, and in the current draft IUCN sockeye assessment, proposed listings for two out of five Skeena sockeye subpopulations are “critically endangered” and one is “endangered”.<sup>20</sup> Insufficient numbers of spawning adults is a major factor limiting juvenile production for these stocks<sup>21</sup>. Of the 29 Skeena sockeye stock units 16 are not monitored annually for escapement and approximately one third are monitored rarely or not at all; one third of these stocks have not had a juvenile survey, and another third have not had a juvenile survey for over 10 years.<sup>22</sup>

The Tye test fishery only gives in-season escapement data at the species level. DNA analysis from the test fishery can be used to provide stock-specific data post-season, but the test fishery is located in the estuary, and the stocks are subject to mortality by in-river First Nations and recreational fisheries as well as natural sources after they pass the test fishery. The Core Stock Assessment Program is currently being developed for the North Coast and may fill many of the current stock assessment data gaps if it is fully implemented with sufficient funding.<sup>23</sup> However, that remains to be seen as funding cuts to DFO science programs in recent years have been substantial, and for now it appears that SG 60.2 is indeed only partially met.

### 1.1.3.1 – Limit reference points (LRPs)

### All scoring guideposts

Assessment team and Bocking (2005) ARE in agreement. However, if a more precautionary definition of “target stocks” was adopted for this assessment it is doubtful that a passing grade could be assigned for this indicator given that LRPs have not been established for numerous non-Babine sockeye stocks. Where LRPs have been established there is no indication that DFO is using them for their intended purpose: “*If an LRP is*

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<sup>19</sup> English *et al.* 2006. *North and Central Coast Core Stock Assessment Program for Salmon*. Prepared by LGL Ltd. for Pacific Salmon Foundation and Fisheries and Oceans Canada.

<sup>20</sup> Classifications are based on decline rates in multiple stocks over 3 generations (12 years) of trend data – Salmonid Specialist Group of the Species Survival Commission of IUCN World Conservation Union. 2007. IUCN Red List Assessment for Sockeye Salmon *Oncorhynchus nerka*. DRAFT – Nov.26, 2007.

<sup>21</sup> Cox-Rogers *et al.* 2004. Stock status and lake based production relationships for wild Skeena River sockeye salmon. *CSAS Research Document* 2004/010.

<sup>22</sup> Personal communication with Dave Peacock, North Coast Stock Assessment Area Chief, DFO.

<sup>23</sup> English *et al.* 2006. *North and Central Coast Core Stock Assessment Program for Salmon*. Prepared by LGL Ltd. for Pacific Salmon Foundation and Fisheries and Oceans Canada.

*inadvertently reached, management action should severely curtail or stop fishery development, as appropriate, and corrective action should be taken.”*

### 1.1.3.2 – Target reference points (TRPs)

SG 60.2

Assessment team and Bocking (2005) are NOT in agreement. Bocking argues that since SG 100.2 is not met, then SG 60.2 also can not be met because they are both asking the same question: *Are the target reference points (TRPs) for Skeena sockeye scientifically accepted outside the management agency?*

SG 60.2: **Target reference points have been defined for the majority of target stocks harvested in the fishery and these target reference points are not scientifically disputed.**

It is difficult to see how SG 60.2 has been met. The DFO submission clearly states that a functional TRP equivalent only exists for the Skeena sockeye aggregate, and that this TRP equivalent does not take into account the productivity of the wild components of the Babine stock or the non-target wild sockeye stocks, the majority of which are fluctuating at low levels of abundance and are continually exploited above MSY. Furthermore, Skeena Condition #1.2 (below) does not mention TRPs for non-target stocks and non-target species. TRPs are also not mentioned anywhere in Principle 2. Does this mean that the assessment team considers these TRPs unnecessary for the sustainable management of the Skeena sockeye fishery?

*Skeena Condition #1.2: Certification will be conditional until the management agency provides direct evidence that the productivity of non-target stocks has been taken into account when setting the TRP for the target Babine stock.*

### Criterion 1.2 – Fishery allows for the recovery of depleted target stocks Indicators 1.2.1 and 1.2.2

This Criterion has been deemed not applicable by the assessment team as they do not consider non-Babine sockeye to be target stocks. The intent statement for Criterion 1.2 explicitly refers to “exploited populations”, and certainly the majority of non-Babine sockeye stocks are exploited populations. The assessment team obliquely states on page 38 that they interpret “exploited populations” to refer to “targeted stocks” for the purposes of their evaluation. The definition of ‘target stock’ used in the Skeena assessment should be changed to include non-Babine stocks that are exploited (harvested) in the commercial fishery at rates approaching or exceeding MSY.

### 1.3.1 – Age, sex, and genetic structure are monitored

SG 60.3

Assessment team and Bocking (2005) are NOT in agreement.

SG 60.3: The management system includes provisions to minimize the major adverse impacts for the majority of un-enhanced stocks that may be due to the enhancement of other stocks.

Bocking (2005) agrees with DFO that the management system includes the above provisions, but argues that they do not appear to be sufficiently implemented. He cites the fact that “Cox-Rogers *et al.* (2003) identified 7 non-Babine sockeye stocks risking escapement declines of 30-50% under continuous high fisheries exploitation” and that “only Babine sockeye stocks (enhanced and unenhanced) appear to be showing evidence of increasing escapements.”

The majority of non-Babine sockeye stocks are fluctuating at levels far below anything that could be considered optimum and they are routinely exploited at rates exceeding their (loosely) estimated MSY. Over time, small populations become increasingly prone to increased extirpation risk due to genetic drift resulting from inbreeding and immigrations of genetically divergent individuals.<sup>24</sup> There is no evidence presented in the DFO submission that the genetic structures of these sockeye populations are being monitored and are not being adversely impacted in this manner.

## **MSC PRINCIPLE 2**

Principle: *“Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.”*

Intent: *“The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.”*

### **General comments and concerns**

Bycatch of non-target stocks is a major focus of this Principle, and conditions for certification have therefore been assigned requiring the development of recovery plans for weak sockeye and chum stocks. In isolation the conditions appear both sound and appropriate; however, there is no mention of steelhead anywhere in the draft assessment for Skeena. Significant numbers of summer run steelhead are intercepted in the sockeye fishery<sup>25, 26</sup> and several Skeena steelhead stocks are currently depressed to the point that their economic viability is questionable. Regional Ministry of Environment biologists

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<sup>24</sup> Tallmon, Luikart, and Waples. 2004. The alluring simplicity and complex reality of genetic rescue. *TRENDS in Ecology and Evolution*, 19: 489-496.

<sup>25</sup> Gottesfeld and Rabnett. 2007. *Skeena Fish Populations and Their Habitats*. Skeena Fisheries Commission, Hazelton, BC; p. 41.

<sup>26</sup> Tyee test fishery data: <http://www.pac.dfo-mpo.gc.ca/northcoast/skeena/tyeetest.htm>.

(responsible for management of Skeena steelhead) were not adequately consulted in the MSC assessment process. Given this lack of consultation and the significant conservation concerns around Skeena steelhead stocks they do not endorse the MSC certification of the Skeena sockeye fishery as it is currently managed.<sup>27</sup> Dysfunctional management of steelhead bycatch aside, the fact that recovery plans are required for multiple stocks from *at least 2* species demonstrates that this fishery has not been sustainably managed when it comes to impacts on non-target stocks.

Another overarching concern with the DFO self-evaluation and the Draft Assessment under Principle 2 (and 3) is the narrow and outdated concept of what constitutes an ecosystem and an ecosystem impact. This approach is at odds with the Wild Salmon Policy, it is unprecautionary, and as argued here and under Principle 3, it is not scientifically valid.

### Indicator concerns and criticisms

#### 2.1.2 – Provisions to reduce ecosystem impacts

SG 60.1

Assessment team and Bocking (2005) ARE in agreement on the 60 and 80 guideposts. However, I argue that SG 60.1 is only partially met.

SG 60.1: **The management system has a history of responding to by-catch problems and has procedures that are followed to limit by-catch.**

While DFO has a history of responding to by-catch problems on the Skeena, they also have a history of not responding to by-catch problems, or responding to them inappropriately and ineffectually, as well as not following established procedures to limit by-catch. The 2006 fishing season is a case-in-point. Refer to the communications between DFO and BC MOE that occurred during the summer and fall of 2006 regarding conservation concerns over steelhead bycatch. On August 3, 2006 the BC MOE Fish and Wildlife Section Head told DFO managers the following: “Based on our capacity modelling (Tautz *et al.* 1992; Lessard 2005) and risk assessment modelling (Johnston *et al.* 2002) we are in the realm of extreme conservation concern for Skeena steelhead.”<sup>28</sup> DFO continued to hold non-selective fisheries into September, fished to the ceiling exploitation rate for steelhead, and likely exceeded that ceiling. Selective fishing measures that were established in the IFMP to limit bycatch (short sets, half nets, revival tanks, weedlines), however unproven, were not followed.

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<sup>27</sup> Personal communication with Mark Beere, Senior Fisheries Biologist, Ministry of Environment – Skeena Region.

<sup>28</sup> Personal email correspondence from Dana Atagi (Skeena Fish & Wildlife Section Head – BC MOE) to Dave Einarson (DFO North Coast Resource Management Area Chief); copied to other DFO and MOE employees.

### 2.1.3 – Sufficient research on ecosystem impacts

SG 60.1

Assessment team and Bocking (2005) ARE in agreement. However, while the wording in the intent statement for this indicator is vague, the short title for this indicator (from the scoring summary table) is quite clear, as is SG 60.1.

SG 60.1: The management agency collects or plans to collect data on by-catch problems or ecosystem concerns.

Aside from a vague reference to PSARC, the DFO self-evaluation provides no substantive discussion of ecosystem concerns under this Indicator, and provides no detail regarding plans to collect data on ecosystem concerns.

### 2.1.4 – Escapement goals address ecosystem needs

All Scoring Guideposts

Assessment team and Bocking (2005) are NOT in agreement on any of the 100 or 80 Guideposts. And if “support” is taken to mean anything more than “approval” then I argue that SG 60.1 is only partially met.

SG 60.1: The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

Indeed, a key strategy in the Wild Salmon Policy is “Inclusion of ecosystem values and monitoring”. However, Bocking (2005) states, and I agree that “very little has been done by DFO (in comparison to research in Washington State for example), to advance our understanding of freshwater ecosystem needs as they relate to salmon escapement requirements. Current Target Reference Points are based on maximizing yield for fisheries and Limit Reference Points are supposedly set to avoid extinction. It is notionally accepted that escapements, at least occasionally, above MSY are required for proper ecosystem function. Although DFO supports research in this area, very little is occurring. DFO does not have sufficient annual funding to address this research need.” The assessment team has provided no explanation for the large difference between their score and Bocking’s, particularly regarding funding for ecosystem research.

All but one of the studies cited in the DFO self-evaluation as evidence of freshwater ecosystem research they have conducted pertain to the limnology of Skeena sockeye nursery lakes. While these studies have been excellent as far as they go, they have been mostly concerned with various facets of sockeye production potential. And they only cover one portion of the freshwater ecosystem – lakes. Headwater streams, wetlands, and alluvial floodplain systems are all key components of the Skeena freshwater ecosystem that Skeena salmon depend on<sup>29</sup> and numerous studies from other regions indicate that

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<sup>29</sup> Gottesfeld and Rabnett. 2007. *Skeena Fish Populations and Their Habitats*. Skeena Fisheries Commission, Hazelton, BC.

they are affected by harvest removals and by-catch mortality of spawners.<sup>30</sup> The single non-lake study cited by DFO was funded by Forest Renewal B.C. (according to the Acknowledgements), and only one of the four authors listed is from DFO<sup>31</sup>. The only comprehensive research being conducted on the Skeena relating to salmon carcass contributions to freshwater ecosystems outside of sockeye nursery lakes is being conducted by researchers from The University of Montana<sup>32</sup> funded by a charitable U.S.-based foundation. DFO has been notionally supportive of this research, and greater use of project results could help DFO refine escapement goals for the Skeena River.<sup>33</sup>

### 2.3.1 – Provide for recovery of non-target stocks

All 60 SGs

Assessment team and Bocking (2005) are NOT in agreement. The DFO self-evaluation provides no substantial evidence for their claim that they have achieved the three 60 Scoring Guideposts.

SG 80.3: The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.

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.

SG 60.2: The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.

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

The wording in SG 60.1 is unclear – what constitutes an attempt to prevent extirpation? It could be argued that DFO's practice of routinely fishing the majority of depressed wild sockeye stocks at exploitation rates above their estimated MSY undermines any attempts to prevent extirpation. Whatever the meaning of the Guidepost, in order for SG 60.1 to be met DFO would have to be monitoring escapement for the majority of non-target stocks so they could identify those that were at risk of extirpation. They are not doing this for sockeye or chum and BC MOE is not doing this for steelhead escapements. Also, no stock-specific rebuilding strategies were mentioned or referenced in the DFO self-evaluation and to my knowledge stock-specific rebuilding strategies do not exist for the majority of depressed stocks.

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<sup>30</sup> For example, see review by Schindler *et al.* 2003. Pacific salmon and the ecology of coastal ecosystems. *Frontiers in Ecology and Environment*, 1: 31-37.

<sup>31</sup> Johnston *et al.* 2004. Effects of the abundance of spawning sockeye salmon (*Oncorhynchus nerka*) on nutrients and algal biomass in forested streams. *Canadian Journal of Fisheries and Aquatic Sciences* 61: 384-403.

<sup>32</sup> Salmonid Rivers Observatory Network – <http://umt.edu/flbs/Research/SaRON.htm>

<sup>33</sup> Personal communication with Jack Stanford, Professor and Principle Investigator, Salmonid Rivers Observatory Network, Flathead Lake Biological Station, University of Montana.

Regarding SG 60.2, The assessment team states that since “[they] are unable to distinguish the difference between a 50% probability at the 60 scoring level and a 60% at the 80 scoring level, [they] are interpreting the difference between these two criteria as qualitative in that meeting the provisions of the 80 scoring level of 60% is likely to occur given conditional certification.” There are two problems here.

First, there is no evidence presented in the DFO self-evaluation or in the Draft Assessment that either Guidepost (60.2 or 80.3) has been met. In fact, the draft assessment states in the preceding paragraph regarding depressed wild sockeye stocks that “given the relatively long term period of low returns to the depressed systems, there is reasonable doubt that these stocks will have at least a 60% probability of recovery.” Bocking (2005) states “I am not at all clear on what basis DFO thinks that the system has a 50% probability of achieving long term recovery of depleted non-target stocks. They have provided no supporting evidence of this.” Moreover, the majority of the 29 Skeena sockeye nursery lakes appear to be below 50% of their rearing capacity, with low escapements and/or fry recruitment listed as limiting factors on 12 of the 13 lakes where sufficient data exist to establish a limiting factor.<sup>34</sup>

Second, it would seem that either both the 60 and 80 guideposts are flawed because they ask questions that can not be answered, in which case they should be changed or redacted, or DFO has not met either of them, in which case the scoring should reflect this reality.

Regarding SG 60.3, I argue that whatever strategy DFO has for “periodically revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks” is inconsequential on the Skeena given the lack of quality data for the majority of stocks. For example, Cox-Rogers *et al.* (2004) judged the mean quality of existing limnological and juvenile data to be either “poor” or “very poor” for 16 of the 29 sockeye nursery lakes. As of 2003, limnological and juvenile assessments had not been conducted on 11 of these lakes. And as mentioned previously, of the 29 Skeena sockeye stock units 16 are not monitored annually for escapement, and one third are monitored rarely or never. Chum and steelhead escapements are only monitored in a rigorous manner at the Tyee test fishery, yet there is no calibration of the index for any species other than sockeye. The test fishery closes down as soon as the majority of the sockeye go through, leaving insufficient trend data for chum, coho, and steelhead. Stock-specific escapement estimates for species other than sockeye are few and far between.

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<sup>34</sup> Cox-Rogers *et al.* 2004. Stock status and lake based production relationships for wild Skeena River sockeye salmon. *CSAS Research Document* 2004/010.

### **MSC PRINCIPLE 3**

Principle: *“The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.”*

Intent: *“The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.”*

#### **General comments and concerns**

DFO has raised serious doubts among reputable experts regarding their ability to maintain an adequate scientific information base for effective salmon management. The Pacific Fisheries Resource Conservation Council (PFRCC; 2004) notes that “data are inadequate to assess the status of many of the non-Babine sockeye lakes in the Skeena River” and regarding pink salmon, “the recent reductions in escapement monitoring are of particular concern in the Skeena River where pink production can be substantial in both year lines”<sup>35</sup>. Escapement estimates for chum and steelhead are generally not rigorous or spatially explicit enough to ensure a loss of spatial and genetic diversity as a result of the current declines in aggregate escapements as measured at Tyee.

DFO’s conduct during the 2006 Skeena sockeye fishery was widely criticized by regional MOE biologists, Skeena First Nations, conservationists, and many others, including people within DFO. Departmental correspondence from DFO and BC MOE regarding the 2006 fishery was obtained by Skeena River conservationists through Freedom of Information (FOI) and Access to Information (ATIP) requests. I refer to this correspondence occasionally in this critique but I also encourage the assessment team to review this correspondence in full. It paints a very different picture of fisheries management on the Skeena than the DFO self-evaluations from 2004 and should be integral to any rigorous, objective audit of the Skeena sockeye fishery. Most importantly, the management of the 2006 fishery should be considered in all cases where the assessment team has given DFO the benefit of the doubt regarding their ability to meet the numerous conditions attached to this certification. Particular consideration should be given to DFO’s apparently unilateral in-season abandonment of certain objectives of the Integrated Fisheries Management Plan (IFMP), as IFMPs are referenced repeatedly in the DFO self-evaluation.

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<sup>35</sup>PFRCC. 2004. *Advisory: Salmon Conservation Challenges in British Columbia with Particular Reference to Central and North Coast*. Pacific Fisheries Resource Conservation Council, Vancouver, BC.

Another overarching concern with the management system relates to its slow move towards an ecosystem-based approach. This is discussed in detail under Indicator 3.1.3 below.

### Indicator criticisms and concerns

#### 3.1.3 – Identify the impact of fishing on the ecosystem All 60 and 80 Guideposts

The assessment team and Bocking (2005) are NOT in agreement on the 100 Scoring Guideposts and I do not think that any of the guideposts in this indicator have been fully met. I will focus on the 60 and 80 guideposts.

SG 80.1: The management system includes mechanisms to identify and evaluate the impact of fishing on the ecosystem.

SG 80.2: Control mechanisms are used to minimize impacts of fishing on the ecosystem.

SG 60.1: The management system takes measures to control the impacts of the fishery on the ecosystem in the majority of cases where impacts have been verified.

While the “inclusion of ecosystem values and monitoring” is a key strategy in the WSP, the DFO response to this indicator demonstrates an outdated and unprecautionary approach to fisheries management that is clearly not “ecosystem-based”.

First, DFO provides no evidence to substantiate their claim that “spawning escapements of target and most non-target stocks have been either stable or increasing over the last 5 decades”. In fact, as the assessment team points out, Skeena chum and several non-target sockeye stocks are currently in various states of depression and in need of recovery plans, and proposed listings in the current draft IUCN report on sockeye salmon are “critically endangered” for 2 out of 5 Skeena sockeye subpopulations and “endangered” for another.<sup>36</sup> Even if DFO’s above claim were true it is made in reference to a perceived healthy ecosystem state and therefore belies a *shifting baseline syndrome*<sup>37, 38</sup> by only considering the past 5 decades. Numerous studies in Alaska have demonstrated the dramatic effect that the advent of commercial fishing had on freshwater ecosystems through the removal of marine-derived nutrient subsidies<sup>39, 40</sup> and commercial fisheries

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<sup>36</sup> Classifications are based on decline rates in multiple stocks over 3 generations (12 years) of trend data – Salmonid Specialist Group of the Species Survival Commission of IUCN World Conservation Union. 2007. IUCN Red List Assessment for Sockeye Salmon *Oncorhynchus nerka*. DRAFT – Nov.26, 2007.

<sup>37</sup> Pitcher and Pauly. 1998. Rebuilding ecosystems, not sustainability, as the proper goal of fishery management. In: *Reinventing Fisheries Management*. Pitcher et al. (eds.). Kluwer.

<sup>38</sup> Pauly. 1995. Anecdotes and the shifting baseline syndrome of fisheries. *TRENDS in Ecology and Evolution*, 10: 430.

<sup>39</sup> Finney et al. 2000. Impacts of climatic change and fishing on Pacific salmon abundance over the past 300 years. *Science*, 290: 795-799.

<sup>40</sup> Schindler et al. 2005. Marine-derived nutrients, commercial fisheries, and the production of salmon and lake algae in Alaska. *Ecology*, 86: 3225-3231.

have been removing millions of Skeena River salmon annually for over 100 years.<sup>41</sup> Spawning escapements over the past 5 decades provide little evidence for DFO's claim that "it [is] likely that contributions of spawners to nutrient loads in watersheds and to food for predators and scavengers are improving and unlikely an impact on the current ecosystem".

Next, consider the following statement from the DFO self-evaluation: "To date, no damage to the ecosystem has been reported by the management system. This appears to be supported by an ever-vigilant public comprised of harvesters and stewardship groups who have not reported or alleged damage to the ecosystem." I refer the assessment team to peer-reviewed papers that review the vast body of empirical studies produced in the past decade or so demonstrating the myriad benefits that salmon-bourne marine-derived nutrients provide to freshwater and terrestrial ecosystems.<sup>42, 43, 44, 45</sup> Additional studies have presented evidence for a pervasive nutrient deficit in systems and regions where salmon stocks have been chronically depressed or extirpated<sup>46, 47</sup>, including in British Columbia.<sup>48, 49</sup> During the time period being considered by the assessment team, and until the present, millions of pink and sockeye have been harvested annually in areas 3/4/5. The BC Ministry of Environment unofficially considers these interceptions of marine nutrients to be an ecological concern.<sup>50</sup>

Regarding fishing impacts on the marine ecosystem, DFO refers to their response under Indicator 2.1.2. However, the response under indicator 2.1.2 is mostly dedicated to non-target stock management. The passing mention of impacts of fisheries removals on marine piscivores is limited to sockeye removals, with no mention of any other salmon species subject to incidental harvest mortality (e.g. Chinook, pink, chum). The only references cited are personal communications and the 2003 IFMP. A recent study found

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<sup>41</sup> Argue and Shepard. 2005. Historical commercial catch statistics for Pacific salmon (*Oncorhynchus* spp.) in British Columbia, 1828 to 1950. *Canadian Technical Report of Fisheries and Aquatic Sciences*, 2601: 595 p.

<sup>42</sup> Cederholm *et al.* 1999. Pacific salmon carcasses: Essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. *Fisheries*, 24: 6-15.

<sup>43</sup> Gende *et al.* 2002. Pacific salmon in aquatic and terrestrial ecosystems. *Bioscience*, 52: 917-928.

<sup>44</sup> Naiman *et al.* 2002. Pacific salmon, nutrients, and the dynamics of freshwater and riparian ecosystems. *Ecosystems*, 5: 399-417.

<sup>45</sup> Schindler *et al.* 2003. Pacific salmon and the ecology of coastal ecosystems. *Frontiers in Ecology and Environment*, 1: 31-37.

<sup>46</sup> Gresh, T., J. A. Lichatowich and P. Schoonmaker (2000). An estimation of historic and current levels of salmon production in the northeast Pacific ecosystem: Evidence of a nutrient deficit in the freshwater systems of the Pacific Northwest. *Fisheries*, 25: 15-21.

<sup>47</sup> Thomas *et al.* 2003. Assessing the historic contribution of marine derived nutrients to Idaho streams. In: *Nutrients in Salmonid Ecosystems: Sustaining Production and Biodiversity*. J.G. Stockner – ed. American Fisheries Society, Symposium 34, Bethesda, MD, USA.

<sup>48</sup> Schoonmaker *et al.* 2003. Past and present Pacific salmon abundance: Bioregional estimates for key life history stages. In: *Nutrients in Salmonid Ecosystems: Sustaining Production and Biodiversity*. J. G. Stockner (ed.). American Fisheries Society, Symposium 34, Bethesda, MD, USA.

<sup>49</sup> Harvey and MacDuffee – eds. 2002. *Ghost Runs: The Future of Wild Salmon on the North and Central Coasts of British Columbia*.

<sup>50</sup> Personal communication with Mark Beere, Senior Fisheries Biologist, BC Ministry of Environment – Skeena Region.

that resident killer whales (*Ornicus orca*) preferentially prey on chinook salmon in north coastal BC (management areas 1-6) but also prey on chum salmon when they are available.<sup>51</sup> This would indicate that the poor stock status of Skeena chum and continuing harvest and release mortalities of Skeena-bound chinook and chum in the area 3/4/5 commercial fisheries may have some impact on the marine ecosystem.

Finally, based on the DFO self-evaluation, the official strategy regarding ecosystem-based management of escapements appears to be mostly oblivious to the aforementioned body of literature: “DFO Stock Assessment Division is monitoring research in the Pacific Northwest on ecosystem impacts of salmon escapement levels [references to 4 papers – see below] and is carrying out its own research. Canadian research and operational guidelines will be developed when clear impacts have been identified.” There are several problems here. First, of the 4 papers they cited as examples of research they were monitoring, only 1 (Chaloner *et al.* 2002) contains original empirical research. The other 3 papers are all quite interesting, but they are perspective papers and essays and should therefore be disregarded by the assessment team for the purposes of evaluating DFO’s performance under this Criterion. Second, I am at a loss as to how DFO could imply that “clear impacts” have not been identified for fisheries removals of millions of salmon annually from a salmon-based ecosystem. Third, as “clear impacts” *have* been demonstrated (see above), it appears that by DFO’s own admission, they have not developed any substantive “research and operational guidelines” on this matter, and therefore do not pass the 60 Scoring Guidepost.

### **3.1.7 – Useful and relevant information to decision makers**      SG 60.2 and 80.2

Assessment team and Bocking (2005) are NOT in agreement on SG 60.2 and I am not in agreement on SG 80.2.

SG 60.2: Risk assessments are considered in formulating important management decisions.

Bocking argues that SG 60.2 is only partially met, due to the fact that risk assessments are not always conducted or considered in formulating important management decisions. Despite the lack of evidence provided by DFO for this Guidepost, it could be argued that there is probably no fisheries management agency in the world that does not engage in some form of risk assessment regarding important management decisions. If that is the case, it would appear that the MSC does not require a particularly high standard under this Indicator.

SG 80.2: Management decisions consistently rely on useful and relevant information provided within the system and there is not a record of decisions going against the information provided.

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<sup>51</sup> Ford and Ellis. 2006. Selective foraging by fish-eating killer whales *Ornicus orca* in British Columbia. *Marine Ecology Progress Series*, 316: 185-199.

I argue that SG 80.2 is not met. Regarding the first part of the Guidepost, management decisions *often* “rely on useful and relevant information” but not *consistently*. DFO North Coast stock assessment biologists are highly competent and appear to provide sound advice based on the information they have. However, funding for science is inadequate<sup>52</sup> and there are numerous information gaps that undermine the overall quality of the information used in management decisions. Some examples:

- While the Tyee Test Fishery is useful for estimating escapements to the mainstem Skeena, no test fishing is conducted ‘in front’ of the commercial fishery. Therefore robust data on abundance, timing, and composition are not available for managers, sometimes leading to incorrect predictions of the above parameters (e.g. 840k overestimate of the sockeye return in 2006). Expert opinion has identified this as a significant flaw in the Skeena fishery model.<sup>53</sup>
- Monitoring of oceanic distributions of Pacific salmon is highly limited, and certainly does not occur on a stock-specific basis to the extent that it would be useful for regional managers to make run predictions.
- When climate-driven changes in run timing and behaviour occur (e.g. 2006) the management agency is caught off-guard, as the utility of established predictive models declines. Research on climate change impacts on Skeena region stocks is virtually non-existent.
- Annual escapements are not monitored for numerous stocks, including some stocks of concern, and for some stocks of concern the escapement data are only reliable for the aggregate when it hits the estuary (e.g. chum).
- In-season escapement data from the Tyee test fishery are only useful for the target species – sockeye – as they are calibrated using data from the Babine and Sustut counting facilities. No statistically reliable multiplier exists for non-target species, making sound decision-making around weak-stock management very difficult.
- Short-term mortality rates for released bycatch are somewhat well-established, but the spawning mortality rates for released bycatch used to calculate exploitation rates on non-target species are informed guesses at best.
- Hail data are widely suspected to underestimate bycatch and retention of non-target species by fishers. Gross under-reporting of bycatch was documented through observer programs in the early-mid 1990s<sup>54, 55, 56, 57</sup> and is alleged to still

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<sup>52</sup> PFRCC. 2004. *Advisory: Salmon Conservation Challenges in British Columbia with Particular Reference to Central and North Coast*. Pacific Fisheries Resource Conservation Council, Vancouver, BC.

<sup>53</sup> Personal Communication with Carl Walters, Professor, UBC Fisheries Centre.

<sup>54</sup> Thomas, J.O. 1991. Catch sampling and tag recovery involving steelhead caught in the 1991 northern British Columbia net fishery. Unpublished report prepared by J.O. Thomas and Assoc. for BC Ministry of Environment, Lands, and Parks (MELP). Draft report, 1993. 59 p.

<sup>55</sup> Thomas, J.O. 1992. Catch sampling and tag recovery involving steelhead caught in the 1992 northern British Columbia net fishery. Unpublished report prepared by J.O. Thomas and Assoc. for BC Ministry of Environment, Lands, and Parks (MELP). Draft report, 1993. 69 p.

<sup>56</sup> Thomas, J.O. 1993. Catch sampling and tag recovery involving steelhead caught in the 1993 northern British Columbia net fishery. Unpublished report prepared by J.O. Thomas and Assoc. for BC Ministry of Environment, Lands, and Parks (MELP). Draft report, 1993. 108 p.

<sup>57</sup> Thomas, J.O. 1994. Skeena Fisheries Resource Technician Program. Unpublished report prepared by J.O. Thomas and Assoc. Ltd. for the BC Ministry of Agriculture, Fisheries, and Food (MAFF), and the BC Ministry of Environment, Lands, and Parks (MELP). Draft report, December 1994.

be taking place<sup>58, 59</sup>. While ample observer data exist that could be used to assess the veracity of bycatch haul data, DFO has not undertaken such an analysis for any North Coast fisheries, or if so they have not made it public.

- Exploitation rate estimates for non-target species are directly affected by fleet compliance with selective fishing requirements (*i.e.* short nets/sets, weedlines, revival boxes). However, there have been no recent empirical studies to assess the accuracy of compliance rate assumptions, and enforcement resources and practices are not sufficient to ensure consistent compliance.

Regarding the second part of the Guidepost, I argue that there *is* a record of decisions going against the information provided. The 2006 departmental correspondence that was obtained through FOI details a decision making process that is dominated by politics and concerns over “optics”, and which allowed the in-season abandonment of selective fishing measures that were prescribed in the IFMP and the extension of the fishery by over 3 weeks. Under pressure from fishing interests, DFO North Coast Resource Management opened the fishery in early September based on a model which informed them that the steelhead run was either late or “virtually over”, with either scenario resulting in a steelhead harvest rate less than the allowable maximum of 24%. However, the model was apparently never meant to be used after late August, and it is well known that the steelhead run continues well into September. The final harvest rate likely exceeded the agreed upon ceiling for steelhead given that the model inputs for compliance may not have been accurate.

### **3.1.8 – Socioeconomic incentives for sustainable fishing**      SG 80.1, 80.2, 60.1

Assessment team and Bocking (2005) are NOT in agreement on SG 80.1 and Levy’s (2005) arguments quoted in the Nass certification regarding SG 80.2 are applicable to SG 80.2 and 60.1 here as well – please refer to them.

SG 80.1: The management system regularly considers the use of social and economic incentives to the stakeholders in the fishery, which are designed to facilitate the development of fishing gear and practices that can lead to sustainable fishing.

SG 80.2: The management system includes a program to create incentives for harvesters to not exceed target catches or exploitation rates.

SG 60.1: The management system provides for the use of social or economic incentives to ensure sustainable fishing.

### **3.4.1.1 – Fishery control systems including no-take zones**      SG 60.2

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<sup>58</sup> Personal communications with fisheries observers who wish to remain anonymous – October 2007.

<sup>59</sup> Personal email correspondence from Bob Hooton (Head, Fish & Wildlife Section – Vancouver Island Region – BC Ministry of Environment) to other BC MOE officials; August 4, 2006; obtained under FOI.

Assessment team and Bocking (2005) are NOT in agreement; and neither am I.

SG 60.2: Established harvest and/or escapement goals for target stocks consider the impact of the fishery on the majority of the non-target species, and on the ecosystem generally.

The DFO response under this indicator makes no mention of ecosystem consideration in harvest and/or escapement goals. As Bocking states, “established escapement goals do not implicitly consider the impact of the fishery on the ecosystem generally.” To paraphrase DFO’s response under Indicator 3.1.3, they do not believe that clear ecosystem impacts of the fishery have been demonstrated, and until such time as impacts are demonstrated they are refraining from even conducting research on how they might go about incorporating ecosystem requirements into escapement and harvest management.

#### 3.4.2.1 – Compliance provisions (effective enforcement)

SG 60.1

Bocking (2005) declined to comment on this indicator. I argue that SGs 100.3, 100.4, 80.1, 80.2, and 60.1 have not been met. I focus here on the 60 SG, as it trumps the other SGs for the purposes of the MSC certification.

SG 60.1: The management system includes compliance provisions that are effective for the majority of the fisheries.

DFO has described the conservation and protection framework but has provided no evidence in their submission that compliance provisions are effective for the majority of fisheries.

The fact that “the Conservation & Protection Directorate (within Fisheries Management) currently deploys 170 Fisheries Officers plus Marine Enforcement Officers and Aboriginal Fishery Guardians” is a meaningless statistic. What would be more useful here is average number of officers that are deployed to patrol the Skeena commercial sockeye fisheries relative to the number of boats fishing (*e.g.* officer hours per boat day) for several consecutive years. On page 41 DFO describes several variables that they calculate statistics for at the end of the season in order to determine enforcement efficacy, calculate compliance rates for each area and fishery, and identify enforcement priorities for the following season. This same text appears verbatim on the DFO Conservation and Protection website ([http://www.pac.dfo-mpo.gc.ca/ops/Cp/evaluation\\_e.htm](http://www.pac.dfo-mpo.gc.ca/ops/Cp/evaluation_e.htm)). The fact that such a process occurs is not evidence of effective compliance provisions; however, the summary data resulting from this process could provide evidence that compliance provisions are effective. It does not appear that such data were made available to the assessment team or the public.

The compliance and enforcement strategy website cited in the DFO self-evaluation ([http://www.pac.dfo-mpo.gc.ca/ops/Cp/issues\\_e.htm](http://www.pac.dfo-mpo.gc.ca/ops/Cp/issues_e.htm)) indicates that no punitive actions

are taken when fishers are found to be non-compliant with conservation-related conditions of their licence, and no examples of punitive actions for non-compliance are provided in the self-evaluation. The incentives for non-compliance are many but what incentive is there for compliance?

As a fisheries observer on board commercial gillnetters and seiners on the north coast in the 1990s I personally witnessed numerous acts of non-compliance with fisheries regulations and conditions of license on board multiple vessels, and I have spoken with many other observers who have had similar experiences. This begs the question, what is the severity of infractions being committed on the many vessels in the fleet that do not carry observers?

In 2006 there were no enforcement officers present on the North Coast, with the exception of the final two poorly attended openings in September. DFO biologists collecting DNA samples found the fleet to be in gross non-compliance with license requirements to maintain functioning revival boxes for bycatch species.

Given the widespread allegations of routine non-compliance I suggest that granting a passing mark under this indicator would be less than rigorous in the absence of multiyear summary data on the following:

- Intensity of compliance monitoring (e.g. officer hours per boat day)
- Frequency of vessel checks and inspections relative to the intensity of the fishery (e.g. checks per boat day).
- Compliance rates for vessels checked.
- Descriptions of infractions and resulting enforcement actions.
- Vessel, dockside, and processor observer reports.

### 3.5.2 – External review

SG 80.1

Assessment team and Bocking (2005) are NOT in agreement.

SG 80.1: **The management system provides for a review of management performance by one or more independent experts at least once every five years.**

The DFO self-evaluation contains no evidence that the above Guidepost has been met for management of the Skeena sockeye fishery. The assessment team has not indicated why they were able to consider this Guidepost met in the absence of such evidence. An independent science review panel is currently being put together to review salmon management on the Skeena, but its membership and terms of reference have not yet been made public. There is no indication that it will reconvene again within 5 years.

### 3.5.3 – Recommendations from reviews incorporated

All Scoring Guideposts

Assessment team and Bocking (2005) are NOT in agreement. Bocking states, and I concur, that “because of the lack of external reviews, these Scoring Guideposts can only be partially met.” For example, consider SG 60.1:

SG 60.1: Recommendations from internal and external reviews are considered by the management agency and an explanation is provided for the actions or lack of action associated with the majority of these recommendations.

At best, the guideposts under this indicator are not applicable given the lack of external reviews.

### 3.5.4 – Mechanism for resolving disputes

All 80 Guideposts

Assessment team and Bocking (2005) are NOT in agreement regarding any the 80 Guideposts, and I concur with Bocking.

SG 80.1: The management system has a dispute-resolution process for resolving significant disputes.

SG 80.2: The dispute resolution mechanism is available for use by affected parties, but is not routinely used.

SG 80.3: The dispute resolution mechanism does not discriminate against any disputing party.

DFO has not described a dispute resolution process for resolving significant disputes in their self-evaluation, only a dispute resolution mechanism – Ministerial authority. Therefore SG 80.1 is not met. If such a process has come into existence since DFO made this submission, the assessment team should describe it in future versions of the assessment.

Regarding SG 80.2, the availability of the Minister to resolve disputes for or between affected parties is highly questionable; DFO certainly provides no proof of this in their submission. Given that the dispute resolution mechanism is the discretion of an elected official there are several scenarios where discrimination would be inherent; the most obvious example being a case in which the affected party had a dispute with the Minister himself. Another consideration would be the events that transpired in 2006 where the Department had a series of highly controversial commercial fishery openings late in the season following lobbying by interested parties and industry representatives. In that case the outcome favoured those who exercised the most effective political leverage. The Gitanyow and other First Nations’ current legal actions against the Department<sup>60</sup>, <sup>61</sup> suggest that DFO’s dispute resolution protocols on the Skeena are less than effective.

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<sup>60</sup> Luba, F. 2007. First nation sues DFO over sockeye fishery. *The Province*, July 27, 2007.

<sup>61</sup> Personal communication with Gerald Wesley, Chief Treaty Negotiator, Tsimshian First Nations Treaty Society.

**3.6.3 – Observes legal and customary (First Nation) rights**      SG 80.1 and 60.1 and Condition 39

Here the assessment team has assigned a lower score than Bocking (2005) suggested; however, I argue that the score should be lower still given recent developments. I also argue that the associated condition is inadequate.

SG 100.1: The management system is in compliance with all major legal and customary rights of First Nation peoples that are impacted by the fishery.

SG 80.1: The management system is found to be in compliance with all legal and most of the customary rights of First Nation peoples that are impacted by the fishery.

SG 60.1: The management system is in compliance with the legal rights of First Nation peoples that are impacted by the fishery.

Again, I refer the assessment team to the Gitanyow First Nation's current legal action against the Department. Given that the matter is before the Federal Court it would appear that SG 80.1 may not be met (compliance with ALL legal rights) and SG 60.1 may be only partially met. Of course, we in Canada are innocent of a crime until proven guilty. However, given that the MSC appears to be a champion of the precautionary approach it would seem appropriate to apply it in the scoring of all indicators in this assessment, including this one.

*Condition 39: Certification will be conditional until the management agency provides evidence that First Nation issues regarding aboriginal and treaty rights have been identified and these issues are being addressed through an effective consultation or negotiation process.*

The wording in the condition the assessment team has imposed for this indicator does not match the wording of the above Guideposts. In order for the Department to meet SGs 60.1 and 80.1, it would seem that they must *be* in compliance with the legal rights of First nation peoples that are impacted by the fishery and not simply engaging in a loosely defined process. In any event, the Gitanyow lawsuit suggests that whatever consultation and negotiation processes exist, they are not very effective.

**3.7.1 – Avoid catch and minimize mortality of non-target species**      SG 60.1

The assessment team and Bocking (2005) are NOT in agreement on SG 80.2. I argue that given the conduct of the fleet and the Department in 2006, SG 60.1 is only partially met.

SG 80.2: Taking into consideration natural variability in population abundance, there is evidence that the capture and discard of non-target species or undersized individuals of

target species is trending downward, or is at a level of exploitation that has been determined by management to be acceptable.

SG 60.1: The majority of fisheries are conducted in a manner that is consistent with the goal of reducing the catch of non-target species or undersized individuals of target species.

Regarding SG 80.2 Bocking (2005) states: “I do not believe there is evidence that the capture and discard of non-target species is trending down or that the level of exploitation is acceptable, particularly for steelhead and chum.” I concur; DFO has provided no data to support this claim.

Regarding both Guideposts, consider again the 2006 fishery. The mean size of earlier returning sockeye in the 2006 run was far below average while their abundance was above average. The small size of the earlier returning sockeye led to substantial reductions in their catchability by gillnets. This led to a general fleet-wide abandonment of selective fishing methods and equipment (half nets, short sets, weedlines, use of revival boxes, etc.) as stipulated in the 2006 IFMP in the hopes that traditional fishing methods and equipment would allow for increased catches. The increased effort with traditional gear for the majority of the season likely led to substantial increases in catches and mortality of non-target species. The abandonment of revival box use likely led to further increases in pre-spawning mortality rates for released fish. And consider again the nearly complete lack of enforcement in 2006, and the small enforcement presence in 2007.

Gillnets are inherently non-selective, and given the extremely high short-term mortality rates associated with gillnets (*e.g.* ~50-75% for steelhead<sup>62</sup>), any mixed-stock fishery employing gillnets is inherently non-selective. Short-term mortality rates associated with seines are considerably lower than for gillnets (*e.g.* ~20-40% for steelhead<sup>63</sup>); however, they too have problems which have not been adequately addressed by DFO. For example, people on the grounds in Area 3 in 2007 described up to 200-300 chum being thrown back (literally) per set, with boats lined up three deep in a confined area, potentially recatching the same fish numerous times.<sup>64</sup> Very little empirical data exist for recapture rates of individual fish in such situations, and no reliable estimates exist for long-term mortality rates of fish that are caught and released even once.

Selective net fisheries have a limited ability to reduce exploitation of non-target species; there is little evidence that the exploitation rate reductions are at all substantive, and no evidence that they result in higher spawning success.

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<sup>62</sup> For example: Beere. 1992. The Skeena River steelhead observer program July 18 – August 18, 1992. *Skeena Fisheries Report # SK 80*, BC Ministry of Environment, Smithers, BC, and references therein.

<sup>63</sup> Reviewed in: Bison and Labelle. 2007. A simulation model to investigate the potential impacts of marine and fresh water fisheries on the Thompson River steelhead trout population (*Oncorhynchus mykiss*). *In preparation*.

<sup>64</sup> Personal communications with individuals who wish to remain anonymous.

### 3.7.3 – Minimize operational waste

SG 100.1, 100.2, 80.1, 60.1

Assessment team and Bocking (2005) are NOT in agreement on any of the following Guideposts.

SG 100.1: The management system has a formal program to reduce operational waste in the fishery, with the long-term goal of eliminating such waste.

SG 100.2: The program is effective, as reflected by reduced incidents of operational waste.

SG 80.1: The management system has a program that sets guidelines for reducing operational waste.

SG 60.1: There is a program to reduce operational waste.

Here, I will only reiterate what Bocking (2005) has already said – there is no evidence presented in the DFO submission that any of the above guideposts are met.

### 3.7.4 – Cooperation of fishers

SG 60.1, 80.1

Assessment team and Bocking (2005) are NOT in agreement on SG 80.1 and I suggest that SG 60.1 may not be met.

SG 80.1: Sufficient numbers of fish harvesters and processors comply with requests for data on catches and discards of non-target species and undersized individuals of target species to ensure that reliable estimates of total catches and discards for the fishery can be obtained.

SG 60.1: Catch and discard data provided by the fishing industry and other relevant stakeholders are sufficient to manage the harvests from the majority of the non-target species and undersized individuals from the majority of the target species.

Certainly there are many good operators within the fleet who report all bycatch with precision and accuracy. However, there is no evidence presented in the DFO submission that speaks directly to the Scoring Guideposts in this indicator. The only compliance rate data provided are without context and come from a personal communication:

“DFO has documented compliance with catch monitoring provisions. These documents show that compliance with log book requirements ranges from 67% to 89% of the fleet depending on which fishery is surveyed [citation: Bert Ionson, Fisheries and Oceans Canada, pers comm.]” This same text appears verbatim in the Nass and Fraser submissions, so it appears that the numbers may apply to the entire BC salmon fleet. The fishery under consideration here is the Skeena sockeye fishery and compliance rate data

from other fisheries is not appropriate. There is no mention of a time frame, sample size, or sampling method for the above data.

As stated under Indicator 1.1.2.1, it is widely speculated that many commercial fishers engage in non-reporting or ‘token reporting’ and personal retention of non-target bycatch. As a fisheries observer during the ‘coho crisis’ I personally witnessed such behaviour around coho on numerous vessels. Reliable estimates of steelhead bycatch are not obtained – DFO and MOE stock assessment biologists consider reported steelhead catches to be of little value and do not use them for predictive modelling.<sup>65</sup> The accuracy of catch reporting, especially hail-ins, could theoretically be estimated by comparing hail data between boats with and without on-board fisheries observers, or by comparing observer and hail catch data within fisheries. Apparently such comparisons have never been made or at least have not been made publicly available. Given the importance of accurate catch data in estimating exploitation rates for non-target species, SGs 80.1 and 60.1 should be considered not met until DFO provides explicit proof to the contrary.

If the assessment team is considering giving DFO the benefit of the doubt in this matter they should also consider the fleet’s gross non-compliance with the revival box condition-of-license and DFO’s complete failure to enforce this requirement in 2006. And as stated previously, as of Nov 2007 the Pacific Region catch monitoring framework that is cited multiple times in the DFO self-evaluation has not yet led to a draft public document for catch reporting standards in commercial salmon fisheries.<sup>66</sup>

### **3.7.5 – Fishing methods minimize impacts on habitat**      SGs 60.1, 80.1, and 100.1

Assessment team and Bocking (2005) are not in agreement.

SG 60.1: The management system has a program for assessing the impact of the fishery on habitat, and for making fishers aware of suitable fishing gear and practices that are known to reduce adverse impacts on habitat.

Bocking (2005) states that the above Guideposts can not be fully met due to the lack of a formal program. The assessment team has not indicated that a program does in fact exist as stated in the Scoring Guideposts for this Indicator.

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<sup>65</sup> Personal communication with Dave Peacock, North Coast Stock Assessment Area Chief, DFO and personal communication with Mark Beere, Senior Fisheries Biologist, BC Ministry of Environment – Skeena Region.

<sup>66</sup> Personal communication with Bert Ionson, DFO.

## **NASS CRITIQUE**

Due to the close proximity of the Skeena and Nass watersheds, the substantial overlap in their associated fisheries, and the fact that they are both managed by DFO North Coast, many of the concerns expressed below regarding the Nass assessment are similar or identical to those expressed above regarding the Skeena assessment. In an attempt to avoid needless repetition the reader is often referred to comments made in the Skeena portion of this review that are directly transferable or applicable to the Nass. In some cases repetition was deemed necessary.

As stated in the Introduction, conditional MSC certification appears to be justified for the Nass fishery. However, it does not appear that the existing conditions will successfully hold the management system to full compliance with the MSC 80 Scoring Guideposts. These deficiencies can likely be resolved with the modification of existing conditions and/or the addition of further conditions suggested below. Please note that there is considerable overlap among these suggested additions and modifications, and I have made no attempt to resolve this matter. Some harmonization of the suggested additions/modifications will likely be necessary if they are accepted by the assessment team.

### **MSC Principle 1**

Refer to Skeena critique (above) for definition and intent (page 6).

### **General comments and concerns**

As Levy (2006) states, “from a production perspective, the Nass River salmon fishery is probably the most effectively managed commercial salmon fishery in BC...There is probably no other large salmon fishery in BC or elsewhere which compares with the Nass for the quality of in-season fisheries management information”.<sup>67</sup> Yet the recent declines in abundance and lack of spawning escapement data for several smaller Nass sockeye stocks indicate some serious flaws in an otherwise exemplary stock assessment system. The certification conditions proposed by the assessment team cover the majority of these flaws as they pertain to sockeye. However, it appears some issues have been overlooked.

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<sup>67</sup> Levy, D. 2006. *Nass River Salmon Fishery Report Card*. Prepared by David Levy, Levy Research Services Ltd.; prepared for Sierra Club of Canada, BC Chapter; August, 2006.

## Indicator and condition comments and concerns

### 1.1.2.1 – Reliable estimates of removals

SGs 60.3, 80.3, and 100.2

The issues with these Guideposts for the Nass fishery are identical to the issues raised under the same Indicator for the Skeena fishery (above). Please refer to those comments.

SG 100.2: Mortality rates for the fish released or discarded during the fishery are available.

SG 80.3: Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 5 years.

SG 60.3: Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 10 years.

The objection to certification under this indicator is DFO's failure to provide explicit proof that they have mechanisms to ensure accurate catch reporting and that those mechanisms are evaluated every 5-10 years. If DFO or the assessment team is able to provide such explicit proof then the problem is solved. If not, the problem could be solved for the Nass fishery with the **addition of a condition stipulating that:**

- 1. DFO rigorously evaluate their mechanisms for ensuring accurate catch reporting, and**
- 2. If mechanisms for ensuring accurate catch reporting are determined to be insufficient (reported catches are statistically inaccurate) the mechanism(s) must be improved and re-evaluated in a reasonable time frame (<< 5 years).**

### 1.1.2.2 – Reliable estimates of escapement

Condition #1.1

Nass Condition #1.1: *Certification will be conditional until annual escapement estimates are computed for each of the Nass sockeye stocks targeted in the fisheries for Nass sockeye.*

Regarding this indicator and the above condition, the draft assessment states that escapements of the smaller sockeye stocks currently not being monitored could be "readily estimated using DNA samples obtained from the Lower Nass fishwheels." While this statement is true, it could be taken to imply that such a program would be a viable substitute for routine spawner and/or juvenile surveys and therefore meet the requirements of the condition. **The use of fishwheel/DNA-based escapement estimates should include routine calibration (i.e. every 1-3 years) using stock-specific spawner and/or juvenile counts.**

#### 1.1.2.4 – Productivity estimates

SG 100.1, 80.2, 80.3

Assessment team and Levy (2005) appear to not be in agreement regarding SG 100.1 and (perhaps) partially not in agreement on SG 80.2 and 80.3. The assessment team gave this Indicator full marks, but it is not on the “looks good” list for Principle 1 in the draft assessment.

SG 100.1: Scientifically defensible productivity estimates (eg, stock/recruitment relationships) have been derived for all target stocks and the relative productivity of non-target stocks is known.

SG 80.2: There is adequate information to estimate the relative productivity of the non-target stocks where the fishery harvests may represent a significant component of those non-target stocks.

SG 80.3: The harvest limitations for target stocks take into consideration the impacts on non-target stocks and the uncertainty of the productivity for these stocks.

Levy (2005) made the following points, and these may have been overlooked by the assessment team:

- Productivity estimates are based on juvenile assessments, not stock:recruitment analysis (refs. 46,47).
- The juvenile studies are based on lake capacity estimates and assume no spawning habitat limitation.
- Historical fishery performance information gives information on target stock productivity, but is less useful for non-target stocks.
- Management focuses on providing sufficient escapement, not on biological productivity.
- Reference is made to coho and steelhead as non-target stocks; no consideration is given to non-Meziadin Lake sockeye stocks.

#### 1.1.3.1 – Limit reference points (LRPs)

Condition 1.2

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.

Nass Condition #1.2: *Certification will be conditional until LRP's have been defined for each of the Nass sockeye stocks targeted in the fisheries for Nass sockeye.*

The above condition apparently is meant to address SG 80.1, the only Guidepost under this Indicator that the assessment team deemed not fully met. However, the wording of the condition does not match the wording of SG 80.1. **In order to comply with SG 80.1, Nass Condition 1.2 should require that LRP's for all sockeye stocks are not only defined but have “some scientific basis”.** That said, the phrase “some scientific basis” could be taken to mean anything from the opinion of a scientist to a rigorous empirical

evaluation. Something resembling the latter interpretation would of course be the most desirable from a conservation/sustainability perspective. Whatever the interpretation, it should be clarified here and wherever else similar terminology is used in the assessment.

### 1.1.3.2 – Target reference points (TRPs)

SG 100.1, 80.1, 80.2

Assessment team and Levy do not appear to be in agreement on SG 100.1 and 80.1, and I argue that 80.2 has not been fully met.

SG 100.1: The Target Reference Point (TRP) for target species have been reviewed and found to be scientifically defensive (*sic.*?) and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.

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

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.

Regarding SG 100.1, Levy states that the TRPs have not been reviewed by PSARC. Based on the DFO self-evaluation it appears that the TRPs may not have been reviewed by a Pacific Salmon Commission technical committee either. However, this may have changed.

The DFO response does not indicate whether SG 80.1 has been met – As Levy points out, “absence of expressions of concern from provincial scientists is largely irrelevant since the province is not involved in sockeye management.”

Regarding SG 80.2, it is not clear in DFO’s response that variable productivities of non-target stocks are explicitly considered in setting the target stock TRPs. **If such proof exists, it should be provided, and if not, a condition should be assigned to the certification that deals with this Guidepost.**

### Criterion 1.2 – Fishery allows for the recovery of depleted stocks

Indicators 1.2.1 and 1.2.2

Indicator 1.2.1: There is a well-defined and effective strategy, and a specific recovery plan in place, to promote recovery of the target stock within reasonable time frames.

Indicator 1.2.2: Target stocks are not depleted and recent stock sizes are assessed to be above appropriate limit reference points for the target stocks.

The assessment team has deemed the two Indicators under this Criterion to be not applicable, stating: “There are no depleted target stocks. In years when returns of Nass sockeye are small or returns of other salmon species are less than escapement goals, appropriate management actions were taken to reduce harvest pressure. Escapements have been consistently above LRP for Nass sockeye since 1982 despite large variations in annual returns.” I argue that the two indicators are quite applicable.

Regarding the Criterion, the Draft Assessment states (p.38): “The evaluation under this criterion will assess the degree to which the management strategy is designed to keep targeted stocks from becoming depleted, and to promote recovery if they become depleted.” It would appear from this intent statement that the current status of the target stock(s) is not the only attribute of the fishery that this Criterion is meant to judge. In the case of Indicator 1.2.1 it would appear to deal with the ability of the management agency to enact a recovery plan for a target stock in the event that it becomes depleted.

Indicator 1.2.2 speaks directly to the issue of whether or not the target stocks are depleted. As stated in the Draft Assessment (p.38), this indicator “evaluates the current status of the target species or stocks, and the basis for being reasonably certain about their status.” Not only does this seem quite applicable, it is arguably one of the most important Indicators in this assessment.

Given that the Guideposts under both indicators refer to “target stocks” and not “target species” it would seem the only reasonable grounds for considering both indicators not applicable would be the lack of sufficient information to determine whether or not several of the target stocks are depleted. According to Levy (2006) “[sockeye] populations with poorly defined or no escapement goals (or where there is uncertainty in stock status) include: Damdochoux Lake and Creek, Bowser Lake, Fred Wright Lake, Gingit Creek, Zolzap River, and Brown Bear Lake.”<sup>68</sup> It should also be noted that the management agency has expressed concern over the fact that several smaller Nass sockeye stocks appear to be declining<sup>69</sup>, and the Salmonid Specialist Group of the IUCN has proposed that Nass sockeye are “vulnerable” to biodiversity loss based on recent declines in several stocks.<sup>70</sup>

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<sup>68</sup> Levy, D. 2006. *Nass River Salmon Fishery Report Card*. Prepared by David Levy, Levy Research Services Ltd.; prepared for Sierra Club of Canada, BC Chapter; August, 2006.

<sup>69</sup> Personal communication with Dave Peacock, North Coast Stock Assessment Area Chief, DFO.

<sup>70</sup> “Vulnerable” classification is based on > 30% rate of decline in multiple stocks over 12 years of trend data and falls between “least concern” and “endangered” – Salmonid Specialist Group of the Species Survival Commission of IUCN World Conservation Union. 2007. IUCN Red List Assessment for Sockeye Salmon *Oncorhynchus nerka*. DRAFT – Nov.26, 2007.

## **MSC Principle 2**

Refer to Skeena critique (above) for definition and intent (page 12).

### **General comments and concerns**

The concerns here are similar to those for the Skeena assessment, except that all sockeye stocks are considered ‘target stocks’ under the Nass assessment, and are therefore dealt with more thoroughly under Principle 1. And with the small modification suggested below, the poor status of Nass chum stocks should be adequately addressed with Condition 2.1. One important consideration that may not be adequately addressed under Nass Principle 2 is the interception of Skeena-bound salmon and steelhead in Area 3 (Nass) sockeye fisheries.

As with the Skeena assessment, another overarching concern here is the narrow concept that DFO and the assessment team appear to have of what constitutes an ecosystem and an ecosystem impact. This issue is discussed at length elsewhere in this review.

### **Indicator and condition comments and concerns**

#### **2.1.2 – Provisions to reduce ecosystem impacts**

SG 60.1

SG 60.1: The management system has a history of responding to by-catch problems and has procedures that are followed to limit by-catch.

Please refer to the comments made under this Indicator for the Skeena. The problem appears to be less acute in the case of the Nass fishery, but is still relevant given that Skeena salmon and steelhead are intercepted in Area 3 fisheries. And issues with non-compliance and lack of enforcement likely extend to Area 3, or to put it another way, there’s no proof that they don’t.

#### **2.1.3 – Sufficient research on ecosystem impacts**

SG 60.1

SG 60.1: The management agency collects or plans to collect data on by-catch problems or ecosystem concerns.

Again, the problem here is quite similar to the problem with this Indicator in the Skeena assessment. To repeat those concerns: aside from a vague reference to PSARC, the DFO self-evaluation provides no substantive discussion of ecosystem concerns under this Indicator, and provides no detail regarding plans to collect data on ecosystem concerns. **If the Department is not collecting data on ecosystem concerns – and it is likely they**

are not in any substantive manner (see 2.1.4 below) – then a condition requiring them to do so would be justified here.

#### 2.1.4 – Escapement goals address ecosystem needs All Scoring Guideposts

The assessment team and Levy (2005) are NOT in agreement on this Indicator.

SG 80.1: Ongoing research is supported to determine the impacts of carcasses on freshwater ecosystem processes and to identify tradeoffs between harvests and freshwater ecosystem concerns.

SG 80.2: The management system provides for the communication of research results to managers so that the results can be used in the development of escapement goals for meeting freshwater ecosystem needs.

SG 60.1: The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

Indeed, a key strategy in the Wild Salmon Policy is “Inclusion of ecosystem values and monitoring”. However Levy (2005) states, and I agree, that “Preliminary research efforts, mostly undertaken in other watersheds, do not permit analysis of trade-offs, determination of impacts between fish harvests and freshwater ecosystem impacts. Nor do they permit understanding the adequacy of existing escapement goals for meeting freshwater ecosystem needs. This is an important area where focused research is required to determine these relationships.” The statement quoted from Bocking (2005) under this indicator for the Skeena assessment is also applicable here – please refer to it.

As with DFO’s Skeena submission, all but one of the studies cited as evidence of freshwater ecosystem research they have conducted appear to focus on the limnology of Nass sockeye nursery lakes. While these appear to be rigorous and respectable studies, their scope does not extend to analyzing the adequacy of escapement targets in meeting freshwater ecosystem needs for salmon carcasses. Furthermore, they only cover one portion of the freshwater ecosystem – lakes. Headwater streams, wetlands, and alluvial floodplain systems are all key components of the Nass freshwater ecosystem that Nass salmon depend on and numerous studies from other regions indicate that they are likely affected by harvest removals and by-catch mortality of spawners.<sup>71</sup> The single non-lake study cited by DFO was funded by Forest Renewal B.C. (according to the Acknowledgements), and only one of the four authors listed is from DFO<sup>72</sup>. There is no reasonable proof in the DFO submission that the Department is conducting or supporting research into whether Nass escapement goals meet Nass freshwater ecosystem needs.

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<sup>71</sup> For example, see review by Schindler *et al.* 2003. Pacific salmon and the ecology of coastal ecosystems. *Frontiers in Ecology and Environment*, 1: 31-37.

<sup>72</sup> Johnston *et al.* 2004. Effects of the abundance of spawning sockeye salmon (*Oncorhynchus nerka*) on nutrients and algal biomass in forested streams. *Canadian Journal of Fisheries and Aquatic Sciences* 61: 384-403.

**In order for the fishery to be certified an additional condition should be imposed explicitly requiring full compliance with the 80 Scoring Guideposts under this Indicator for all (lake and non-lake) components of the freshwater ecosystem that stand to benefit from salmon carcasses.**

**2.3.1 – Provide for recovery of non-target stocks**

Condition 2.1

SG 80.3: The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.

SG 80.5: Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.

SG 80.6: The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks

Nass Condition 2.1: *Certification of the Nass sockeye salmon fishery is contingent upon developing and implementing a recovery plan for chum salmon stocks that are below the LRP and that spawn in the Nass or its tributaries. Such a plan must have clear procedures to determine the impact of the existing fishery management system on these stocks and provide for decreasing incidental harvest rates on chum salmon, if harvest pressure is found to have significant risks to chum recovery.*

While the above condition is good as far as it goes, it does not speak to SG 80.6., but it should given the extent to which the Nass catchment has been modified by industrial forestry. **Nass Condition 2.1 should explicitly require that the impact of non-fishing related human activity be considered in the Nass chum recovery plan, and any future recovery plans for Nass salmon.**

**MSC Principle 3**

Refer to Skeena critique (above) for definition and intent (page 17).

**General comments and concerns**

The Nass salmon fishery is widely viewed as being the best-managed large salmon fishery in British Columbia. The fishwheel mark-recapture tagging programs on the Nass provide managers with excellent in-season data and the successful use of multiple fishwheels on the Nass allows for significant upriver fishing effort where selectivity is much easier to achieve. The Nisga'a have substantial ownership in the fishery and are

active participants in the management of the fishery, and it appears that their legal and customary rights and needs are being met by DFO.

As with the Skeena, the obstacles to sustainability in the Nass sockeye fishery mostly arise from the mixed-stock nature of the marine component of the fishery. These include high incidental capture rates for non-target stocks, fleet compliance and enforcement issues, and lack of management control in the derby-style fishery openings. As discussed elsewhere, there appears to be an outdated and narrow concept in the management agency of what constitutes an ecosystem and an ecosystem impact resulting from the fishery. And the Department appears to be moving quite slowly to implement those aspects of the Wild Salmon Policy pertaining to ecosystem-based management. If these serious but manageable flaws in Nass fishery management system are to be addressed anywhere, they should be addressed through improvements to the conditions attached to the MSC certification.

### **Indicator and condition comments and concerns**

#### **3.1.2 – Periodic assessment of biological status**

SG 80.1

SG 80.1: Assessments or updates of the status of the stocks for the major target stock units are made on a periodic basis, dependent upon the level of exploitation.

Given that escapement estimates are not available in recent years for most of the smaller sockeye stocks (*e.g.* Bowser, Damdochax, Kwinageese) it is unclear how SG 80.1 could be fully met. Presumably this will be taken care of with Nass Condition 1.1; however, the scoring under this guidepost should still reflect the current reality.

#### **3.1.3 – Identify the impact of fishing on the ecosystem**

All Scoring Guideposts

Assessment team and Levy (2005) are NOT in agreement on SG 80.1, and I argue that none of the Scoring Guideposts have been fully met under this Indicator.

SG 80.1: The management system includes mechanisms to identify and evaluate the impact of fishing on the ecosystem.

SG 80.2: Control mechanisms are used to minimize impacts of fishing on the ecosystem.

SG 60.1: The management system takes measures to control the impacts of the fishery on the ecosystem in the majority of cases where impacts have been verified.

The issues here are essentially the same as they are under this same indicator in the Skeena assessment – please refer to those comments. The argument for failure of the certification under this Indicator could be ruled out if DFO were to provide some acknowledgement that removals of salmon through fishing have been clearly shown to

have direct impacts on salmon-based freshwater ecosystems. Such acknowledgement would make it possible to **impose a condition requiring the management system to:**

- 1. Develop a mechanism to identify and evaluate the impact of fishing on the ecosystem.**
- 2. Demonstrate that their control mechanisms effectively minimize impacts of fishing on the ecosystem.**

### **3.1.8 – Socioeconomic incentives for sustainable fishing**      SG 80.2, 60.1

Assessment team and Levy (2005) are NOT in agreement.

SG 80.2: *The management system includes a program to create incentives for harvesters to not exceed target catches or exploitation rates.*

SG 60.1: *The management system provides for the use of social or economic incentives to ensure sustainable fishing.*

Levy argues, and I agree, that “Selective fishing and collaborative management are well-developed however they are not incentives, in themselves, for sustainable fishing.” He also makes the following points:

- “There are no target catches and Nass sockeye fisheries are regulated by means of openings and closures. This provides partial lack of management control of the fishery.”
- “In reality there are no incentives and the primary motivation for commercial fishers is to harvest as many fish as rapidly as possible.”

Ironically, conditional MSC certification for the Nass sockeye fishery should provide some measure of economic incentive to fish in a sustainable manner. However, the current certification conditions don’t address the fact that target catches do not exist, even though SG 80.2 makes explicit reference to target catches. The continuation of derby-style gillnet and seine openings with little emphasis on value-added processing will likely prevent any substantive increase in the sustainability of the fishery. **The certification should include a condition explicitly requiring the implementation of a program that would create incentives for harvesters to not exceed target catches or exploitation rates.**

### **3.2.1 – Research plan for target and non-target species**      SG 80.1, 80.2, 80.3, 80.5

Assessment team and Levy are not in agreement on SG 100.2; however, I further argue that SGs 80.1, 80.2, 80.3, and 80.5 have only been partially met.

SG 80.1: *The management system incorporates a research component that provides for the collection and analysis of information necessary for formulating management strategies and decisions for both target and non-target species.*

SG 80.2: The research plan addresses concerns related to the impact of the fishery on the ecosystem.

SG 80.3: The research plan addresses socio-economic issues that result from the implementation of management.

SG 80.5: Funding is adequate to support short-term research needs.

If SGs 80.1, 80.2, and 80.5 were fully met there would not be substantial information gaps on the status of several non-Meziadin sockeye stocks. In the DFO self-evaluation SG 100.2 was deemed not met (red) while the assessment team has deemed it partially met. SG 80.3 is similar enough to SG 100.2 that it could be considered partially met given the complete lack of substantiating evidence of socio-economic research in the DFO submission.

#### **3.4.1.1 – Fishery control systems including no-take zones**

SG 60.2

The comments made under this Indicator for the Skeena assessment are directly applicable here – please refer to them.

SG 60.2: Established harvest and/or escapement goals for target stocks consider the impact of the fishery on the majority of the non-target species, and on the ecosystem generally.

#### **3.4.1.2 – Measures to restore depleted fish populations**

SG 80.2

DFO scored SG 80.2 as not met (red); however, the assessment team has upgraded this SG to fully met (green).

SG 80.2: A time schedule for restoration, which considers environmental variability, is determined by the management system.

If there have been recent developments that would change the scoring for this Guidepost, they should be explained in the assessment. If the Guidepost is considered not applicable because there are no Nass sockeye stocks in need of restoration, the Guidepost should be marked as such in the assessment. However, this indicator may be applicable due to the concern over the smaller non-Meziadian sockeye stocks, and the general concern for biodiversity among Nass sockeye stocks recently expressed by the IUCN Salmonid Specialist Group<sup>73</sup>.

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<sup>73</sup> Salmonid Specialist Group of the Species Survival Commission of IUCN World Conservation Union. 2007. IUCN Red List Assessment for Sockeye Salmon *Oncorhynchus nerka*. DRAFT – Nov.26, 2007.

### 3.4.2.1 – Compliance provisions (effective enforcement)

SG 60.1

I argue that SGs 100.3, 100.4, 80.1, 80.2, and 60.1 have not been met. I focus here on the 60 SG, as it trumps the other SGs for the purposes of the MSC certification.

SG 60.1: *The management system includes compliance provisions that are effective for the majority of the fisheries.*

The DFO response to this Indicator is virtually identical between the Skeena and Nass assessments. As such, my response is also nearly identical between the two assessments – please refer to comments made under this Indicator for the Skeena assessment (above).

Presumably DFO is capable of providing information proving that they at least partially meet SG 60.1, but they have not done so. **A condition should be attached to the certification requiring DFO to provide reasonable evidence (see comments under Skeena) proving that compliance provisions are effective for the Area 3 sockeye fishery.**

### 3.5.2 – External review

SG 80.1

Assessment team and Levy (2005) are not in agreement on the 100 Scoring Guideposts and I argue that SG 80.1 may not be met.

SG 80.1: *The management system provides for a review of management performance by one or more independent experts at least once every five years.*

While broad scale reviews have been undertaken for west coast salmon stocks and fisheries from time to time, the DFO self-evaluation contains no evidence that the above Guidepost has been specifically met for management of the Nass sockeye fishery.

### 3.5.3 – Recommendations from reviews incorporated

All Scoring Guideposts

Regarding the Skeena, Bocking (2005) states, and I concur, that “because of the lack of external reviews, these Scoring Guideposts can only be partially met.” This appears to be applicable to the Nass as well. For example, consider SG 60.1:

SG 60.1: *Recommendations from internal and external reviews are considered by the management agency and an explanation is provided for the actions or lack of action associated with the majority of these recommendations.*

### 3.7.1 – Avoid catch and minimize mortality of non-target species

SG 80.2, 60.1

The response to this Indicator for the Skeena is also applicable here. The assessment team and Bocking (2005) are not in agreement on SG 80.2. I argue that given the conduct of the fleet and the Department in 2006, SG 60.1 is also only partially met.

SG 80.2: Taking into consideration natural variability in population abundance, there is evidence that the capture and discard of non-target species or undersized individuals of target species is trending downward, or is at a level of exploitation that has been determined by management to be acceptable.

SG 60.1: The majority of fisheries are conducted in a manner that is consistent with the goal of reducing the catch of non-target species or undersized individuals of target species.

Regarding SG 80.2, no evidence is provided in the DFO submission that the capture and discard of non-target species is trending down or that the level of exploitation is acceptable.

Regarding both Guideposts, the assessment team is referred to the abandonment of selective fishing measures in 2006. This is discussed in detail under this Indicator for the Skeena assessment (above) – please refer to it.

The following text is repeated from the Skeena section as it deals specifically with the Area 3 fishery:

People who were onboard seiners in Area 3 in 2007 have described up to 200-300 chum being thrown back (literally) in single seine sets, with boats lined up three deep in a confined area, potentially re-catching the same fish numerous times.<sup>74</sup> Very little empirical data exist for recapture rates of individual fish in such situations, and no reliable estimates exist for long-term mortality rates of fish that are caught and released even once.

So-called selective net fisheries have a limited ability to reduce exploitation of non-target species; I have seen little evidence that the exploitation rate reductions are at all substantive, and no evidence that they result in higher spawning success.

### 3.7.4 – Cooperation of fishers

SG 60.1, 80.1

The comments made under this Indicator for the Skeena (above) are directly applicable here – please refer to them.

SG 80.1: Sufficient numbers of fish harvesters and processors comply with requests for data on catches and discards of non-target species and undersized individuals of target

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<sup>74</sup> Personal communications with individuals who wish to remain anonymous.

species to ensure that reliable estimates of total catches and discards for the fishery can be obtained.

**SG 60.1:** Catch and discard data provided by the fishing industry and other relevant stakeholders are sufficient to manage the harvests from the majority of the non-target species and undersized individuals from the majority of the target species.

Given the importance of accurate catch data in estimating exploitation rates for non-target species, SGs 80.1 and 60.1 should be considered not met until DFO provides explicit proof to the contrary.



**Summary for Skeena River sockeye**

**PRINCIPLE 2 - Ecosystem and Non-target Populations**

Criterion 2.1 - Maintain natural functional relationships among species

Indicator 2.1.1 Impacts on ecosystem processes can be identified

Indicator 2.1.2 Provisions to reduce ecosystem impacts

Indicator 2.1.3 Sufficient research on ecosystem impacts

Indicator 2.1.4 Escapement goals address ecosystem needs

Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species

Indicator 2.2.1 Information on biological diversity acquired and used

Criterion 2.3 - Fishery allows for the recovery of depleted stocks (Non-target Stocks)

Indicator 2.3.1 Provide for recovery of non-target stocks

Assessment team scoring

Criteria @ 100    Criteria @ 80    Criteria @ 60

	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	Assessment team scoring
Indicator 2.1.1		P															97
Indicator 2.1.2				P													90
Indicator 2.1.3			P														93
Indicator 2.1.4	P																95
Indicator 2.2.1	P																98
Indicator 2.3.1			P			P	P	P	P								74

Robert Bocking scoring

Criteria @ 100    Criteria @ 80    Criteria @ 60

	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	Robert Bocking scoring
Indicator 2.1.1		P															
Indicator 2.1.2		P	P	P								X					
Indicator 2.1.3			P									X					
Indicator 2.1.4		P								P		X					
Indicator 2.2.1	P	P															
Indicator 2.3.1			P			P	P	P	P	P	P	P	P	P			

- X = A lower score is recommended for this Guidepost based on new or additional information
- Red = Guidepost has NOT been met
- P = Guidepost has been partially met
- Green = Guidepost has been met

Summary for Skeena River sockeye

**PRINCIPLE 3 - Management and Operational Framework**

Management Framework

Criterion 3.1 - Management system consistent with MSC principles and criteria

Indicator 3.1.1 Clear and defensible set of objectives

Indicator 3.1.2 Periodic assessment of biological status

**Indicator 3.1.3 Identify the impact of fishing on the ecosystem**

Indicator 3.1.4 Uses best information and precautionary approach

Indicator 3.1.5 Responses to new information are timely and adaptive

Indicator 3.1.6 Responsive to social and economic impact of fishery

**Indicator 3.1.7 Useful and relevant information to decision makers**

**Indicator 3.1.8 Socioeconomic incentives for sustainable fishing**

Criterion 3.2 - Framework for research pertinent to management

Indicator 3.2.1 Research plan for target and non-target species

Indicator 3.2.2 Research is timely, available and reviewed

Criterion 3.3 - Transparency in operations and consultation process

Indicator 3.3.1 Open consultations process

Criterion 3.4 - Measure to control levels of harvest

Subcriterion 3.4.1 - Catch and exploitation levels

**Indicator 3.4.1.1 Fishery control systems including no-take zones**

Indicator 3.4.1.2 Measures to restore depleted fish populations

Subcriterion 3.4.2 - Ensure that conservation objectives are met

**Indicator 3.4.2.1 Compliance provisions (effective enforcement)**

Indicator 3.4.2.2 Monitoring provisions

Criterion 3.5 - Regular and timely review of management system

Indicator 3.5.1 Internal review

**Indicator 3.5.2 External review**

**Indicator 3.5.3 Recommendations from reviews incorporated**

**Indicator 3.5.4 Mechanism for resolving disputes**

Criterion 3.6 - Compliance with legal and administrative requirements

Indicator 3.6.1 Compliance with international agreements

Indicator 3.6.2 Compliance with domestic laws and regulations

**Indicator 3.6.3 Observes legal and customary (First Nation) rights**

Fisheries Operational Framework

Criterion 3.7 - Ecosystem sensitive gear and fishing practices

**Indicator 3.7.1 Avoid catch and minimize mortality of non-target species**

Indicator 3.7.2 No destructive fishing practices

**Indicator 3.7.3 Minimize operational waste**

**Indicator 3.7.4 Cooperation of fishers**

**Indicator 3.7.5 Fishing methods minimize impacts on habitat**

Assessment team scoring

Criteria @ 100 Criteria @ 80 Criteria @ 60

Score

1 2 3 4 5 1 2 3 4 5 6 1 2 3 4 5

Assessment team scoring

Robert Bocking scoring

Criteria @ 100 Criteria @ 80 Criteria @ 60

1 2 3 4 5 1 2 3 4 5 6 1 2 3 4 5

Indicator	Assessment team scoring															Robert Bocking scoring																								
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