The British Columbia Commercial Sockeye Salmon Fisheries

FINAL CERTIFICATION REPORT

VOLUME 1

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MSC reference standards:

MSC Accreditation Manual Issue 5,
MSC Fisheries Certification Methodology (FCM) Version 6
MSC TAB Directives (All)
MSC Chain of Custody Certification Methodology (COC CM) Version 6.

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Executive Summary

TAVEL Certification and its Assessment Team for the four candidate British Columbia sockeye (*Oncorhynchus nerka*) fisheries conducted in both marine and freshwater portions of the Fraser, Nass and Skeena watersheds and Barkley Sound, recommend that these four fisheries be certified in accordance with the MSC Principles and Criteria for Sustainable Fishing. This certification project has stretched over a nine year period, since the initial pre-assessment of the fishery was conducted. The recommendation incorporates information from that period, and in the opinion of TAVEL and the assessment team, this report is current with the management practices used by Fisheries and Oceans Canada (DFO) in the management of the fishery. TAVEL Certification and the assessment team have endorsed the scores in this report and are satisified that the information used in scoring, and the performance scores awarded are appropriate for the current stock status for the four units of certification. The scores attained by the four candidate fisheries are as follows.

	Fraser		Barkley Sound		Skeena		Nass	
MSC Principle	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**
Principle 1	83.4	8	86.1	4	82.2	5	91.6	2
Principle 2	82.3	2	88.9	1	85.3	2	88.8	1
Principle 3	87.4	7	91.3	4	87.4	7	97.1	0

This report provides the details of the certification process that was undertaken for the candidate fisheries, however, much of the information that is referred to in this document is either directly appended to the report or can be downloaded from the MSC website at the following address (http://www.msc.org/track-a-fishery/in-assessment/pacific/british-columbia-sockeye-salmon/assessment-downloads).

Readers should note that in order to appropriately review this report, it is critical to review this report concurrently with other documents, particularly the information submission which was prepared by DFO to respond to the performance indicators which were developed by the Assessment Team to evaluate the fishery. These documents can be found at the above website address.

Volume 1 of this certification report incorporates the Assessment Team's evaluation and scoring of the four units of certification. Volume 2 includes the stakeholder submissions received during the assessment process while Volume 3 includes the Team's responses to the significant points raised in those submissions.

Volume 1, Section 1 of the report provides background information on the MSC sustainable fishing program, specific context in relation to this certification process and guidance to readers on how to interpret this report. This section provides crucial information on how readers can most efficiently review and evaluate the report.

Section 2 describes the units of certification, which effectively means what combination of fishing methods, management requirements and geographical boundaries are being considered for certification. This section also provides basic biological information about the species, descriptions of the commercial fisheries which are assessed within this report. Section 2.4

describes a critical concept to the MSC evaluation of BC sockeye salmon fisheries, that of target versus non-target sockeye stocks.

Fisheries and Oceans Canada (DFO) is the management authority for all the commercial BC salmon fisheries. Their approach to salmon fisheries assessment and management is described in Section 3.

Sections 4 and 5 of the report provide additional background on other aspects of the commercial salmon fishery industry. Section 4 briefly describes the processing and transhipment sectors and the important links to the harvest sector. This information is important in the context of the MSC chain of custody traceability requirements faced by all businesses downstream from the sockeye salmon fisheries. Section 5 provides background on fisheries that are conducted in BC and which may interact with some of the sockeye fisheries.

The MSC certification process is described in detail in Sections 6 and 7. The latter section describes the certification process used to date and lists individuals who participated in the process, either as stakeholders or team members. Finally, Section 7.3 provides the exact wording of all the performance indicators (PIs) and the 60, 80 and 100 scoring guideposts (SGs) which the Assessment Team defined to evaluate the performance of the fisheries against the MSC standard.

Section 8 provides details about the current stock status and trends for each of the four units of certification. In October 2008, the International Union for the Conservation of Nature (IUCN), placed sockeye salmon, including a number of BC stocks, on its Red List of Threatened species. Section 9 reviews a number of issues raised in the IUCN report and provides the Assessment Team's perspective of those issues. In November, 2009, a judicial inquiry was appointed to poor sockeye returns to the Fraser River in 2009. The inquiry results and DFO response to subsequent recommendations will be reviewed as part of the annual surveillance audit process.

Section 10 presents the detailed results for the evaluation of the fisheries against the MSC standard. Tables 10.1.1, 10.2.1 and 10.3.1 provide the results of the scoring of the four fisheries against the performance indicators developed to respond to the three MSC Principles and Criteria.

Section 11 identifies the Chain of Custody requirements for the fishery, indicating that the chain of custody requirements have been confirmed to the first point of landing. The target eligibility date to use the MSC logo on certified product is clarified in Section 11.1, as January 17, 2009.

Section 12 briefly describes the what peer review and public comment processes have been completed and how stakeholders can access the MSC objections processes. Section 13 states the formal certification recommendation for the four candidate fisheries. Section 14 states the contractual requirements to be completed by the client in order to maintain certification once granted. Section 15 describes the MSC Logo licencing stipulations for this certification.

Volume 2 of the report contains the correspondence related to the certification. Appendices 1 through 4 contain stakeholder correspondence received during the course of the assessment. Appendix 5 contains the peer reviewer reports and the team's response to peer review comments. Appendix 6 contains the DFO Action Plan to address condition requirements.

Volume 3 includes the Team's responses to the stakeholder comments, as required by MSC fishery certification policy. Appendices 7 through 9 are the stakeholder communications received after the Public Draft Report. TAVEL and the Assessment team have responded to the significant issues raised in those communications. Appendix 10 provides the TAVEL response to comments provided by the client.

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1.0 Introduction

The Marine Stewardship Council (MSC) is a non-profit organization whose mandate is the long-term protection of the world's marine fisheries and the associated ecological components. Through a process of consultation with various stakeholders over a two-year period commencing in 1996, the MSC established its standard for well managed and sustainable fisheries called the "MSC Principles and Criteria for Sustainable Fishing" (MSC P&Cs).

The finalized MSC Fisheries Certification standard was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program. The fisheries certification methodology (FCM) has since been updated periodically with the current version (FCMv6) issued in September 2006.

The objective of the MSC is to promote fisheries certified as sustainable directly in the marketplace through the use of the MSC Fish-tick eco-label on certified fish products. Ultimately, through educating fish product consumers about the plight of fishing stocks in the world and the MSC Program, it is hoped they will reward sustainable fisheries by choosing those fish products originating from certified sustainable fisheries.

Interested fisheries can submit their candidature to an accredited certification body for comparison against the MSC P&Cs. The comparison is a three part process inclusive of a pre-assessment (data gap analysis of the fishery), a full assessment (measurement of the fishery against the MSC P&Cs) and certification (5 year validity with annual surveillance requirements) for those fisheries that meet the standard. Successfully certified fisheries can claim their fishery marketing materials.

The BC Salmon Marketing Council (BCSMC), on behalf of the commercial salmon industry, proposed that the certification assessment evaluate the four sockeye fisheries targeting stocks returning to the Fraser, Skeena and Nass watersheds and Barkley Sound in British Columbia and Canadian EEZ waters. This assessment evaluated the fishery management system used to manage both the marine and fresh water (in-river) sockeye salmon fisheries conducted in those four systems. This report presents the results of the certification assessment of these fisheries.

1.1 Certification Process Context

This report is the result of MSC fishery assessment activities that span a period of more than nine years. It is the longest ongoing fishery assessment process since the inception of the MSC Sustainable Fisheries Certification Program. To put this in perspective, other fishery certification processes in less challenging conditions would normally have completed the certification process within a two to three year period. Assuming that certification was achieved for that fishery, it would have completed most of the five year certification validity period defined for MSC certified fisheries. This is important to point out because this protracted assessment process has prevented the fishery from benefiting from the required certification conditions designed to improve fishery management performance and prevented the client membership from benefiting from any sales opportunities which might have occurred if the fishery had been certified earlier.

Perhaps more important, is that the process of certification (i.e. the timely completion of the certification tasks) has suffered from the drawn out timeline. This protracted period has resulted in higher costs to the client, simply because each certification step has required all parties engaged in the process (i.e.

clients, DFO, First Nation and ENGO stakeholders, the assessment team members and the certification companies), to constantly backtrack and review the preceding certification step and its results in order to proceed to the next assessment task.

It is important to point out that the performance indicators and scoring guideposts that were developed and approved for this fishery assessment were authorized in 2003. This is important because subsequent salmon certifications or re-assessments (e.g. Alaska Salmon re-certification, California Chinook salmon fishery, Iturup Island pink and chum salmon fisheries) incorporated additional performance indicators, particularly under Principle 3 (e.g. 3.1.9: The management system has taken significant steps to protect salmon habitat including water diversions and agricultural practices; and 3.1.10: The hatcheries use management practices and protocols that sustain the genetic structure and productivity of the natural spawning population and there is coordination between hatchery programs from different agencies/operators.). While it was recognized that these additional performance indicators assessed important management components, there was no MSC procedural necessity to revise the performance indicators approved in 2003 to incorporate these new performance indicators into the BC Sockeye assessment and as such, these performance indicators are not included or evaluated in this assessment.

The issue of the protracted timeline of this project has raised concerns among engaged stakeholders that the results of this fishery assessment process, culminated in this Public Draft Report, are less valid. This issue has been debated by the assessment team and TAVEL Certification. Our common view is that the fishery management performance scoring, the resulting certification conditions and the recommended certification outcomes represented within this report are appropriate for the four evaluated sockeye fishery units of certification.

The Skeena fishery was rescored in 2008 due to fisheries management actions and fisher compliance concerns raised in the 2006 and 2007 seasons. Specifically, the rescoring was triggered by fishery management actions which were not consistent with the information provided during the certification assessment visits, the DFO submissions and stakeholder consultations. These changes in management and harvester behavior were confirmed in the Report of the Skeena Independent Science Review Panel[1]. Because some of the identified fishery compliance issues also occurred in fisheries targeting Nass sockeye, the relevant performance indicators for Nass sockeye were also rescored in 2008.

With regard to assessments for Fraser and Barkley Sound candidate fisheries, the fishery management actions employed in 2006-2008 were either consistent with those described during the fishery evaluation and interview process or more precautionary, not less. As a result, the team concluded that there was no reason that these fisheries be rescored in 2008.

TAVEL Certification and the assessment team have endorsed the scores in this report and are satisified that the information used in scoring, and the performance scores awarded are appropriate for the current stock status for the four units of certification.

[1] Walters, C.J., Lichatowich, J.A., Peterman, R.M. and Reynolds, J.D. 2008. Report of the Skeena Independent Science Review Panel. A report to the Canadian Department of Fisheries and Oceans and the British Columbia Ministry of the Environment. May 15, 2008, 144 p.

1.2 Interpreting this Report

This report provides the results assessment conducted on the four BC sockeye units of certification. Through the assessment process, the team has reviewed a vast amount of information provided by Fisheries and Oceans Canada (DFO), the client, environmental, conservation and First Nation stakeholder groups. To include all submitted information received during the assessment would result in a very large, unmanageable report. Most of the key information submissions provided during the process can be found at the MSC website (http://www.msc.org/track-a-fishery/in-assessment/pacific/british-columbia-sockeye-salmon/assessment-downloads).

Incorporation of Client/DFO Certification Submission

Of key importance to readers are the documents submitted by DFO in support of the candidature of these fisheries. There are twelve client documents corresponding to an individual document for each MSC Principle for each of the four units of certification. These documents provide DFO and the client's proposed score for each performance indicator, the rationale for the score and the supporting information to prove conformance of the fishery management system for each of the units of certification.

The assessment team did not incorporate all client submission information in the scoring and rationale section of this report. When the team deemed the client submission information adequate to support the score proposed by the client, the information was not incorporated into this report and an appropriate score was awarded. If the team did not agree with the client's proposed score, a specific rationale was developed most often in the case that a performance indicator scored below 80.

In all cases, it is important that this report be read in concurrently with the DFO submissions.

Numbering of Certification Conditions

Conditions have been issued for a number of performance indicators in each unit of certification where scores greater than 60 and less than 80 were attained. Conditions were initially numbered consecutively starting with all Principle 1, then Principle 2 and 3 conditions following the presentation of each unit of certification. Rescoring of performance indicator in the Skeena and Nass units of certification in 2008 led to issuance of additional conditions. These additional conditions were numbered using the proceeding condition number and a letter to indicate that these conditions were a result of the rescoring process. This system was employed to allow stakeholders to confirm conditions which were issued in the initial public release of the draft report in August 2007 and those conditions which were issued in 2008.

2.0 The British Columbia (BC) Salmon Fisheries

2.1 Units of Certification

The MSC certification methodology defines a candidate fishery unit of certification as follows "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock)."

The units of certification under consideration for certification in this project are the non-First Nation commercial sockeye fisheries and the First Nation Excess Salmon to Spawning Requirement (FN ESSR) fisheries and FN Economic Opportunity (EO) fisheries targeting sockeye returning to the four following watershed systems:

1) Skeena Watershed
2) Nass Watershed
3) Barkley Sound
4) Fraser River Watershed

These fisheries are defined by geographic area and gear targeting sockeye however management measures are in place to distribute the harvest on stocks that can better withstand higher rates of harvest or distribute the harvest amongst different users. These fisheries represent the majority of the BC commercial fisheries that harvested sockeye salmon in recent years. Table 2.1 displays the type of fishery, gear and geographic location of the candidate fisheries.

In this report, each unit of certification has been scored separately.

Table 2.1: List of BC commercial sockeye salmon fishery units of certification

Fisheries
Marine Fisheries
Seine & Gillnet Fisheries
North Coast
Nass
Skeena
South Coast
Fraser
Barkley Sound
Troll Fisheries
West Coast Van. Is.
Inside Fisheries
Freshwater Fisheries
Nass – FN EO & ESSR Fisheries
Skeena – FN EO & ESSR Fisheries
Fraser – Non-FN Fisheries, FN EO & ESSR Fisheries
Somass

Unit of certification specifics for the four candidate fisheries are as follows.

Species: Sockeye salmon (Oncorhynchus nerka).

Geographic Area: British Columbia and Canadian Pacific EEZ waters

Method of Capture: Seine, gillnet, troll, beach seine, fish wheels, weirs, dip nets.

Fisheries Considered: Non-First Nation Commercial fisheries, First Nation Excess Salmon to Spawning Requirement fisheries and FN Economic Opportunity fisheries.

Stocks: **Nass** - all sockeye are target stocks but Meziadin sockeye represent the bulk of production. There are no enhanced sockeye stocks in the Nass watershed and all stocks are believed to have similar productivity.

Skeena - Babine sockeye were considered to be the significant target stock. This stock includes both enhanced and wild components. All other Skeena sockeye stock were classified as non-target stocks because when there were very low returns of Babine sockeye (e.g. 1998-99) there were no targeted fisheries for Skeena sockeye.

Barkley Sound - The historically target stocks included Great Central Lake, Sproat Lake and Henderson Lake sockeye. In recent years, Henderson Lake is not a targeted stock and its location and timing make it possible to minimize harvest of Henderson Lake sockeye in the Barkley Sound fisheries.

Fraser - Fraser sockeye management is very complex with different stocks targeted each year based on their forecast returns and assessment cycle year. There are only a few enhanced stocks and these are clearly targeted with terminal fisheries but most of the commercial fisheries harvest a mixture of stocks. In recent years, Early Stuart and Cultus sockeye have not been targeted in commercial fisheries but both stocks did support commercial fisheries in the past.

Management: The commercial sockeye fisheries in Canada are managed by Fisheries and Oceans Canada (DFO).

Traceability within Fishery: All salmon must be harvested in accordance with the license conditions issued to the harvester at the beginning of the season. Dependent on the fishery, these conditions clearly identify the requirements of the vessel master to maintain harvest logs of all operations and/or submit daily catch records and fish slips. These documents identify the management area fished, species and number of fish retained and released. Traceability is sufficient to confirm the origin of fish from the fishery.

At-Sea Processing: There is no at-sea processing of salmon into final product form in British Columbia. There are freezer troll vessels which will freeze gutted fish while at sea.

Point of Landing: Commercial harvesters in marine fisheries are required to hail-in to an approved contractor prior to landing at a designated landing location. All sockeye harvested in commercial in-river fisheries must be checked through compulsory landing stations.

2.2 Life History

The life history of sockeye salmon has been studied and written about extensively. The general description be confined to the commercial sockeye fisheries provided below is taken from 2 sources: Canada's Department of Oceans and Fisheries web site (http://www.pac.dfo-mpo.gc.ca/species/salmon/salmon_facts/sockeye_e.htm) and the Alaska Department of Fish and Game's Notebook series (http://www.adfg.state.ak.us/pubs/notebook/fish/sockeye.php).

Sockeye salmon (*Oncorhynchus nerka*)

The main spawning area of sockeye salmon extends from the Fraser River to Alaska's Bristol Bay. Most sockeye in BC and the Yukon spawn in late summer or fall in lake-fed systems; at lake outlets, in lakes, or in streams flowing into lakes. Major spawning runs are found in the Fraser, Skeena, Nass, Stikine, Taku and Alsek watersheds as well as those of the Smith and Rivers inlets. Major spawning runs were found in the Columbia River before the construction of main stem dams in the 1930s.

Young sockeye may remain in their freshwater nursery lakes for a year or more, with some waiting until the second or third year to make their seaward journey. Once in salt water, BC sockeye move north and north-westward along the coast. Their maturing years find them in a huge area of the Pacific Ocean extending west to approximately the International Date Line (2600 miles from the coast of Vancouver Island), north to the northern Gulf of Alaska and south to the Oregon-California border.

The female selects the spawning site, digs a nest (redd) with her tail, and deposits eggs in the downstream portion of the redd as one or more males swim beside her and fertilize the eggs as they are extruded. After each spawning act, the female covers the eggs by dislodging gravel at the upstream end of the redd with her tail. A female usually deposits about five batches of eggs in a redd. Depending upon her size, a female produces from 2,000 to 4,500 eggs.

Eggs hatch during the winter, and the young sac-fry, or alevins, remain in the gravel, living off the material stored in their yolk sacs, until early spring. At this time they emerge from the gravel as fry and move into rearing areas. In systems with lakes, juveniles usually spend one to three years in fresh water before migrating to the ocean in the spring as smolts. However, in systems without lakes, many juveniles migrate to the ocean soon after emerging from the gravel.

Sockeye salmon return to their natal stream to spawn after spending one to four years in the ocean. Mature sockeye salmon that have spent only one year in the ocean are called jacks and are, almost without exception, males. Once in the ocean, sockeye salmon grow quickly. While returning adults usually weigh between 4 and 8 pounds, weights in excess of 15 pounds have been reported.

In some areas, populations of sockeye salmon remain in fresh water all their lives. This landlocked form of sockeye salmon, called "kokanee," reaches a much smaller maximum size than the anadromous form and rarely grows to be over 14 inches long.

2.3 Candidate Fishery Summaries

2.3.1 Skeena Sockeye Fisheries

Skeena and Nass sockeye are currently harvested in marine portions of Areas 3, 4 and 5 and freshwater areas within Area 4 (Skeena watershed), see Figure 1.

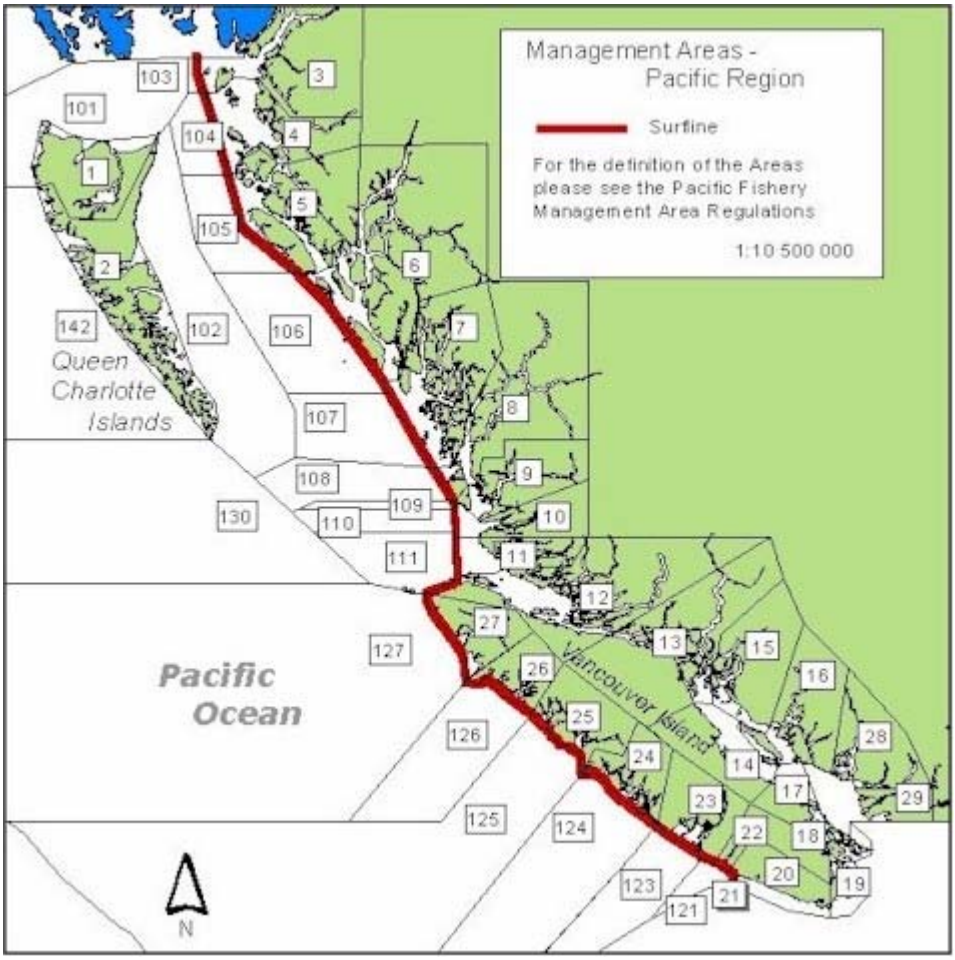


Figure 1: Management areas defined in the Pacific Region salmon fisheries. Source: DFO, 2008

In their submission, DFO indicated the following. Ocean fisheries that harvest Skeena River sockeye operate on a mixed stock aggregate. There are no opportunities to isolate component stocks spatially in ocean fisheries. The 26 non-Babine stocks are aggregated into three groups based on their run timing (early: Alastair, Atna, Bulkley, Johnston, Lakelse, Maxan, Morice; Mid:Aldrich, Asitka, Club, Damshilgwit, Dennis, Johanson, Kluatantan, Kluayaz, McDonell, Motase, Sicintine, Slamgeesh, Spawning, Stephens, Sustut, Swan; late: Azuklotz, Bear, Kitsumkalum, Kitwanga).

Inland fisheries target enhanced sockeye stocks in areas adjacent to the spawning channels at Pinkut and Fulton Rivers where there is complete isolation from other sockeye populations. There are also harvest opportunities to target enhanced stocks in terminal fisheries in the Babine River (outlet of Babine Lake) where significant timing differences separate the majority of the wild stocks (the early tributaries and the late Babine River) from the mid-timed enhanced stocks. Fishing opportunities in the mainstream Skeena below the Babine River confluence provide intermediate opportunities for temporal or spatial isolation.

2.3.2 Nass Sockeye Fisheries

Nass sockeye are currently harvested in marine portions of Areas 3, 4 and 5 and freshwater areas within Area 3 (Nass watershed, see figure 1).

DFO`s submission states that Nass River sockeye are caught in a complex array of mixed-stock fisheries in southern southeast Alaska, northern British Columbia (Statistical Areas 1 through 4), and in First Nations food, social, and ceremonial fisheries (FSC) and escapement surplus to spawning requirement (ESSR) fisheries within the Nass River itself.

2.3.3 Barkley Sound Sockeye Fisheries

Barkley Sound sockeye are only targeted in Area 23, see figure 1.

The following information was extracted from the DFO Response to MSC Indicators for Principle 1 for the Barkly Sound unit of certification.

Barkley sockeye are harvested within a relatively localized area restricted to Barkley Sound and Alberni Inlet. It is assumed these terminal fisheries account for all or a significant portion of the total exploitation of these populations. However, as the fish are not marked there are no data regarding high seas interceptions.

To avoid gear conflicts, gear types are restricted to specific catch areas. The catch, by gear and area, is estimated each week during the fishing season.

2.3.4 Fraser River Sockeye Fisheries

Fraser Sockeye are primarily harvested in marine Areas 11, 12, 13, 20 and 29 and freshwater areas within Area 29 (Fraser watershed. See Figure 1). Historically, there were net fisheries in Area 16 (Sabine Channel), troll fisheries along the West Coast of Vancouver Island (Area 23-27) and occasionally Area 2W purse seine fisheries.

DFO, in the client submission, stated that with few exceptions, fisheries that harvest Fraser River sockeye operate on a highly mixed stock aggregate. Because the fisheries form a gauntlet on migrating sockeye, there are few opportunities to isolate component stocks spatially (e.g., terminal fisheries for the component stocks). Therefore, the primary management determinant is the identification and isolation of stock components based on their run timing and abundance in-season as detailed by Woodey (1987).

Stock unit definitions are arrayed by purpose in the following table.

Purpose	Stock Resolution			
	Run Timing (4 stock units)	In-season (7-10 stock units)	Production (18 stock units)	Escapement (37-41 stock units)
Pre-season Mgmt.	X	X	X	
In-season Mgmt.	X	X		
Assessment	X		X	
Conservation	X	X	X	X

Full details of the stock definitions and escapement can be found in the DFO client submission at the MSC website (http://www.msc.org/track-a-fishery/in-assessment/pacific/british-columbia-sockeye-salmon/assessment-downloads).

2.4 Target versus Non-Target Stocks

The original set of MSC's performance indicators and scoring guidelines identify different requirements for target stocks, target species, non-target stocks and non-target species. Under Principle 1, assessment team evaluations were to be focused on target stocks / target species unless the criteria specifically referred to non-target stocks or species. Under Principle 2, the opposite was true (i.e. assessment team evaluations were to be focused on non-target stocks or non-target species unless the criteria specifically referred to target stocks or species). While the new default assessment tree established in the MSC Fisheries Assessment Methodology (FAM) for certification bodies uses some different terms (e.g. retained species and bycatch species), there is still the requirement to address target stocks and species under P1 and the other stocks and species under P2. The assessment tree used in this fishery (developed in 2003, prior to the FAM) is quite clear in requiring target stocks to be assessed as above reference levels in Principle 1 (PI 1.2.2). In contrast, while non-target stocks are not required to be above reference levels at present, they must be considered in Principle 1 in relation to the management of target stocks; and also in Principle 2 in relation to the plans in place for the recovery of any non-target stocks that are depleted (PI 2.3.1).

For BC sockeye fisheries, it is clear that the target species is sockeye salmon and all other species caught are non-target species. Depending on the capture gear and status of the non-target species, some non-target species may be retained and the others must be released. The next step of identifying the target and non-target sockeye stocks for each BC sockeye fishery is more complicated. Some contend that all the sockeye stocks harvested in a sockeye fishery are target stocks. Others argue that the target stocks are only those stocks that contribute to the abundance necessary to conduct the fishery. In support of this rationale, in BC it is obvious some sockeye stocks are clearly non-target stocks because measures are taken to minimize the harvest of these stocks and these stocks could not, on their own, support a commercial fishery. For the MSC certification of the Alaska salmon fisheries, the Assessment Team accepted the management agencies position that all sockeye stocks harvested in Alaska sockeye fisheries were target stocks. After reviewing the recent management practices for the BC sockeye fisheries we have concluded that three of the fisheries under review include both target and non-target sockeye stocks.

The Skeena and Barkley Sound fisheries provide examples of the distinction between target and non-target sockeye stocks. Commercial fisheries targeting Skeena sockeye have not been conducted in years when the returns for the Babine stocks are not sufficient to provide a harvestable surplus. Similarly,

commercial fisheries targeting Barkley Sound sockeye have not been conducted in years when the returns for the Somass stocks are not sufficient to provide a harvestable surplus. Consequently, we classified all non-Babine sockeye stocks within the Skeena watershed (12% of the total Skeena sockeye escapement) as non-target stocks for the Skeena sockeye fishery. The Henderson Lake sockeye stock (usually less than 10% of the sockeye escapement to Barkley Sound streams) was classified as a non-target sockeye stock for the Barkley Sound fishery. In addition to the clear numerical dominance of the target stocks in the Skeena and Barkley Sound fisheries, the productivity (returns/spawner) of the target stocks for these fisheries tend to be substantially higher than the productivity for the non-target stocks.

For the Fraser sockeye fishery, the combination of 20 stock units, four run-timing groups and cyclic dominance for some stocks makes the definition of target and non-target stocks more complex than other salmon fisheries. For many Fraser sockeye stocks over 90% of the adult returns are age 4, so cycle years for sockeye refer to returns every 4 years (e.g. the 1994 cycle year refers to returns in 1998, 2002, 2006, 2010 ...). DFO's submission for the Fraser sockeye fishery (DFO Fraser 2004a, p. 3) included a list of the management stock groups for each cycle year (Table 2.2).

Table 2.2: Fraser sockeye stock groups for each cycle year (from DFO Fraser 2004a).

1997 Cycle Year (7 stock units)	1998 Cycle Year (9 stock units)	1999 Cycle Year (10 stock units)	2000 Cycle Year (8 stock units)
Early Stuart	Early Stuart	Early Stuart	Early Stuart
Early Miscellaneous	Fennell/Bowron/Raft	Fennell/Bowron/Raft	Bowron/Fennell/Upper Adams
Nadina/Gates/Pitt	Nadina/Gates/Pitt	Nadina/Gates/Pitt	Nadina/Raft/Gates/Pitt
Quesnel/Chilko	Scotch/Seymour	Scotch/Seymour	Chilko
Late Stuart/Stellako	Quesnel/Chilko	Chilko	Quesnel/Late Stuart/Stellako
Birkenhead	Late Stuart/Stellako	Quesnel	Birkenhead
Weaver/Portage/Misc	Birkenhead	Late Stuart/Stellako	Weaver/Cultus
	Adams/Lower Shuswap	Birkenhead	Portage/Adams/Misc
	Weaver/Portage/Misc	Adams/Lower Shuswap	
		Weaver/Portage	

Our interpretation of this table with regard to target and non-target stocks is that all stocks specifically identified for a cycle year are target stocks for that cycle year; and those stocks not identified are considered to be non-target stocks for that cycle year. Therefore, the target and non-target stocks for the Fraser sockeye fishery are:

	1997 Cycle year	1998 Cycle year	1999 Cycle year	2000 Cycle year
Target Stocks				
Early Stuart				
	Early Stuart	Early Stuart	Early Stuart	Early Stuart
Early Summer				
	Nadina/Gates/Pitt	Nadina/Gates/Pitt	Nadina/Gates/Pitt	Nadina/Gates/Pitt
		Fennell/Bowron/Raft	Fennell/Bowron/Raft	Fennell/Bowron/Raft
		Scotch/Seymour	Scotch/Seymour	Upper Adams
Summer				
	Chilko/Quesnel	Chilko/Quesnel	Chilko/Quesnel	Chilko/Quesnel
	Late Stuart/Stellako	Late Stuart/Stellako	Late Stuart/Stellako	Late Stuart/Stellako
Late				
	Birkenhead	Birkenhead	Birkenhead	Birkenhead
	Weaver/Portage	Weaver/Portage	Weaver/Portage	Weaver/Portage
		Adams/Lower Shuswap	Adams/Lower Shuswap	Adams
				Cultus
Non-Target Stocks				
Early Stuart				
	None	None	None	None
Early Summer				
	Fennell/Bowron/Raft	Upper Adams	Upper Adams	Scotch/Seymour
	Scotch/Seymour			
	Upper Adams			
Summer				
	None	None	None	None
Late				
	Cultus	Cultus	Cultus	Lower Shuswap
	Lower Shuswap			
	Adams			

Most of the Fraser sockeye stocks are target stocks or have recently been target stocks in at least one of their four cyclic lines. Within the Early Stuart and Summer run-timing groups there are no non-target sockeye stocks. Within the Early Summer run-timing group, there are six non-target stocks in the 1997 cycle year and one non-target stock in each of the other cycle years. Within the late-summer run-timing group, Lower Shuswap is a non-target stock in the 1997 and 2000 cycle year and Adams is a non-target in the 1997 cycle year.

Historically, Cultus was one of the target stocks in the late-run group for several cycle lines. For the past 10 years, fisheries for late-run stocks have been substantially reduced and other measures have been implemented to recover the Cultus sockeye stock. For this assessment, we have classified Cultus as a depleted target stock. It could be argued that Cultus should be classified as a non-target stock because there have not been any targeted fisheries for this stock for more than 10 years. While this stock could be classified in either category, the classification category for this would not change this component of our evaluation of Fraser sockeye. The certification condition related to the recovery of the Cultus stock is currently located under P1 but the same condition would be appropriate under P2 if this stock was classified as a non-target stock.

Fraser sockeye fisheries also harvest sockeye from CUs outside the Fraser River. All non-Fraser sockeye CUs are non-target stocks when harvested in fisheries targeting Fraser sockeye. One of these non-Fraser sockeye CUs (Sakinaw) is an example of a depleted non-target sockeye stock and the certification concerns related to the recovery of the Sakinaw sockeye are included under P2.

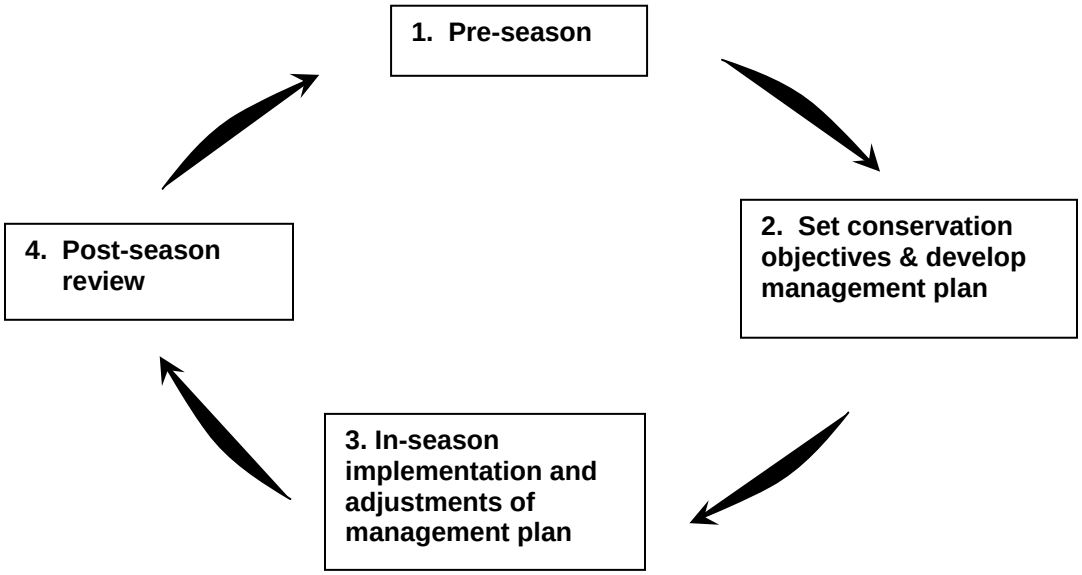
For the Nass sockeye fishery, all sockeye stocks were classified as target stocks for our assessment. The Nass sockeye fishery has a dominant sockeye stock (Meziadin Lake), however, other Nass sockeye stocks contribute significantly to the fishery (on average 30%) and historical data indicate that the productivity tends to be more similar between the various sockeye rearing lakes within the Nass watershed than between the Skeena watershed lakes (Shortreed et al. 1999).

3.0 Fisheries Management System

The following information is from a DFO information release on Salmon Management posted on the DFO website prior to 2009.

Fisheries and Oceans Canada has a responsibility to manage Canada's salmon resources to rigorous conservation standards. Because of the variable and sometimes unpredictable nature of salmon and the environment, management decisions give priority to the conservation and protection of all fish stocks and their habitat.

Salmon management is an extremely complex process that includes three harvesting sectors - Aboriginal, commercial and recreational - and integrated management plans that are guided by law, regulation, court decisions, treaties, and a number of policies. Salmon management follows an annual cycle as with four key planning phases:



1. Pre-season

The pre-season outlook provides managers with a tool to aid in the planning process for the coming fisheries. DFO's Science Branch collects and analyzes a range of data to develop a forecast for the coming season – a hypothesis of likely returns of salmon to specific fishing areas.

- Pre-season planning is a collaborative effort between the Integrated Harvest Planning Committee, sector advisory committees and DFO branches of Fisheries and Aquaculture Management, Conservation and Protection, and Science.
- The PSARC (Pacific Scientific Advice Review Committee) advises the Resource Management Executive Committee (RMEC) of Fisheries and Oceans Canada and other bodies on stock and habitat status, and the potential biological consequences of fisheries management actions and natural events.
- With this information DFO develops a pre-season outlook – an estimate of the likely number of salmon that will return to their spawning grounds in a given year. This is done for most species and river systems.

2. Development of conservation objectives and management plan

The development of Integrated Fisheries Management Plans (IFMPs) ensures that conservation concerns are balanced with the harvesting interests of recreational, commercial and First Nations fishers. As part of the fishing plan development, obligations under the Pacific Salmon Treaty are considered and incorporated into the final plan.

- IFMPs are developed based on information provided by DFO research scientists, resource managers, Conservation and Protection staff, and Salmon Enhancement Project managers. The plans are then brought to First Nations and stakeholders, including recreational and commercial fishers and environmental organizations for extensive consultations, both separately as individual groups, and collectively through the Integrated Harvest Planning Committee.
- Fishing plans for Fraser River sockeye take into account the potential number of migrating sockeye salmon that may die in the river due to environmental conditions or migration timing factors. These plans are designed to be adjusted during the fishing season to accommodate for fluctuations in temperatures and water flow levels. The plans outline conservation objectives and set the criteria or 'decision rules' that determine how the plan will be adjusted to reflect changing conditions (e.g. abundance, timing, and environmental conditions).
- After conservation needs and First Nations' food, social and ceremonial requirements are met, DFO consults with other fishing groups and a share is estimated for each fishery. These consultations are guided by past practice and departmental policy. Harvesting this share is contingent on actual returns of salmon to the Fraser River, which is assessed in-season, and takes place under strict regulations with a series of fishery openings.

3. In-season management

In the case of Fraser River sockeye and pink salmon, the fishery is managed collaboratively by the Fraser River Panel (FRP) (a group comprised of government, First Nations and recreational and commercial interests from both the U.S. and Canada). The Pacific Salmon Commission (PSC), a body independent of government, provides advice to the Fraser River Panel and to DFO regarding run size, stock identification, timing of returns and migration conditions.

At the peak of the fishing season, DFO, the PSC and the FRP meet twice a week to analyze data from test fisheries and assess environmental conditions to determine when and where fishery openings may take place. All three of these groups are involved in the analysis and decision-making process. As in-river environmental conditions fluctuate, actual return numbers come in, and allocations are fished, this group continually analyzes data and adjusts fishing plans to maximize fishing opportunities while ensuring sufficient numbers of salmon reach their respective spawning grounds.

4. Post-season review

At the end of each fishing season, DFO estimates the number of salmon that have migrated up the Fraser River to their spawning grounds. These numbers are collected and analyzed and the information is then compiled into a report called a post-season review. This information is used for a range of purposes including identification of any catch imbalance between Canada and the US to be addressed in future years, determining the impact of water temperatures and levels on salmon survival, and whether escapement (the number of fish reaching the spawning grounds) goals were met. [2]

4.0 Processing, Transshipment

For the BC salmon fisheries, all landings are recorded and reported to the government. Processing occurs predominately at shore-side plants where landings are monitored by fishery enforcement officers and recorded by each licensed processing facility. Landings at remote locations or at tenders are transported to processing facilities. Each processor controls the transport of its product from landing locations to processing facilities. Transshipments at sea are the exception, not the rule.

This report acknowledges that sufficient monitoring takes place to identify the fishery of origin for all landed salmon. This is sufficient to allow a Chain of Custody to be established from the point of landing forward for all products derived from the fishery. MSC chain of custody certifications were not undertaken in this project, and therefore, are to be undertaken on a separate and individual basis for those entities that may wish to identify and/or label products derived from the MSC certified fishery.

5.0 Other Fisheries in the Area

There are numerous fisheries that operate wholly or partially within the provincial and federal waters off of British Columbia, Canada. For the purposes of this report, the number and types of fisheries are too numerous to list. In general there are fisheries on a number of finfish and invertebrate species. A full list of fisheries in BC waters can be found at the web sites for both the provincial and federal governments:

i. http://www.pac.dfo-mpo.gc.ca/ops/fm/Commercial/index_e.htm;
ii. http://www.agf.gov.bc.ca/fisheries/commercial/commercial_main.htm).

6.0 Summary of Previous Certification Evaluations

No previous assessments under the MSC program have been conducted on BC salmon fisheries. However, since this full certification process started n 2003, a number of other fisheries in British Columbia have started MSC full certification assessments including BC pink and chum salmon fisheries, BC spiny dogfish fishery and BC albacore tuna fishery. The BC halibut and BC Pacific hake fishery

[2] This description of DFO management of salmon was quoted from the DFO web site at http://www-comm.pac.dfo-mpo.gc.ca/pages/release/bckgrnd/2006/bg012_e.htm.

were certified in 2009. Other sectors of the BC Seafood Industry are considering or undergoing MSC assessments.

7.0 The Assessment Process

Pre-assessment

Scientific Certification Systems, Inc. conducted a pre-assessment of the BC salmon fisheries, as required by the MSC program, prior to the initiation of certification in 2001. After review of the pre-assessment, the applicant (BCSMC) for certification authorized the formal, full assessment of the salmon fisheries in BC. The project initially was constructed to examine all 5 species of salmon, but was then revised to focus solely on sockeye fisheries in 4 locations.

Full Certification Assessment

The following section provides a description of the tasks which were undertaken by Scientific Certification Services, in the beginning of the full certification assessment contract and those tasks completed by TAVEL Certification since May 2008.

All aspects of the assessment process from the beginning of the assessment process to the completion of the initial pre-peer reviewed draft report for client and stakeholder review were carried out under the auspices of Scientific Certification Systems, Inc., an accredited MSC certification body, and in direct accordance with MSC requirements (MSC Fisheries Certification Methodology Version 5), except where the MSC approved a variance in its methodological requirements.

At the initiation of this project, SCS was contacted by representatives in the conservation sector in BC interested in discussing the MSC assessment process for salmon. The conservation sector representatives informed SCS that a number of conservation groups were interested in participating in the process, and that these groups as a collective had discussed their interests and the processes they believed would be necessary to make the MSC assessment of salmon in BC a success in the opinion of the conservation sector.

In general, conservation stakeholders explained to SCS that the project would only be successful and supported by the conservation sector if the processes followed were completely open and transparent, allowing stakeholders to both question and comment on each step of the process – even where such consultation was not specifically required under the MSC program. In specific, the conservation groups wanted to be able to receive any information used in the assessment, and to have access to the information in a timely manner so they could have sufficient time to comment. Receiving information in a timely manner was defined in this context as stakeholders receiving information at the same time as other participants in the process. Thus, when the industry and government submitted information to SCS, or when SCS conveyed information to the client or the government, the stakeholders requested that they receive the very same information at the very same time. The concerns were simple – stakeholders wanted to ensure that the assessment was based on validated information and that the assessment team was not biased by information that could not be reviewed and commented upon by all participants.

Although the MSC certification methodology does not require stakeholder involvement at every step of the assessment process, the client agreed to meet the requests of the conservation community to ensure a fully open, transparent, and successful process.

To finalize the agreed consultative processes, SCS exchanged letters with the Sierra Club as the representative from the conservation community (see Vol 2: Appendix 1). From this exchange, a final set of protocols were agreed. Although following the agreed consultative process significantly increased the time required to complete certain steps in the certification methodology, it also provided SCS with important and significant insights into issue associated with both the MSC process and with salmon management in British Columbia.

As a result of the agreed protocols, SCS made efforts to include all stakeholders at all the critical junctures of the process.

Team Selection

SCS contacted the client and stakeholders in the environmental community to solicit input on assessment team members. Comments were received from all parties and SCS retained the services of three assessment team members based on negotiations with both industry and conservation groups.

Setting Performance Indicators and Scoring Guideposts

All stakeholders in the BC salmon assessment process expressed concerns that the Performance Indicators and Scoring Guideposts that had been developed and used to assess the salmon fisheries in Alaska in 2000, were deficient. In general, most participants in the process in BC felt the set of Performance Indicators and Scoring Guideposts used in Alaska were far too general, and required greater specificity to ensure acceptable performance against the MSC standard. To achieve that objective, the SCS assessment team drafted a new set of performance indicators and scoring guideposts with greater specificity about the performance objectives being required to meet the MSC standard. In addition, SCS worked with stakeholders (industry and conservation groups) to identify 2 peer reviewers (Brian Riddell and Randall Peterman) that independently commented on the acceptability of the indicators and guideposts drafted for use in the BC salmon assessment (see Vol 2: Appendix 2). The SCS assessment team reviewed the comments received and revised the draft accordingly.

SCS posted the peer reviewed Draft Performance Indicators and Scoring Guideposts (31 March 2003) as required by the MSC, but for a period longer than the required 30 days to allow enough time for all interested parties to comment. SCS received a few comments (see Vol 2: Appendix 3). The final Performance Indicators and Scoring Guideposts for use in the assessment were posted on 3 June 2003.

Obtaining and Reviewing Data on Fishery Performance

During a full assessment of a fishery, it is the responsibility of the applicant or client to provide the assessment team with the required information to prove that the fishery or fisheries being assessed meet the MSC standard. Upon request, and with some consultation from the SCS assessment team, the client working in conjunction with the Department of Fisheries and Oceans provided the

following written documents as proof that the sockeye fisheries in BC comply with the MSC standards:

- Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Skeena River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts Pacific Wild Salmon Fishery, Skeena Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 3– Fishery Management System, Pacific Wild Salmon Fishery, Fraser River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 3– Fishery Management System, Pacific Wild Salmon Fishery, Skeena River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004 Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Fraser River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Fraser River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Nass River Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Nass Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 3– Fishery Management System, Pacific Wild Salmon Fishery, Nass Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Barkley Sound Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Barkley Sound Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004
- Response to Marine Stewardship Council Indicators for Principle 3– Fishery Management System, Pacific Wild Salmon Fishery, Barkley Sound Sockeye, Fisheries and Oceans Canada Pacific Region, May 2004.

These documents were also released simultaneously to all interested stakeholders either by direct email or by posting to the MSC web site.

Upon release of the client/DFO documents, SCS also posted a notice to all stakeholders that the assessment team would take input from any interested parties on the sustainability of the sockeye salmon fisheries. The Marine Conservation Caucus, the body organized to represent the conservation groups in BC, pulled together their own review of the fisheries under examination, as well as comments on the documents submitted by the client to SCS. The documents submitted to the SCS assessment, and released publicly are:

- Review of MSC Certification Evaluation of Skeena Sockeye Stocks, Prepared by: Robert Bocking, LGL Limited, environmental research associates, Prepared for: Sierra Club of Canada, BC Chapter, Date: April 21, 2005.
- Independent Review of Nass River Sockeye Fishery Performance Measures, Prepared for Sierra Club of Canada, BC Chapter, Victoria, BC, Prepared by David Levy, Ph.D., Levy Research Services Ltd., North Vancouver, BC, April 2005
- Marine Stewardship Council Evaluation of the Barkley Sound sockeye fishery., Assessment of the Department of Fisheries and Ocean's response to the Marine Stewardship Council's principles of sustainable fishing., Prepared by R. John Nelson for the Sierra Club of British Columbia, April 30, 2005
- Independent Assessment of British Columbia Salmon Fisheries for Fraser Sockeye, Barkley Sound Sockeye and Skeena River Sockeye., Prepared by: Ken Wilson, Prepared For: The Sierra Club of Canada, BC Chapter,

In addition to the documents submitted by the conservation groups, SCS also received email correspondence from Fred Hawkshaw (see Vol 2: Appendix 3, and also included within the Stakeholder summary comments in Vol 2: Appendix4b). Mr. Hawkshaw provided some specific comments about individual indicators of performance, as well as some general comments about fisheries management in BC and the MSC process.

Meetings with industry, managers, and stakeholders

SCS conducted meetings with fishery managers, and fishery scientists on several occasions during the review and evaluation process. The most intensive series of meetings between the SCS assessment team, industry, and DFO occurred in May 2005. There was a specific request from the Marine Conservation Caucus (MCC) to attend these meetings; however, it was agreed in the end that these meetings would be disrupted considerably if all parties were in the room at one time trying to debate the issues. To their credit, MCC representatives agreed to be briefed directly after the meeting by the SCS assessment team, at which time the stakeholders were given the opportunity to provide direct comment to the assessment team as well. This ensured a free and thorough exchange of information and documents, but limited public debates that could have reduced the efficiency of the meetings. . In June 2005, representatives from the BC Aboriginal Fisheries Commission (BCAFC), Cowichan Tribes and Secwepemc Fisheries Commission requested to meet with members of the SCS evaluation team. In the interest of efficiency one member of the evaluation team (Karl English) met with each of these groups on the following dates: June 9, 2005 for the BCAFC, June 30, 2005 for Cowichan Tribes, and July 29, 2005 for the Secwepemc Fisheries Commission. Subsequent to these meeting the Secwepemc Fisheries Commission submitted a letter, dated August 3, 2005, to SCS describing their concerns related to MSC Certification of BC Salmon Fisheries.

Scoring fishery

The assessment team scored the fishery using the required MSC methodology and without input from the client group or stakeholders in 2005. All team members participated in and agreed upon the outcome of the review.

Drafting report

The assessment team collaborated with the SCS lead assessor, Chet Chaffee, drafted the report in accordance with MSC required process. As agreed with all participants and stakeholders, the draft report was provided to the client and all other stakeholders prior to peer review. This was variation from the MSC fisheries certification methodology, which required the Certification Body (CB) to release the report only to the client for comment before peer review.

Selection of peer reviewers

SCS, as required, released an announcement of potential peer reviewers soliciting input from stakeholders on the merits of selected reviewers in late 2007.

*Transition of Certification Assessmen***t**

In May, 2008, in order to expedite the BC Sockeye Salmon MSC assessment, the BC Salmon Marketing Council requested TAVEL Certification complete the certification process initiated in 2001 by Scientific Certification Services. This transition was completed in full consultation with Marine Stewardship Council on matters pertaining to Fisheries Certification Methodology and with Accreditation Services International on matters pertaining to Certification Body accreditation requirements to ensure the integrity of the certification process. TAVEL posted and circulated a public update to notify stakeholders of the intent and transition process.

TAVEL Certification contracted the same team members to complete the assessment and will contract the peer reviewers identified by Scientific Certification Services (SCS) to review the draft report prior to public draft report review period.

Due to the lapse of time from the initial scoring of fishery performance in 2005 and changes in the way certain aspects of the Skeena and Nass fisheries were managed in 2006 and 2007, the team conducted a rescoring of relevant performance indicators to bring the assessment in line with current understanding and practices. The rescoring considered existing documentation and the independent science review panel report of Skeena sockeye management.

Corrective Action Plan Development

Once the rescoring was completed in June 2008, a summary of the revised scores and new conditions were provided to the client. DFO, with the aid of the client, developed and submitted a corrective action plan in late 2008 to address the 36 conditions imposed on the four fisheries.

Peer Review

The draft report was provided to the peer reviewers, Dr. Greg Ruggerone and Mr. Ray Beamsderfer, together with the rescored performance indicators, extensive input received during the three month public comment period in late 2007.

Public Draft Report

Upon completion of the peer review, the team completed necessary redrafting and a certification recommendation was presented. The draft report was released into the public domain for the mandatory 30 day comment period from July 17 to August 24, 2009.

Final Certification Report

Upon conclusion of the public draft report comment period, the team began the process of evaluating and responding to the comments provided by the client and stakeholders. This report culminates the responses to those comments and provides a certification determination for the four units of certification.

Final Certification Steps

The remaining steps of the certification process will follow the MSC fisheries certification methodology, version 6. These remaining steps includethe posting of the Final Certification Report and the 15 day objection period; and finally a certification determination and public certification report.

7.1 Evaluation Team

SCS Project Team (2002 – May 2008)
Project Manager: Dr. Chet Chaffee, SCS (USA)
Team Members:
MSC Principle 1: Mr. Karl English (LGL, Sidney, BC, Canada))
MSC Principle 2: Dr. Dana Schmidt (Golder & Associates, Canada))
MSC Principle 3: Dr. Jim Joseph (independent, San Diego, California)

TAVEL Certification Project Team (May 2008 to present)
Lead Auditor: Mr. Steve Devitt, TAVEL Certification (Canada)
Team Members:
MSC Principle 1: Mr. Karl English (LGL, Sidney, BC, Canada))
MSC Principle 2: Dr. Dana Schmidt (Golder & Associates, Canada))
MSC Principle 3: Dr. Jim Joseph (independent, San Diego, California)

7.2 The MSC Standard and Certification Methodology

The Marine Stewardship Council standards for sustainable fisheries management were developed through an 18-month process (May, Leadbitter, Sutton, and Weber, 2003). An original draft was developed by an expert working group, which met in Bagshot, UK in 1996. The draft standard was then presented through a series of 8 workshops that lasted 3 days each. Comments from each of the workshops, and from written submissions to the MSC were compiled and made available to a second expert working group at Airlie House in Virginia, USA.

The final MSC standard (see below) was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program.

The scope of the MSC Principles and Criteria relates to marine fisheries activities up to but not beyond the point at which the fish are landed. The MSC Principles and Criteria apply at this stage only to marine fishes, fresh water fishes, and invertebrates (including, but not limited to shellfish, crustaceans and cephalopods). Aquaculture and the harvest of other species are not currently included. Issues

involving allocation of quotas and access to marine resources are considered to be beyond the scope of these Principles and Criteria.

Sustainable fishing Principles and Criteria have been identified by the MSC to recognize the diversity of fisheries across the world. The MSC derived an evaluation methodology to maintain the intent and rigor of its Principles and Criteria but allow enough flexibility in the application of the standard to permit scientists to make sound judgments about the sustainability of any given fishery regardless of differences in species composition, geographic location, oceanographic conditions, or fishing methods. This method uses a set of performance measures that can be prioritized to reflect regional, biological, or ecological characteristics in the fishery.

Section 7.4 contains the proposed set of sub-criteria, indicators, and scoring guideposts for use in evaluating the BC sockeye fisheries.

Under the MSC assessment protocols, all criteria, sub-criteria, and indicators are weighted using Analytical Hierarchy Process (AHP), and a method known as pair wise comparison. The weights assigned indicate the relative importance of each performance indicator, sub criteria, and criteria in achieving the overall scores for the fishery.

The scoring of the fishery occurs once the assessment team has completed its review of all the information collected on the fishery. Each performance indicator is assigned a score between 0 and 100 through a consensus process where the entire assessment team agrees to the assigned score.

Scoring guideposts provide an indication of what level of performance is required to achieve specific scores. Benchmarks or guideposts are provided for achieving scores of 60, 80, or 100 to help guide the assessment team scoring discussions. Scoring guideposts labeled as '100' indicate the best performance achievable for an indicator. This is the highest mark any fishery could be expected to receive. The '80' scoring guidepost references the level of acceptable performance for an indicator; whereas, the '60' scoring guidepost indicates the minimal threshold allowable in an MSC evaluation. Therefore, performance indicator scores between 80 and 100 indicate performance in line with the anticipated performance under the MSC standard. A score between 60 and 80 for an indicator, points out that the evaluating scientists identified a minor deficiency that needs corrective action. An indicator score below 60 indicates a major deficiency in the fishery that needs corrective action. The scoring guideposts used to rate an indicator are considered hierarchical in that to achieve a particular score, the scoring guideposts of all lower scores must first be met.

An overall score is calculated for each MSC Principle by combining the individual scores and weights of the performance indicators, sub-criteria, and criteria under the Principle. A fishery fails the assessment process if either the weighted average score for any of the three MSC Principles falls below 80 (<80), or if any individual performance indicator is assigned a score of less than 60 (<60). In either case, before certification can be awarded the applicant must show that the factors causing the problems have been corrected.

A fishery is considered to have passed the MSC evaluation process and is recommended for certification when it achieves a weighted average score of 80 or above (≥80) on each of the three MSC Principles individually, and the applicant agrees by contract to improve the score for the fishery on any individual performance indicator that scores between 60 and 79 (≥ 60 - <80). Improvement is defined as improving the score to the level of 80 for each individual performance indicator where a score between 60 -79 originally occurred. Improvements must be completed to the satisfaction of the certifying body

within a specified time period of no more than 5 years, which is the period of certification. Specific actions and timeframes for making improvements must be spelled out by the client in an Action Plan submitted to and approved by the certifying body.

7.3 MSC Principles and Criteria

7.3.1 MSC Principle 1

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.

MSC Criteria

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

7.3.1 MSC Principle 2

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.

MSC Criteria:
1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

7.3.3 MSC Principle 3

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.

MSC Criteria:

A. Management System:
1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:
2. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process;
3. be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings;
4. observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability;
5. incorporates an appropriate mechanism for the resolution of disputes arising within the system;
6. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
7. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
8. incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion;
9. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;
10. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
    a. setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
    b. identifying appropriate fishing methods that minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
    c. providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
    d. mechanisms in place to limit or close fisheries when designated catch limits are reached;

e. establishing no-take zones where appropriate;

11. contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. MSC Operational Criteria:
Fishing operations shall:

12. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimize mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
13. implement appropriate fishing methods designed to minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
14. not use destructive fishing practices such as fishing with poisons or explosives;
15. minimize operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
16. be conducted in compliance with the fishery management system and all legal and administrative requirements; and
17. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

7.4 Performance Indicators and Scoring Guideposts

This section contains the proposed set of sub-criteria, performance indicators, and scoring guideposts for use in evaluating BC sockeye fisheries.

To facilitate the correct interpretation of the evaluation components drafted, we have also provided definitions (see Definitions section below) for most of the important terms commonly associated with the management of salmon fisheries. These terms are used to define the fisheries being evaluated, the evaluation sub-criteria and indicators, and the scoring guideposts. These definitions are again the same as those used in the evaluation of California and Alaska salmon fisheries.

The key to understanding the criteria is to understand the differences between the MSC Principles. Principle 1 focuses on the target population, defined as target species or target stocks. Under this principle the fundamental building blocks for sound fisheries management are considered:

1. The definition of the target stocks;
2. The quality of monitoring and stock assessment programs;
3. The specific management goals for target stocks;
4. The procedures to facilitate the recovery of target stocks that are depleted; and
5. The fisheries are conducted in a manner that will not compromise the age, size and genetic structure of the target stocks.

Principle 2 focuses on the impact of the fishery on the ecosystem and non-target populations. Here we are assessing how the fishery management operations deal with:

1. The importance of maintaining a productive, functional and diverse ecosystem;
2. Provisions to minimize the fishery impacts on endangered, threatened, protected or icon species; and
3. Procedures for the recovery of depleted non-target stocks.

Principle 3 focuses on the management and operational framework that has been put in place to achieve the management goals. Some indicators under Principle 3 appear to overlap with indicators under Principles 1 and 2, however, the Principles 1 and 2 are concerned with the outcomes of a management system respecting the fact that the resources are maintained at the desired levels of abundance, while Principle 3 is concerned with evaluating whether all of the processes for reaching management objectives are in place. Components unique to Principle 3 include:

1. The evaluation of the consultation process;
2. The procedures used to control fisheries;
3. The extent of internal and external review of the management system;
4. The compliance with legal and administrative requirements; and
5. The implementation of responsible fishing practices.

The management of salmon fisheries has often been divided into five major components:

1. Resource inventory;
2. Pre-season planning;
3. In-season management (i.e. conducting the fisheries);
4. Post-season evaluations; and
5. Research and stock assessment.

Each of these components is covered by the proposed evaluation criteria. Criteria under Principles 1 and 2 address most of the issues associated with resource inventory and pre-season planning while Principle 3 criteria address in-season management and post-season evaluations. Issues associated with research and stock assessment are included under each of the three MSC Principles as they apply to target stocks, non-target stocks and the management of fisheries.

Definitions

Managers and biologist use a wide variety of terms to describe the groups of fish they manage for specific fisheries. For the purpose of this evaluation we will use the following terms and definitions:

Bycatch – the harvest of non-target species or non-target stocks.

Cycle year - for sockeye returns every 4 years (e.g. the 1994 cycle year refers to recruitment returns in 1998, 2002, 2006, 2010 from the 1994 spawning year class) for many Fraser sockeye stocks over 90% of the adult returns are age 4.

Enhanced stocks - stocks of salmon that have been directly augmented using artificial propagation techniques (e.g. hatcheries, in-stream incubators, spawning channels, hatchery out-planting)

Escapement – those mature salmon that are not harvested and thus may contribute to the spawning component of the stock.

Fisheries scientists outside the management system – this includes fisheries scientists that are not full-time employees of Alaska Department of Fish and Game but have demonstrated expertise related to the fisheries management or stock assessment issues in question. These could include professional scientists employed in the private sector, universities or other non-governmental organizations.

Harvest – those fish or other species that are caught and killed during a fishery or die as a direct result of fishing activity.

Indicator stock – a salmon stock for which detailed information is collected and used to manage a larger group of salmon stocks or stock management unit.

Limit Reference Point (LRP) - indicates the state of a fishery and/or a resource, which is not considered desirable. Fishery harvests should be stopped before reaching it. If a LRP is inadvertently reached, management action should severely curtail or stop fishery development, as appropriate, and corrective action should be taken. Stock rehabilitation programs should consider an LRP as a very minimum rebuilding target to be reached before the rebuilding measures are relaxed or the fishery is re-opened.

Majority – this could be a simple majority (e.g. >50% of the stocks in a stock management unit) or a numerical majority (e.g. >50% of the fish in a stock management unit or scientists in a region), where the management system has provided acceptable rational for the definition used in their submission for each indicator.

Natural salmon stock – a naturally-spawning stock that includes spawners produced by hatcheries. This terminology is used to distinguish it from a "wild" or native stock that has not been influenced by artificial propagation.

Non-target species – species that are not the focus of the fishery but are caught in a fishery that is attempting to harvest other species.

Non-target stock – a stock of salmon that is not the focus of the fishery but is caught in a fishery that is attempting to harvest other salmon stocks.

Precautionary approach - A set of measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resources, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong.

Productivity, related to ecological community or the ecosystem – the rate of biomass production per unit area per unit time.

Productivity, related to salmon – the number of salmon per spawner per unit of time (usually per year). A common measure of productivity for salmon is the number of recruits per spawner, where a fish is classified as a recruit if it survives to be harvested or escapes to a spawning area.

Reference points - A (management) reference point is an estimated value derived from an agreed scientific procedure and an agreed model to which corresponds a state of the resource and of the fishery and which can be used as a guide for fisheries management.

Risk - the possibility of suffering harm or loss; danger; a factor, thing, element, or course involving uncertain danger, a hazard. In decision theory "the degree of probability of loss. A statistical measure representing an average amount of opportunity loss." This terminology is used "when large amounts of information are available on which to base estimates of likelihood, so that accurate statistical probabilities can be formulated"

Risk analysis - Any analysis of unknown chance events for purposes of effecting or evaluating decisions in terms of possible penalties and benefits attending these events. A method for generating different probability distributions with accompanying cost and benefits that may attend different courses of action.

Stock – meaning a group of salmon defined by its species, spawning location or spawning region, and in some cases run timing.

Stock management unit – meaning the stock or group of salmon stocks that are treated as a single unit when setting management goals or making fisheries management decisions.

Target Reference Point (TRP) - corresponds to the state of a fishery and/or a resource, which is considered desirable. Management action, whether during a fishery development or stock rebuilding process, should aim at maintaining the fishery system at its level.

Target species – the species of salmon that a specific fishery is attempting to harvest.

Target stocks – specific salmon stock or stock management unit that a specific fishery is attempting to harvest.

Uncertainty - The condition of being uncertain. Doubt. Something uncertain. In statistics, the estimated amount or percentage by which an observed or calculated value may differ from the true value. The incompleteness of knowledge about the states or processes in nature.

Wild stocks – stocks of salmon that have not been augmented through artificial propagation techniques (e.g. hatcheries, in-stream incubators, spawning channels, hatchery out-planting).

(Adapted from FAO, 1995 The Precautionary Approach To Fisheries and its Implications for Fishery Research, Technology and Management: an updated review by S.M. Garcia, Fishery Resources Division, FAO Fisheries Department.)

Summary of Performance Indicators

Tables 7.1, 7.2, and 7.2 provide a summary of the performance indicators derived for this assessment. This set of performance indicators has subsequently been used in the assessment of both California and Alaska salmon fisheries, with some modifications for including more specificity about the management performance of enhanced salmon stocks.

Table 7.1. MSC Principle 1 - Summary of proposed evaluation criteria for BC commercial salmon fisheries

MSC PRINCIPLE 1 - Fishery Management for Target Populations	
Criterion 1.1 - Maintain high productivity of target population & associated ecological community	
Subcriterion 1.1.1 - Stock units	
Indicator 1.1.1.1	Stock units defined
Indicator 1.1.1.2	Scientific agreement on units
Indicator 1.1.1.3	Geographic distribution known
Indicator 1.1.1.4	Indicator Stocks
Indicator 1.1.1.5	Enhanced Stocks
Subcriterion 1.1.2 - Monitoring and assessment	
Indicator 1.1.2.1	Reliable estimates of removals
Indicator 1.1.2.2	Reliable estimates of escapement
Indicator 1.1.2.3	Information on fish age and size
Indicator 1.1.2.4	Productivity estimates
Subcriterion 1.1.3 - Management goals	
Indicator 1.1.3.1	Limit reference points
Indicator 1.1.3.2	Target reference points
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)	
Indicator 1.2.1	Well-defined and effective strategy
Indicator 1.2.2	Stocks are not depleted and harvest rates are sustainable
Criterion 1.3 - Fishing does not impair reproductive capacity	
Indicator 1.3.1	Age, sex and genetic structure are monitored

Table 7.2 MSC Principle 2 - Summary of proposed evaluation criteria for BC commercial salmon fisheries.

MSC PRINCIPLE 2 - Ecosystem and Non-Target Populations	
Criterion 2.1 - Maintain natural functional relationships among species	
Indicator 2.1.1	Impacts on non-target species can be identified
Indicator 2.1.2	Provisions to reduce ecosystem impacts
Indicator 2.1.3	Sufficient research to manage ecosystem impacts
Indicator 2.1.4	Monitoring and research related to escapement goals
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species	
Indicator 2.2.1	Information on biological diversity acquired and used by managers
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

Table 7.3 MSC Principle 3 - Summary of proposed evaluation criteria for BC commercial salmon fisheries.

Z	
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 of target species
Indicator 3.1.3	Identify the impact of fishing on the ecosystem
Indicator 3.1.4	Uses best scientific 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 provided 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, ecosystem and socioeconomic factors
Indicator 3.2.2	Research is timely, available and periodic review of research plan
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
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

Final Sub-criteria, Performance Indicators, and scoring guideposts for use in evaluating BC sockeye fisheries

MSC Principle 1

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 stocks 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.

MSC Criterion 1.1

The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.

Our interpretation of MSC Criterion 1: The performance indicators listed under Criteria 1 focused on the adequacy of the information used to manage the fisheries and stocks. For our assessment, we have organized the performance indicators into the three sub-criteria: 1) the definition of the stock units for each fishery; 2 the information available on the harvests, escapement, biological characteristic, and productivity; and 3) the management goals for each stock unit. As in the evaluations of other fisheries, the effect of the fishery on the associated ecological community will be primarily dealt with under Principle 2. However, the 100 SG for indicators related to management goals under Principle 1 cannot be achieved unless information is collected on the associated ecological community and used in setting management goals.

Subcriterion 1.1.1 Scientifically defensible stock units have been defined and the geographic distribution of these stocks are known.

The intention of this sub-criterion is to evaluate whether the definition of the stock units are clear and appropriate for each species harvested in the fishery**.**

Indicator 1.1.1.1: The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

100 Scoring Guidepost

- There is an unambiguous description of each stock unit, including: its geographic location, run timing, details on all the component stocks, and rational for its definition.
- The rational for each stock unit is clear with regard to conservation, fisheries management and stock assessment requirements.

80 Scoring Guidepost

- The stock units are well defined and include details on the major component stocks.
- The rational for each stock unit for the target species is clear with regard to conservation, fisheries management and stock assessment requirements.

60 Scoring Guidepost

- The majority of stock units are defined.
- The rational for the majority of stock units for the target species is clear with regard to conservation, fisheries management and stock assessment requirements.

Indicator 1.1.1.2: There is general scientific agreement that the stock units are appropriate.

100 Scoring Guidepost

- The stock units for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the stock units are appropriate.
- There is general scientific agreement regarding the stock units for non-target species

80 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the stock units are appropriate for target species.
- There is no significant scientific disagreement regarding the stock units used by the management agency to formulate management decision for the fishery.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the majority of stock units are appropriate for target species.

Indicator 1.1.1.3: The geographic range for harvest of each stock unit in the fishery is known.

100 Scoring Guidepost

- The geographic range for harvests of each stock unit in the fishery is estimated and documented each year.
- The information on the geographic range of harvests is monitored during the fishing season and used when making in-season management decisions.

80 Scoring Guidepost

- The geographic range for harvests of target stocks is defined.
- The information on the geographic range of the harvests of target stocks is monitored during the fishing season and is sufficient to prevent the over harvesting of these stocks.
- The information available on the geographic range for harvest of non-target stocks is sufficient to prevent the over harvesting of these stocks.

60 Scoring Guidepost

- 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.

Indicator 1.1.1.4: Where indicator stocks are used as the primary source of information for making management decisions on a larger group of stocks in a region, the status of the indicator stocks reflects the status of other stocks within the management unit.

100 Scoring Guidepost

- The status of the indicator stocks is well correlated with the stocks that are most at risk from a conservation point of view, not just correlated with the most productive stocks in the region.
- The indicator stocks used have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientists outside the management agency that the indicator stocks are appropriate.
- The relationships between indicator stocks and stocks of interest are assessed every three to five years.

80 Scoring Guidepost

- There is general agreement among regional fisheries scientists within the management agency that the status of indicator stocks reflects the status of other stocks within the management unit.
- There is no significant scientific disagreement regarding the indicator stocks used by the management agency to formulate management decisions for the fishery.

60 Scoring Guidepost

- There is no significant scientific disagreement regarding the indicator stocks used by the management agency to formulate management decisions for the fishery.
- There is a scientific basis for the indicator stocks used in the management of the fishery.

Indicator 1.1.1.5: Where stock units are composed of significant numbers of fish from enhancement activities, the management system provides for identification of the enhanced fish and their harvest without adversely impacting the diversity, ecological function or viability of unenhanced stocks.

100 Scoring Guidepost

- Fisheries targeting enhanced stocks are geographically removed from unenhanced stocks and separate terminal harvest areas are established for these fisheries.
- Times and areas have been identified where the majority of enhanced fish migrate through the general fishery.
- There is real time mark recovery program during the prosecution of the fishery that allows determination of harvest rates of the enhanced component of the run and this data is used in regulation of the fishery.

80 Scoring Guidepost

- In fisheries where both enhanced and un-enhanced stocks are harvested at the same time, the harvest guidelines are based on the goals and objectives established for the un-enhanced stocks.
- There are adequate data and analyses to determine that the presence of enhanced fish in the management units do not adversely impact the unenhanced fish stocks.

60 Scoring Guidepost

- 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.
- 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.

Subcriterion 1.1.2 The monitoring and assessment of fisheries and stocks is adequate for fisheries managers to maintain the high productivity of the target stocks and associated ecological community relative to its potential productivity.

The foundation for the management of most salmon fisheries is information on fishery harvest and escapements. Long-term (>10 yrs) monitoring of specific stocks is generally required to compute estimates of productivity. For some target species, additional information on fish size and age is required. The relative importance of each type of information will vary across fisheries and the species harvested.

Indicator 1.1.2.1: Estimates exist of the removals for each stock unit.

100 Scoring Guidepost

- Catch estimates are available for all fisheries in Canadian waters that harvest the target and non-target stocks harvested in the fishery being evaluated.
- Mortality rates are available for the fish released or discarded during the fishery.

- Catch estimates are available for fisheries outside Canadian waters that harvest the stocks that are the target of the fishery being evaluated.

80 Scoring Guidepost

- Catch estimates are available for all target stocks harvested in the fishery.
- Catch estimates are available for non-target stocks where the catch of the non-target stock may represent a significant component of the harvest of that stock.
- Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 5 years.

60 Scoring Guidepost

- Catch estimates for the majority of target stocks are available.
- Catch estimates are available for non-target stocks where the catch of the non-target stocks may represent a significant component of that stock.
- Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 10 years.

Indicator 1.1.2.2: Estimates exist of the spawning escapement for each stock unit.

100 Scoring Guidepost

- Estimates are available for the annual escapement for each stock unit harvested in the fishery.
- In-season escapement data are collected for all stock units and used to regulate the fishery.

80 Scoring Guidepost

- Estimates are available for the annual escapement of each target stock harvested in the fishery.
- Fishery independent indicators of abundance are available for the non-target species harvested in the fishery.
- In-season escapement data are collected for the target stocks and used to regulate the fishery.

60 Scoring Guidepost

- Escapement estimates for target stocks are available, where escapement estimates are necessary to protect the target stock from overexploitation.
- Fishery independent indicators of abundance are available for non-target stocks where the fishery harvests may represent a significant component of the harvest of that stock.

Indicator 1.1.2.3: The age and size of catch and escapement have been considered, especially for the target stocks.

100 Scoring Guidepost

- Annual monitoring programs collect data on the age and size of the catch and escapement for target and non-target stocks where there is a clear scientific basis for collecting these data.

80 Scoring Guidepost

- Periodic monitoring programs collect data on the age and size of the catch and escapement for target stocks, and for non-target stocks where the fishery harvests may represent a significant component of the harvest of those non-target stocks.
- There is a scientific basis for the frequency of the sampling program to collect age and size data where there is a clear scientific basis for collecting these data.

60 Scoring Guidepost

- The information on age and size of catch and escapement is adequate, where there is general scientific agreement that these data are important to assess the status of the stocks or adjust fisheries management decisions For example: information on the age distribution of pink salmon harvests would not be considered important for stock assessment or fisheries management decisions where as age information would be important for the assessment and management related to most Chinook and sockeye fisheries. Monitoring programs should be in place to detect changes in the size of the fish harvested for each salmon species.

Indicator 1.1.2.4: The information collected from catch monitoring and stock assessment programs is used to compute productivity estimates for the target stocks and management guidelines for both target and non-target stocks.

100 Scoring Guidepost

- Scientifically defensible productivity estimates (e.g. stock/recruitment relationships) have been derived for all target stocks and the relative productivity of non-target stocks is known.
- Risk assessment has been conducted to determine the impact of alternative harvest strategies on non-target stocks. The risk assessment should include an assessment of the uncertainties with estimates of stock productivity for both the target and non-target stocks.

80 Scoring Guidepost

- There is adequate information to identify the harvest limitations and production strategies required to maintain the high productivity of the target stocks.
- 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.
- The harvest limitations for target stocks take into consideration the impacts on non-target stocks and the uncertainty of the productivity for these stocks.

60 Scoring Guidepost

- The available information and analyses are adequate to identify the harvest limitations and production strategies required to maintain the productivity of the majority of target stocks.
- The relative productivity of the non-target stocks is considered in the management strategy, where the fishery harvests may represent a significant component of those non-target stocks.

Subcriterion 1.1.3 Management goals have been set and are appropriate to protect the stocks from decline to their Limit Reference Point or operationally equivalent undesirable low level of abundance.

Indicator 1.1.3.1: Limit Reference Points or operational equivalents have been set and are appropriate to protect the stocks harvested in the fishery.

The Limit Reference Point (LRP) or operational equivalent set by the management agency has been defined above as "the state of a fishery and/or a resource, which is not considered desirable. Fishery harvests should be stopped before reaching it. If a LRP is inadvertently reached, management action should severely curtail or stop fishery development, as appropriate, and corrective action should be taken. Stock rehabilitation programs should consider an LRP as a very minimum rebuilding target to be reached before the rebuilding measures are relaxed or the fishery is re-opened."

100 Scoring Guidepost

- The Limit Reference Point for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the LRP's are appropriate.
- There is general scientific agreement regarding the LRP's for non-target species.

80 Scoring Guidepost

- There is some scientific basis for the LRP's for target stocks and these LRP's are defined to protect the stocks harvested by the fisheries.
- There is no significant scientific disagreement regarding the LRP's used by the management agency to formulate management decision for the fishery.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the LRP's or equivalent are appropriate to achieve the management goals for target stocks.

Indicator 1.1.3.2: Target Reference Points or operational equivalent have been set.

The Target Reference Point (TRP) or operational equivalent set by the management agency has been defined above as "the state of a fishery and/or a resource, which is considered desirable. Management action, whether during a fishery development or stock rebuilding process, should aim at maintaining the fishery system at its level."

100 Scoring Guidepost

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

- There is general agreement among regional fisheries scientist outside the management agency that the TRP's are appropriate.
- The TRP's for the target stocks take into account variability in the productivity of each component of the target stock and productivity of non-target stocks.

80 Scoring Guidepost

- There is no significant scientific disagreement regarding the TRP's used by the management agency to formulate management decision for the fishery.
- The TRP's 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.

60 Scoring Guidepost

- There is general agreement among fisheries scientist within the management agency that the TRP's are appropriate for the target stocks.
- 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.
- The management agency has taken into account the relative productivity of non-target stocks when setting the TRP's for the majority of target stocks.

MSC Criterion 1.2

Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

Our interpretation of MSC Criterion 1.2: This criterion refers to "populations" where our indicators and evaluation criteria refer to stocks or stock units. 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. Note that this has already been partially assessed under Subcriterion 1.1.3.

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.

100 Scoring Guidepost

- There are comprehensive and pre-agreed responses to low stock size that utilize a range of management measures to ensure rapid recovery.
- Stocks are allowed to recover to the TRP before commercial fisheries are permitted that target these stocks.
- The management agency does not use artificial propagation as a substitute for maintaining or recovering wild stocks.

80 Scoring Guidepost

- In the event of severe depletion, recovery plans are developed and implemented to facilitate the recovery of the depleted stocks with 3 reproductive cycles.
- Stocks are allowed to recover to more than 150% of the LRP for abundance before any fisheries are permitted that target these stocks.

60 Scoring Guidepost

- In the event of severe depletion, recovery plans are developed and implemented to facilitate the recovery of the depleted stocks within 5 reproductive cycles
- Stocks are allowed to recover to more than 125% of the LRP for abundance before any fisheries are permitted that target these stocks.

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.

In contrast to Indicator 1.2.1, which evaluates the strategy for stock recovery, this indicator evaluates the current status of the target species or stocks, and the basis for being reasonably certain about their status. The Scoring Guideposts are arranged hierarchically, so that evaluation of the current status depends on the assessment, which in turn depends on data and knowledge about the stocks and the fishery

100 Scoring Guidepost

- There is general agreement among regional fisheries scientist outside the management agency that the methods of estimating escapements and exploitation rates for the target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 10 consecutive years, for any of the target stocks.

80 Scoring Guidepost

- There is general agreement among regional fisheries scientist inside the management agency that the methods of estimating escapements and exploitation rates for the target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 5 consecutive years, for any of the target stocks.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist inside the management agency that the methods of estimating escapements and exploitation rates for the majority of target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in no more than two years in a period of the most recent 5 consecutive years, for the majority of the target stocks.

MSC Criterion 1.3

Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

Our interpretation of MSC Criterion 1.3: The effects of fishing on the "reproductive capacity" of the target stocks have already been partially assessed under criterion 1.1 and 1.2. Criterion 1.3 considers specific concerns about impacts of fishing on age, size, sex and genetic structure of stocks. Because genetic structure is very difficult to determine in most exploited fish stocks, impacts on component stocks (i.e. the stocks that comprise a stock unit) are used as a proxy at the 80 scoring guidepost. Also included in this indicator is an assessment of the management agency's ability to identify and manage the potential impact of enhanced stocks on un-enhanced stocks.

Indicator 1.3.1: Information on biological characteristics such as the age, size, sex and genetic structure of the target stocks is considered prior to making management decisions and management actions are consistent with maintaining healthy age, size, sex and genetic structure of the target stocks.

100 Scoring Guidepost

- There is comprehensive knowledge of the effect of fishing on biological characteristics such as the age, size, sex and genetic structure of the target stocks and the impact of changes in these factors on the reproductive capacity of the target stocks.
- Management actions are consistent with maintaining healthy target stocks relative to biological characteristics such as age, size, sex and genetic structure of all target stocks.
- Enhanced fish are identified and managed as separate target stocks.

80 Scoring Guidepost

- The knowledge of the effect of fishing on biological characteristics such as the age, size, sex and component stocks is adequate to detect threats to the reproductive capacity of the target stocks.
- Management actions are consistent with maintaining healthy target stocks relative to biological characteristics such as age, size, sex and genetic structure of all target stocks.
- The management system includes provisions to minimize any adverse impacts to the genetic structure of un-enhanced stocks that may be due to the enhancement of other stocks.

60 Scoring Guidepost

- The knowledge of the effect of fishing on the biological characteristics such as age, size, sex and component stocks is adequate to detect threats to the reproductive capacity of the majority of target stocks.
- Management actions are consistent with maintaining healthy target stocks relative to biological characteristics such as age, size, sex or genetic structure for the majority of target stocks.
- 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.

MSC Principle 2

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. The criteria and indicators developed are limited to the impacts of fishing operations and the response and effectiveness of the regulatory system to impacts external to the commercial fishing operations, such as other harvests, climate change, and habitat degradation. We acknowledge that forces other than commercial fishing may result in a fishery being unsustainable, and that these may be anthropogenic or natural forces. This certification process addresses the impact of commercial fishing on the harvested stocks and the ecosystem, and the response of fishers and managers to changes in external environmental factors.

MSC Criterion 2.1

The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

Intent:

In the certification of the Alaska salmon fishery, the performance indicators listed under Criteria 1 focused on the adequacy of the information used to assess non-target discards and the effects of harvests on associated ecosystems. For our assessment, we have reorganized the Alaskan performance indicators into two indicators that reflect impacts on marine systems (bycatch and biomass removal) and on freshwater systems (adequacy of escapements in maintaining the ecosystem and integrity of watersheds). These indicators are: 1) the adequacy of management plans, data collection and monitoring of directed marine fisheries on by-catch; 2 the adequacy of escapement objectives to address the freshwater ecosystem concerns. The degree to which the information is collected in the management of the fisheries under Principle 1 will apply for determining if this criterion is adequately addressed and will influence the evaluation scores.

Indicator 2.1.1: The management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified.

The intent of this measure is to ensure that the management plans for the fisheries require collection of adequate data to address direct impacts of fishing on non-target species.

100 Scoring Guidepost

- A monitoring program exists that provides estimates of bycatch that meet statistical criteria acceptable to external reviewers.
- All historic monitoring data is readily available to stakeholder groups and external reviewers.
- Quantities of gear lost are recorded, and the impacts of lost gear on target and non-target species have been researched and accurate projections of impacts have been completed.

80 Scoring Guidepost

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

60 Scoring Guidepost

- Data on bycatch in the majority of the fisheries are available to determine impacts on non-target species.

Indicator 2.1.2 The management system includes measures to reduce marine ecosystem impacts.

For salmon fisheries, the primary concerns related to marine ecosystem impacts are related to the bycatch of non-salmon species and the removal of large numbers of the target salmon species.

100 Scoring Guidepost

- A risk assessment of bycatch concerns has been conducted as part of developing the management plan.
- The effect of the fishery on the marine ecosystem has been explicitly addressed in the management plan.
- Research has been conducted on marine piscivores that utilize the target species to ensure that commercial harvests do not present significant risks to the populations of these piscivores.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been the subject of an open review by stakeholders.
- This information is presented in documents that are made available to stakeholders.

80 Scoring Guidepost

- The effect of the fishery on the marine ecosystem has been addressed by the management system.
- Where problems are identified, fisheries managers make adjustments to reduce impacts on non-target species.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been made known to stakeholders through publicly available information sources.

60 Scoring Guidepost

- The management system does include measures to reduce marine ecosystem impacts to achieve management objectives.
- The management system has a history of responding to bycatch mortality problems and has procedures that are followed to limit bycatch.

Indicator 2.1.3 Research efforts are ongoing to identify new problems and define the magnitude of existing problems, and fisheries managers have a process to incorporate this understanding into their management decisions.

The intent of this measure is to ensure that a research program has been established to evaluate historic and new data to identify future problems. It is also necessary to have an established management process that will ensure research conclusions can quickly be transparently incorporated into future management activities associated with prosecuting the fishery.

100 Scoring Guidepost

- There is detailed knowledge of the relationship between the fishery and the marine ecosystem impacts or ongoing research is attempting to identify if such problems exist.
- The management agency has a proven history of incorporating new research findings into management plans.
- The management agency has a proven history of closing fisheries when bycatch mortality problems arise.
- The management agency has supported the development of more selective fishing practices.

80 Scoring Guidepost

- There is ongoing research of previously identified problems areas to determine if bycatch reduction measures are effective.
- When new problems are identified, the management plans require a new monitoring program be instituted to determine the effectiveness of bycatch reduction measures.
- The management plan allows for between season assessment and institution of new controls on the fishery or stakeholder consultation following the identification of bycatch problems or ecosystem related impacts.
- The management agency has a proven history of successfully arbitrating stakeholder concerns when balance between fish harvests and ecosystem concerns have arisen.

60 Scoring Guidepost

- The management agency collects or plans to collect data on bycatch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about bycatch problems into management actions.
- The management agency responds to data provided on bycatch problems by entities outside of their agency.

Indicator 2.1.4 The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

The intent of this is to encourage the collection of information and data that can be used to address freshwater ecosystem concerns. It is our intent that future reviews of Pacific Salmon certification demonstrate that the information developed from these research programs on ecosystem requirements, such as aquatic system nutrient requirements and piscivore food requirements are incorporated into the management system.

100 Scoring Guidepost

- There is research to determine tradeoffs of fish harvests with ecosystem concerns such as providing for sustainable populations of dependent components of the aquatic ecosystem.
- Results and conclusions from research are made available to stakeholders.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcass on freshwater ecosystem processes and identify any tradeoffs between harvests and freshwater ecosystem concerns.
- 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.

60 Scoring Guidepost

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

MSC Criterion 2.2

The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.

Intent:

This criteria focuses on direct mortality of the prosecuted fisheries on non-target species and the adequacy of the management units of the target species to ensure significant sub-components of the target species are adequately protected to provide for a reasonable expectation of sustainability of these components and their contribution to the genetic diversity of the target population. The impacted species of concern are expanded beyond that of the Alaska Criteria to ensure icon species, such as marine mammals, bears, coastal wolves, and eagles, are adequately protected from direct or indirect impacts of the fisheries (we define icon species as any species of particular public interest that does not qualify under the terms 'endangered, threatened, or protected'). These impacts may be identified at the population and community level. We also address the issue of harvests of fish stocks that have been created or enhanced through fisheries enhancement activities, such as fish hatcheries and spawning channels. Our concern is that the production or harvest of enhanced stocks does not affect the sustainability of natural spawning stocks by adversely impacting the genetic structure of the wild fish. The enhanced component of fish stocks are assumed to be addressed as separate stocks using the indicators and guidelines listed.

Indicator 2.2.1 The management of the fishery includes provisions for integrating and synthesizing new scientific information on biological diversity at the genetic, species or population level of all species harvested in the fishery and impacts on endangered, threatened, protected or icon species.

The intent of this measure is to ensure that the management system incorporates available knowledge and considers the impacts of the fishery on biodiversity issues. This indicator includes the impacts of enhanced fishery harvests on these issues.

100 Scoring Guidepost

- A risk assessment has been conducted, based on current knowledge of direct and incidental mortalities from the fishery, to ensure the fishery does not pose a significant threat to the biodiversity of the target or non-target species.
- Stock composition including enhanced component, is known within Fishery Management Units with the likelihood of harvest of endangered, threatened, protected, or icon species has been estimated.
- Time and area of migrations of weak year classes, sub-stock or population components are known.
- The management system contains provisions to reduce harvests based on biodiversity concerns of affected endangered, threatened, protected or icon species, or weak year classes, of stocks, including the enhanced components, of the targeted species.

80 Scoring Guidepost

- The fishery has been monitored and the stock composition is assessed with a special effort to determine presence of rare, endangered, protected, or icon species.
- The management agency has a history of incorporating new research into management as new research data on impacts of fisheries on biodiversity become available.
- The fisheries management system includes provisions for harvest reduction when biodiversity concerns are identified for target or non-target species.

60 Scoring Guidepost

- Efforts are being made to assess the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.
- The impact of the fishery on endangered, threatened, and protected or icon species is identified and is considered in the management of fisheries.
- There are provisions in the management system to reduce the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

MSC Criterion 2.3

Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

Intent:

Are reductions in fish abundance caused by human activity, unrelated to the directed harvest, considered in the management plan and in the establishment of escapement goals? If so, is the management system sufficiently robust to accommodate the long term recovery of depleted populations and ensure that directed or by-catch harvests, including harvests on enhanced fisheries, do not present significant risks to the long term sustainability of these populations.

Indicator 2.3.1 Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

100 Scoring Guidepost

- The management plans and escapement goals have been shown to have a high (>80%) probability of achieving a long-term recovery of depleted non-target stocks using risk analysis.
- Historic data have been thoroughly examined to ensure fisheries restoration objectives are based on the likely habitat capacity, rather than on trends that cover only the most recent decades, thus avoiding the "moving baseline" syndrome.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Proposed management strategies have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- The management system supports the collection of data on non-fishing related human activity in the development of recovery plans for non-target stocks.

80 Scoring Guidepost

- The management system includes assessment of plans for the recovery of non-target stocks to levels above established LRPs.
- Objectives for recovery have at least some consideration of historic documents on stock abundance.
- The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.
- The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks

60 Scoring Guidepost

- The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.
- The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.
- The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

MSC Principle 3

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.

MSC 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.

For the purposes of this section, the management system is defined to mean all public sector entities with responsibility for managing salmon in British Columbia, including Fisheries and Oceans Canada (FOC), the Pacific Salmon Treaty (PST), and Pacific Salmon Commission (PSC), in addition to scientific assessment groups such as Pacific Scientific Advice Review Committee (PSARC) and other governmental entities that provide advice to mangers.

Some indicators under Principle 3 appear to overlap with indicators under Principles 1 and 2, however, Principles 1 and 2 are concerned with the outcomes of a management system respecting the fact that the resources are maintained at the desired levels of abundance, while Principle 3 is concerned with evaluating whether all of the processes for reaching management objectives are in place.

Management System Criteria

MSC Criterion 3.1

The management system has a strategy for management that clearly defines long-term objectives for managing the impact of fishing on target species, non-target species and the ecosystem; the objectives are consistent with a well- managed fishery and MSC principles and criteria; and the management strategy includes provision for the effective implementation of measures to attain these objectives.

Intent:

The objective regarding this criterion dealing with Management Systems is to compare the Fisheries and Oceans Canada management system for British Columbia salmon, as detailed in the Integrated Fisheries Management Plan for British Columbia Salmon, and elsewhere, with the standards for a well-managed fishery as defined in the MSC Principles and Criteria for Sustainable Fishing. Particularly important is whether the management system has clearly defined objectives and goals that incorporate currently evolving standards for responsible fisheries management with respect to conservation of the species, regard for the ecosystem to which they belong, transparency of the management process and recognition of the impact of the fishery on social, cultural and economic issues.
Throughout this section the term “impact on the ecosystem” is taken to mean the degree to which fishing alters the ecosystem relative to its non-fished state.

Indicator 3.1.1: The management system has a clear and defensible set of objectives for the harvest and escapement for target species and accounts for the non-target species captured in association with, or as a consequence of, fishing for target species.

100 Scoring Guidepost

- Management objectives are clearly defined for all of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are precisely set for each target stock unit in the fishery, as qualified by relevant environmental factors.
- Target Reference Points and Limit Reference Points are clearly defined and documented for each target stock unit in the fishery.
- Harvest controls are effective with respect to the attainment of management objectives for each target stock unit in the fishery.

- The management system provides estimates for all catches, landings and bycatch.

80 Scoring Guidepost

- Management objectives are clearly defined for most of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are set for target stocks or target species in the fishery, as qualified by relevant environmental factors.
- Harvest controls are precise and effective for major target stocks or target species in the fishery.
- The management system provides estimates for all major catches, landings, and bycatch.

60 Scoring Guidepost

- Management objectives are clearly defined and consistent with MSC criteria for a well-managed fishery for the majority of target stocks.
- Harvest controls are effective for the majority of the fisheries on target stocks.
- The management system provides for the estimation of catch, landing, and bycatch for the majority of the fisheries.

Indicator 3.1.2: The management system provides for periodic assessment of the biological status of the target species and the impact of fishing.

100 Scoring Guidepost

- There is an annual assessment or update of the status of stocks for each major target stock unit in the fishery.
- When results of the assessments or updates indicate that there has been a substantial change in the status of the stocks, this new information is made available to stakeholders in conjunction with the implementation of changes to management measures.
- Reports on the methodologies used for the assessments are published on a regular basis in peer-reviewed journals and PSARC, and/or the appropriate PSC committee regularly reviews the technical analyses for the assessments.

80 Scoring Guidepost

- 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.
- Results of assessment and updates of the status of the stocks are made available to stakeholders in a timely fashion.
- Reports on the methodologies used for the assessments are published in non-peer reviewed reports, and PSARC or the appropriate PSC committee reviews the technical analyses for the assessments.

60 Scoring Guidepost

- Assessments or updates of the status of the stocks for the majority of the target species are made for major fishing regions within the fishery.
- Results of assessment or updates of the status of the stocks are made available to stakeholders.

- Technical analysis and methodologies used for the assessments are published or distributed to stakeholders. .

Indicator 3.1.3: The management system includes a mechanism to identify and manage the impact of fishing on the ecosystem.

100 Scoring Guidepost

- Monitoring systems are in place to detect the impact of fishing on the ecosystem.
- Where potential impacts of fishing on the ecosystem have been identified, the management system has clear and well-defined objectives for evaluating and managing the impact of the fishery on the ecosystem.
- Control mechanisms are used to minimize impacts of fishing on the ecosystem.
- There is sufficient evidence to indicate that when used, control mechanisms are adequate for meeting the management objectives.

80 Scoring Guidepost

- The management system includes mechanisms to identify and evaluate the impact of fishing on the ecosystem.
- Control mechanisms are used to minimize impacts of fishing on the ecosystem.

60 Scoring Guidepost

- 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.

Indicator 3.1.4: When dealing with uncertainty, the management system provides for utilizing the best scientific information available to manage the fishery, while employing a precautionary approach.

Uncertainty always exists in estimates of the status of a stock, and technically it is not generally possible to determine the accuracy of the assessments. This uncertainty results from sampling and measurement error, limited understanding of the biology of the fish being modeled, error in model assumptions, and an inability to model all of the important processes that affect the dynamics of the stock. It can also arise as a result of changing fishing technology. However, some idea of the uncertainty can be detected or measured through sampling theory, by lack of fit of the model being used, or by sensitivity analysis.

100 Scoring Guidepost

- The management system provides for the routine assessment of the level of uncertainty in the information collected for management and establishes management controls to address these uncertainties using the best available scientific information and a precautionary approach. .
- The management system implements research efforts to address data gaps.
- For newly developing fisheries for which there is very limited data and information, the management system implements controls on the development of the fishery that are precautionary in nature.

- The management system always quantitatively evaluates the effect of implementation uncertainty (the tendency for actual harvest rates or escapements to differ from those intended by the management regulations) on the effectiveness of the proposed management actions.

80 Scoring Guidepost

- The management system provides for some assessment of the level of uncertainty in the information collected for management and establishes management controls which take into account these uncertainties, using the best available scientific information and a precautionary approach.
- In situations when precautionary measures are necessary to manage the fishery, the management system calls for increasing research efforts in order to fill data and information gaps.
- In most cases where there are newly developing fisheries, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system considers the effect of implementation uncertainty on the effectiveness of most of the proposed management actions.

60 Scoring Guidepost

- The management system for the majority of newly developing fisheries is consistent with a precautionary approach.
- The management system considers the effect of implementation uncertainty on the effectiveness of the majority of the proposed management actions.

Indicator 3.1.5: Management response to new information on the fishery and the fish populations is timely and adaptive.

Intent: The management system should be timely and adaptive i.e., new information used by the management system to initiate new management measures or to update and/or improve current management measures in a timely fashion, because characteristics of the fishery can change and/or the natural system can show reduced or increased productivity over time.

100 Scoring Guidepost

- The management system provides a mechanism for rapid adjustments to be made to its management programs.
- When new information or findings support altering the management and conservation programs (such as stock recovery plans), there is evidence to demonstrate that such adjustments are made within 6 months of obtaining the new information.

80 Scoring Guidepost

- The management system provides a mechanism for responding to unexpected changes in the fishery.
- When new information or findings support altering the management and conservation programs, adjustments are made within 12 months of obtaining the new information.

60 Scoring Guidepost

- For the majority of cases there are provisions for making timely adjustments to the management program, and when they are made the lag time is not so great as to result in the adjustments being ineffectual.

Indicator 3.1.6: The management system provides a process for considering the social and economic impacts of the fishery.

100 Scoring Guidepost

- There exists a formal and well-defined process to consider, over the short and long term, the views, customs, and interests of indigenous peoples who depend on fishing for their food or livelihood.
- There is a formal and well-defined process to consider, over the short and long term, the impact of the fishery on coastal communities that are closely tied to the fishery.
- There are no direct subsidies to the fishing industry.
- The management system regularly seeks and considers input from stakeholders in an effort to understand and address socioeconomic issues related to the fishery.

80 Scoring Guidepost

- The management system regularly undertakes to consider the views, customs and interests of indigenous peoples whose livelihood or food are dependent on the fishery.
- The management system regularly takes into consideration the impact of the fishery on coastal communities that are closely tied to the fishery.
- There are no subsidies to the fishing industry that would lead to unsustainable fishing or ecosystem degradation.
- The management system regularly undertakes measures to understand the socioeconomic impacts resulting from the management of the fishery.

60 Scoring Guidepost

- The management system more often than not considers the views, customs, and interests of indigenous peoples who depend on fishing for a livelihood or food.
- More often than not the management system considers the impact of the fishery on coastal communities that are closely tied to the fishery.
- For the majority of the fisheries there are no subsidies that threaten sustainable fishing.
- More often than not, the input of stakeholders is sought by the management system.

Indicator 3.1.7: The management system provides decision makers with useful and relevant information and advice for managing the fishery.

100 Scoring Guidepost

- The management system provides decision makers with a range of alternatives for achieving the objectives of management, including risk assessments for each alternative.
- All management decisions are based on useful and relevant information and advice that is provided through the management system.
- The management system, whenever possible, provides information to decision makers within a time frame that permits management controls to be determined before they need to be taken.

80 Scoring Guidepost

- The management system provides managers with a range of alternatives for management.
- 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.

60 Scoring Guidepost

- The majority of management decisions rely on data, useful and relevant information, or advice provided through the management system.
- Risk assessments are considered in formulating important management decisions.

Indicator 3.1.8: The management system provides for socioeconomic incentives for sustainable fishing.

100 Scoring Guidepost

- The management system has formal procedure for providing social and economic incentives to stakeholders in the fishery to develop and utilize sustainable fishing practices, particularly the development of selective fishing gear and practices that lead to improved conservation.
- The management system creates strong incentives for harvesters to not exceed target catches or exploitation rates
- The stakeholders in the fishery regularly avail themselves of the opportunity to utilize these incentives.
- Evidence provided by the management system demonstrates that such incentives have contributed to improved conservation.
- The management system continually attempts to understand the impact of their decisions on social and economic factors affecting the stakeholders in the fishery and regularly takes action to mitigate the impacts on stakeholders.

80 Scoring Guidepost

- 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.
- The management system includes a program to create incentives for harvesters to not exceed target catches or exploitation rates.
- Evidence demonstrates that the stakeholders in the fishery have used such incentives.
- The management system attempts to understand the impact of their management decisions on social and economic factors affecting the major stakeholders in the fishery and takes action to lessen the major impacts on stakeholders.

60 Scoring Guidepost

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

- The management system attempts to understand the impact of its decisions on social and economic factors affecting the stakeholders in the fishery and is responsive to requests to reduce these impacts.

MSC Criterion 3.2

The management system provides for a framework for research, the results of which are pertinent to achieving the objectives of management.

Intent:

Under this criterion we are interested in evaluating whether there is a research component to the management system that is sufficiently broad in scope to include all target species and other components of the ecosystem that may be impacted by fishing, and which provides for the acquisition of information and data to support scientifically- sound management actions, and whether the research is timely, open to review by peers and stakeholders in general, and is adequately funded.

Indicator 3.2.1: The research plan covers the scope of the fishery, includes all target species, accounts for the non-target species captured in association with, or as a consequence of fishing for target species, and considers the impact of fishing on the ecosystem and socioeconomic factors affected by the management program.

100 Scoring Guidepost

- The management system incorporates a research component that considers relevant data and information needs for formulating management strategies for all target species, and also information leading to an understanding of the dynamics of the ecosystem including data on the catch, landings and discards of non-target species.
- The framework for research includes investigations dealing with socioeconomic impacts of the fishery.
- The research plan responds in a timely fashion to unexpected changes in the fishery.
- Funding is secure and sufficient to meet long-term research needs.
- There is significant continuing progress in understanding the impact of the fishery on target and non-target species, and the ecosystem in general.
- Research results form the basis for formulating management strategies and decisions.
- Research is regularly published in peer review journals and/or is reviewed by PSARC or the PSC.

80 Scoring Guidepost

- 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.
- The research plan addresses concerns related to the impact of the fishery on the ecosystem.
- The research plan addresses socioeconomic issues that result from the implementation of management.
- The research plan is responsive to changes in the fishery.
- Funding is adequate to support short-term research needs.
- There is progress in understanding the impact of the fishery on target and non-target species.

- Research results are utilized in forming management strategies
- Research is reviewed by PSARC or PSC, or other appropriate and technically qualified entities.

60 Scoring Guidepost

- Research provides for the collection of catch statistical and biological data for the target species.
- There has been useful research on the impact of fishing on target and non-target species taken in the fishery, and on the ecosystem in general.

Indicator 3.2.2: Research results are available in a timely fashion to interested parties, and there is a mechanism for periodic review of the content, scope and results of the research plan.

100 Scoring Guidepost

- There is a formal and codified arrangement for annual stakeholder review of the content and scope of research plans and results, including matters related to its funding, which is open and transparent.
- There is a formal and codified arrangement for peer review of ongoing research
- The management system regularly incorporates into the research plan recommendations emanating from these reviews.
- Research results are made available to all interested stakeholders on a regular basis and in a timely manner.

80 Scoring Guidepost

- The management system provides for periodic reviews by stakeholders in the fishery, of the content and scope of research, including funding requirements.
- There are periodic peer reviews of ongoing research.
- Inputs from these reviews are used by the management system to modify research plans.
- Research results are available to interested parties on a regular basis.

60 Scoring Guidepost

- While there are no formal arrangements for stakeholder research review, such reviews are held on a periodic basis for the majority of the research plans and/or results.
- While there are no formal arrangements for peer review of ongoing research, such reviews are periodically conducted for the majority of ongoing research plans and/or results.
- The majority of research results are available to interested parties.

MSC Criterion 3.3

The management system allows for transparency with respect to its operational details, including a consultative process that provides for the incorporation of information and data from stakeholders in the fishery related to matters of a social, cultural, economic and scientific nature.

Intent:

The objective here is to evaluate whether the management system is open and transparent with respect to all interested parties and whether the views of stakeholders are considered in formulating management strategies.

Indicator 3.3.1: Provides for a consultative process that is open to all interested and affected stakeholders, which allows for their input on a regular basis into the management process.

100 Scoring Guidepost

- The management system provides a formal arrangement for the direct participation of all interested and affected stakeholders from both the public and private sectors, on matters of a social, cultural, economic and scientific nature.
- The management system provides timely, advanced notice of meetings at which there can be stakeholder participation.
- The management system does not exclude any interested and affected stakeholder from the consultative process.
- The management system addresses the interests of all interested and affected stakeholders.

80 Scoring Guidepost

- The management system provides for the regular participation of most interested and affected stakeholders on matters of a social, cultural, economic and scientific nature.
- The management system generally provides notice of meetings at which there can be stakeholder participation.
- The management system does not usually exclude involvement of any interested and affected stakeholder.
- The views of most interested and affected stakeholders are regularly considered in the formulation of management strategies.

60 Scoring Guidepost

- The majority of interested and affected stakeholders are provided with a forum for input into the formulation of management plans and measures.

MSC Criterion 3.4

The management system implements measures to control levels of exploitation in the fishery.

Sub-Criterion 3.4.1: The management system has provisions for controlling levels of exploitation to achieve the escapement and/or harvest rate goals for target stocks, and for the setting of harvest limits for non-target species, when there is information indicating such limits are necessary.

Under this sub-criterion the issue of whether the management system provides for mechanisms such as closed areas, no take zones, and closed dates and times for placing controls on fisheries to ensure that objectives related to exploitation levels and escapement are achieved is evaluated.

Indicator 3.4.1.1: Utilizes methods to limit or close fisheries in order to achieve harvest and/or escapement goals, including the establishment of closed areas, no-take zones, and closed dates and times when appropriate.

100 Scoring Guidepost

- The management system provides a formal and codified system to achieve harvest and/or escapement goals for target stock units and, as appropriate, non-target species of fish.
- The management system provides a formal and codified mechanism for establishing closed areas, no-take zones, and closed dates and times for any areas of the fishery.
- Management sets exploitation and escapement levels designed to maintain the target stock units at levels of abundance that can sustain high productivity.
- There is no evidence provided by the management system to indicate that, as a result of fishing, target stock units are in serious decline or degradation of the ecosystem is occurring.
- Measures are currently implemented to achieve these objectives.

80 Scoring Guidepost

- Harvest rates and/or escapement levels designed to achieve target goals are regularly implemented.
- The management system provides for the establishment of closed areas, no-take zones and closed dates and times.
- Controls are set to maintain or restore target species to high productivity levels, and in a manner that does not contribute significantly to ecosystem degradation.
- Measures that limit harvest rates and set escapement goals are implemented when necessary.

60 Scoring Guidepost

- Harvest rates and/or escapement goals for the majority of the target stocks are effective in halting declines in stock abundance caused by the fishery.
- 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.

Indicator 3.4.1.2: Provides for restoring depleted target species to specified levels within specified time frames.

100 Scoring Guidepost

- The management system has a formal and codified mechanism, which is adequate for restoring depleted target stocks to the TRP or equivalent high level of abundance, as qualified by relevant environmental factors.
- The mechanism includes strict guidelines for restoring these depleted populations within a certain time frame are formalized by the management system.

80 Scoring Guidepost

- The management system includes measures, which are adequate to restore depleted populations of target stock to the TRP or equivalent high level of abundance as qualified by relevant environmental factors.

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

60 Scoring Guidepost

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

Sub-Criterion 3.4.2: The management system incorporates measures to ensure that its objectives regarding the conservation of the stocks under its purview and the impact of the fishery on the ecosystem are carried out.

Two major issues are dealt with under this topic. One examines whether the management system includes provisions to determine whether there is adequate enforcement of the measures established for achieving the objectives of management. In these evaluations, compliance is considered to be the result of adequate enforcement mechanisms by the management system and education with respect to providing clear and timely information to the fishing industry regarding such measures. The other examines whether the management system includes adequate monitoring of the fishery so as to evaluate the performance of the fishery with regard to the policies and objectives of management.

Indicator 3.4.2.1: The management system includes compliance provisions.

100 Scoring Guidepost

- The management system provides for a formal arrangement, such as a compliance committee or a staff review team on compliance, to review the effectiveness of enforcement.
- Education and enforcement procedures are implemented and applicable rules are consistently applied.
- Enforcement actions are effective in achieving the objectives of management.
- There are no infractions being consistently committed in the fishery.

80 Scoring Guidepost

- The management system includes compliance provisions that are effective for the fisheries.
- Infractions, which result in adverse impacts on the status of the stocks or on the ecosystem, are rare.

60 Scoring Guidepost

- The management system includes compliance provisions that are effective for the majority of the fisheries.

Indicator 3.4.2.2. The management system includes monitoring provisions.

100 Scoring Guidepost

- The management system incorporates a formal, effective program for monitoring the fishery, which fully evaluates the performance in terms of whether the regulations are resulting in the intended

harvest rates and/or escapements, and achievement of objectives regarding impacts on the ecosystem caused by the fishery.
- Monitoring is comprehensive, and includes all relevant components of the fishery
- Results are reported widely on a regular and timely basis.

80 Scoring Guidepost

- The management system incorporates an effective monitoring program, which evaluates the performance of the fishery relative to management goals and policies.
- Monitoring is broad in scope, and results are available to the majority of the stakeholders.

60 Scoring Guidepost

- The management system includes provisions for a monitoring program to evaluate the performance of the majority of the fisheries against its policies and objectives.

MSC Criterion 3.5

The management system provides for regular and timely review and evaluation of its performance, and for appropriate adjustments based on the findings of these reviews and evaluations that are consistent with the objectives of the program.

Intent:

The objective under this criterion is to evaluate whether the management system has an effective mechanism for reviewing performance vis-à-vis the objectives and policies of the management programs. An effective mechanism would include both internal and external reviews, and, when appropriate, the recommendations from the reviews would be incorporated into the management of the fishery. Also, the issue of whether the management system provides a mechanism for resolving disputes emanating from such reviews, or any other sources, is evaluated.

Indicator 3.5.1: There is an effective and timely system for internal review of the management system.

100 Scoring Guidepost

- The management system provides for continuing internal review that is broad in scope, effective, and timely.
- The review process and results are made available to all stakeholders.

80 Scoring Guidepost

- The management system includes provision for an internal review that is conducted periodically as the need arises.
- The results of the review are made available to interested stakeholders.

60 Scoring Guidepost

- The management system provides for internal review of its performance, and when available, review results are made available to the majority of interested stakeholders.

Indicator 3.5.2: There is an effective and timely system for external review of the management system.

100 Scoring Guidepost

- The management system provides for one or more independent experts to review at least bi-annually all of the important components of management performance.
- The format and standards of the review are established with input from outside the management system.
- Provision is made for making public the review results.

80 Scoring Guidepost

- The management system provides for a review of management performance by one or more independent experts at least once every five years.
- The format and standards of the review are established within the management system.
- Review results are made available to the public.

60 Scoring Guidepost

- The management system is open to external review at least once every 10 years.

Indicator 3.5.3: There is a mechanism for incorporating into the management system recommendations resulting from the review process.

100 Scoring Guidepost

- The recommendations from internal and external reviews are always acted upon and, where appropriate, incorporated into the management system.
- The management system provides for a report to all interested stakeholders describing how it acted on the recommendations of these reviews.

80 Scoring Guidepost

- The recommendations from internal and external reviews are usually, but not always, used to make changes to the management system.

60 Scoring Guidepost

- 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.

Indicator 3.5.4: There is an appropriate mechanism for resolving disputes.

100 Scoring Guidepost

- The management system has a formal and codified mechanisms for resolution of disputes arising as a result of the fishery.
- Affected parties routinely use the dispute resolution mechanism.
- The dispute resolution mechanism is unbiased and fair respecting all disputing parties.

80 Scoring Guidepost

- The management system has a dispute-resolution process for resolving significant disputes.
- The dispute resolution mechanism is available for use by affected parties, but is not routinely used.
- The dispute resolution mechanism does not discriminate against any disputing party.

60 Scoring Guidepost

- There is a mechanism for resolving disputes that is provided for by the management system.

MSC Criterion 3.6

The management system provides for the operation of the fishery to be in compliance with all relevant legal and administrative requirements.

Intent:

In this section we attempt to evaluate the management system with regard to whether it manages the fishery in a manner that is consistent with Canada's commitments under relevant international treaties and agreements, and with domestic laws and regulations that pertain to the fishery. In this context we also evaluate whether the management system is in conformity with the legal and customary rights of First Nations peoples, as established by treaties with those peoples, the Canadian Constitution, and other applicable instruments.

Indicator 3.6.1: The fishery is not operated in a unilateral manner in contravention to international agreements.

For the purposes of this Indicator, only treaties and conventions which the government of Canada has signed, ratified or otherwise is a High Contracting Party to, shall apply.

100 Scoring Guidepost

- When the stocks of fish under the authority of the management system are also under the authority of an international treaty to which the Government of Canada is a party, treaty obligations are respected, and actions by the management system are coordinated with the recommendations of the treaty organization.
- All measures taken within the management system are in compliance with relevant international treaty obligations.

- The management system does not undertake unilateral exemption from any treaty obligation pertaining to the fishery.

80 Scoring Guidepost

- The management system does not willingly act in contravention to any international treaty obligations pertaining to the fishery.
- The management system does not knowingly undertake unilateral exemption from any treaty obligation pertaining to the fishery.
- Evidence indicates any inadvertent action with regard to the contravention of any international treaty obligations by the management system is rare.

60 Scoring Guidepost

- The management system is in compliance with the majority of international treaty recommendations dealing with the fishery.

Indicator 3.6.2: The fishery is carried out in a manner consistent with all relevant domestic laws and regulations relevant to the fishery.

100 Scoring Guidepost

- The management system conducts annual assessments of the fisheries compliance with relevant domestic laws and regulations, and these assessments have confirmed full compliance with these laws and regulations.

80 Scoring Guidepost

- The management system conducts at least bi-annual assessments of the fisheries compliance with relevant domestic laws and regulations, and these assessments have confirmed that none of the violations that have occurred would result in failure to achieve the objectives of the management plan.

60 Scoring Guidepost

- The management system conducts periodic assessments of the fisheries compliance with relevant domestic laws and regulations, and these assessments have not identified any violations that would result in failure to achieve the objectives of the management plan.

Indicator 3.6.3: The management system provides for the observation of legal and customary rights of First Nation peoples.

100 Scoring Guidepost

- The management system is in compliance with all major legal and customary rights of First Nation peoples that are impacted by the fishery.
- The management system includes processes for consultation with First Nations peoples on the impact of the commercial fishery on their food, social and ceremonial fisheries.

80 Scoring Guidepost

- 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.
- The management system includes processes for providing information to First Nations peoples on the major impacts of the commercial fishery on their food, social and ceremonial fisheries.

60 Scoring Guidepost

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

Fishery Operations Criteria

MSC Criterion 3.7

Fishing operations make use of gear and fishing practices that limit ecosystem impacts.

Intent:

The intention regarding this criterion relating to fishery operations is to evaluate the degree to which the management system is capable of implementing responsible fishing practices. The understanding here regarding responsible fishing practices refers to the criteria defined in the MSC, Principle 3.B., Operational Criteria 12-17, and with those sections of the FAO Code of Conduct for Responsible fishing dealing with the conduct of fishing practices by the fishing industry.

Indicator 3.7.1: Utilization of gear and fishing practices that minimize both the catch of non-target species, and the mortality of this catch.

100 Scoring Guidepost

- There are requirements in the management system to reduce the capture of non-target species, which include:
    - Controlling the use of gear types and fishing practices that result in significant catches of non-target species or undersized individuals of target species, and/or
    - Implementing closed seasons and no-fishing zones during times and in areas where the probability of making significant catches of non-target species or undersized individuals of target species is high, and
    - Holding education programs for the fishing industry and other relevant stakeholders to make them aware of the benefits of using fishing techniques and gear that minimize the catch of non-target species or undersized individuals of target species.
- Taking into consideration natural variability in population abundance and the possibility of declining abundance resulting from heavy exploitation, the management system can demonstrate the effective use of these methods by fishers by the existence of downward trends in the catches of non-target species.

- The management system creates incentives to decrease the catch of non-target species (e.g. by providing more fishing time for vessels achieving certain standards for reducing such catches).

80 Scoring Guidepost

- Through educational programs for members of the fishing industry and other relevant stakeholders, the management system discourages the use of gear types and fishing practices that result in high catches of non-target species or undersized individuals of target species, and encourages them to avoid fishing in areas identified to have high concentrations of non-target species or undersized individuals of target species.
- 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.
- Fishers generally conduct their fishing activity in a manner that is consistent with the goal of reducing the catch of non-target species or undersized individuals of target species.

60 Scoring Guidepost

- 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.

Indicator 3.7.2: Prohibits the use destructive fishing practices, such as poisons and explosives.

100 Scoring Guidepost

- The management system prohibits fishing practices that utilize poisons or explosives, or other such devices that damage or destroy physical, chemical, and/or biological features or characteristics of the areas where such practices are prosecuted.
- Evidence can be provided by the management system that such destructive practices are not currently being employed in the fishery.

80 Scoring Guidepost

- The management system can demonstrate that destructive fishing practices, such as poisons or explosives, are not currently being used in the fishery.

60 Scoring Guidepost

- The management system prohibits or discourages the use of destructive fishing practices.

Indicator 3.7.3: Minimizes operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.

100 Scoring Guidepost

- The management system has a formal program to reduce operational waste in the fishery, with the long-term goal of eliminating such waste.
- The program is effective, as reflected by reduced incidents of operational waste.

- The management system has a formal program in which they work with the fishing industry and other relevant stakeholders to promote the proper handling of catch.

80 Scoring Guidepost

- The management system has a program that sets guidelines for reducing operational waste.
- The management system encourages the fishing industry and other relevant stakeholders to promote programs for the proper handling of catch.

60 Scoring Guidepost

- There is a program to reduce operational waste.

Indicator 3.7.4: The management system solicits the cooperation of the fishing industry and other relevant stakeholders in the collection of data on the catch and discard of non-target species and undersized individuals of target species.

100 Scoring Guidepost

- The majority of fish harvesters and processors are in compliance with management requests for the collection of data on catches and discards of non-target species and undersized individuals of target species.
- Continued improvement in the quality and quantity of catch and discard data is evident.

80 Scoring Guidepost

- 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.

60 Scoring Guidepost

- 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.

Indicator 3.7.5: Implements fishing methods that minimize adverse impacts on habitat, especially in critical zones.

100 Scoring Guidepost

- The management system has a formal program to identify and document the impact of the fishery on habitat, and implements measures to restrict gear and fishing practices that have been shown to adversely affect habitat.
- The crews of fishing vessels comply with such measures and thereby avoid damaging the habitat.
- There is no evidence of continued impacts of fishing on habitat.

80 Scoring Guidepost

- The management system undertakes measures to identify and document the impact of the fishery on habitat and to set guidelines for reducing habitat impacts.
- Fish harvesters are encouraged to follow the guidelines for reducing habitat impacts.

60 Scoring Guidepost

- 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.

7.5 Information Reviewed

One of the most significant, and difficult, aspects of the MSC certification process is ensuring that the assessment team gets a complete and thorough grounding in all aspects of the fishery under evaluation. In even the smallest fishery, this is no easy task as the assessment team typically needs information that is fully supported by documentation in all areas of the fishery from the status of stocks, to ecosystem impacts, through management processes and procedures.

Under the MSC program, it is the responsibility of the applying organizations or individuals to provide the information required to prove the fishery or fisheries comply with the MSC standards. It is also the responsibility of the applicants to ensure that the assessment team has access to any and all scientists, managers, and fishers that the assessment team identifies as necessary to interview in its effort to properly understand the functions associated with the management of the fishery. Last, it is the responsibility of the assessment team to make contact with stakeholders that are known to be interested, or actively engaged in issues associated with fisheries in the same geographic location.

In the BC sockeye fisheries, the applicant (BCSMC) provided a very thorough set of documents that reviewed all aspects of the management of the fisheries under examination and salmon management in general (Section 7). The information was compiled in a format that was very conducive to assessing the fisheries performance indicator by indicator. To date, it appears to be the most thorough submission compiled by a client on any fishery in the MSC program. The submissions made by the client should be considered the benchmark for all other fishery submissions in the future. The information submitted is not only relevant to each performance indicator, but also includes the client's view as to how each fishery compares to the standard. The client also arranged for the assessment team to meet with the appropriate scientists, managers, and enforcement officials responsible for the management of the fishery.

In contrast to the applicant's role in MSC assessments, the stakeholders in the fishery are under no specific obligation, other than personal preference, to provide the assessment team with information. Therefore, a significant effort was made to contact and solicit comments from stakeholders to ensure the assessment team understood their concerns. As discussed earlier (Section 7), the stakeholders in BC also provided a very thorough set of documents on each fishery, and again in a format very conducive to the assessment. The stakeholders in these assessments have also set a benchmark, along with the stakeholders in the pollock fishery assessment, for providing information to an assessment team.

7.6 Assessment Meeting and Interviews

The sites and people chosen for visits and interviews were based on the assessment Team's need to acquire information about the management operations of the fisheries under evaluation. Agencies and their respective personnel responsible for fishery management, fisheries research, fisheries compliance, and habitat protection were identified and contacted with the assistance of the client.
The assessment team met with managers and scientists from DFO for a week. At these meetings, DFO personnel provided SCS evaluation team members with presentations summarizing the written documents already provided. Because of the complexity of the set of fisheries being evaluated under one project, it was not an easy or straightforward task for the client to sort through and properly organize the hundreds of reports and thousands of pages of documents by unit of certification and by fishery and by performance indicator. The fact that the client, in conjunction with DFO, accomplished this made it far more efficient for the assessment team to complete its work and for stakeholders to understand thoroughly what information was used to assess the fisheries. Table 7.4 provides a general list of the people and organizations either met or talked to (by email or phone) during the assessment process.

During this fishery assessment, direct information and/or opinions from a variety of stakeholders, was also provided through the auspices of the Sierra Club acting as a representative of the conservation sector in BC (see Section 7).

Tables 7.4a – 4f. People Interviewed as part of the BC Sockeye Fisheries Assessment Process

Table 7.4.A. Full Assessment Meetings with Management Personnel and Industry on 24 May 2005

Date	Name	Affiliation
24-May-05	Sandy Argue	BC Ministry Agriculture, Food and., Fisheries (MAFF)
	Christina Burridge	BC Salmon Marketing Council (BCSMC)
	Rob Morley	Canadian Fishing Company
	Bert Ionson	DFO
	Brian Riddell	DFO
	Dave Peacock	DFO
	Don Radford	DFO
	James Boland	DFO
	Paul Ryall	DFO
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Karl English	LGL
	Rich Lincoln	MSC
	Murray Chatwin	Ocean Fisheries Ltd.
	Mike Lapointe	Pacific Salmon Commission (PSC)
	Don Kowal	PSC
	Chet Chaffee	SCS

Table 7.4.B. Full Assessment Meetings with Management Personnel and Industry on 25 May 2005

25-May-05	Christina Burridge	BC Salmon Marketing Council (BCSMC)
	Rob Morley	Canadian Fishing Company
	Alistair Thomson	DFO
	Bert Ionson	DFO
	Chuck Parken	DFO
	Dave Peacock	DFO
	Diana Dobson	DFO
	James Boland	DFO
	Paul Ryall	DFO
	Steve Groves	DFO
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Karl English	LGL
	Sandy Argue	MAFF
	Rich Lincoln	MSC
	Murray Chatwin	Ocean Fisheries Ltd.
	Mike Lapointe	PSC
	Chet Chaffee	SCS

Table 7.4.C. Full Assessment Meetings with Management Personnel and Industry on 26 May 2005

26-May-05	Christina Burridge	BC Salmon Marketing Council (BCSMC)
	Rob Morley	Canadian Fishing Company
	Dave Peacock	DFO
	James Boland	DFO
	James Boland	DFO
	Mark Potyrala	DFO
	Mark Saunders	DFO
	Paul Ryall	DFO
	Steve Groves	DFO
	Chief Harry Nyce Sr.	Director. Fish and Wildlife, Nisga'a Lisisms
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Karl English	LGL
	Sandy Argue	MAFF

	Rich Lincoln	MSC
	Greg Taylor	Northern Processors Assoc.
	Murray Chatwin	Ocean Fisheries Ltd.
	Chet Chaffee	SCS

Table 7.4.D. Full Assessment Meetings with Management Personnel and Industry on 27 May 2005

27-May-05	Christina Burridge	BCSMC
	James Boland	DFO
	Andrew Thomson	DFO - Aquaculture
	Sue Farlinger	DFO-Habitat
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Karl English	LGL
	Al Castledine	MAFF
	Jamie Alley	MAFF
	Sandy Argue	MAFF
	Rich Lincoln	MSC
	Chet Chaffee	SCS

Table 7.4.E. Full Assessment Meetings with Stakeholders on 24 May 2005

Date	Name	Affiliation
24-May-05	Bill Wareham	David Suzuki Foundation (DSF)
	Jeffery Young	David Suzuki Foundation (DSF)
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Dave Levy	Levy Research
	Bob Bocking	LGL
	Karl English	LGL
	Rich Lincoln	MSC
	Chet Chaffee	SCS
	Ken Wilson	Sierra Club BC
	R. John Nelson	Sierra Club BC
	Vicky Husband	Sierra Club BC

Table 7.4.F. Full Assessment Meetings with Stakeholders on 27 May 2005

27-May-05	Otto Langer	David Suzuki Foundation (DSF)
	Dana Schmidt	Golder
	Jim Joseph	Independent
	Karl English	LGL
	Rich Lincoln	MSC
	Chet Chaffee	SCS
	Terry Glavin	Sierra Club BC
	Vicky Husband	Sierra Club BC

In addition to the meetings that SCS held with stakeholder in the conservation sector (see Table 3f above), SCS met with a few members of the MCC (Marine Conservation Caucus in BC) on different occasions to provide updates on activities. Also, SCS made a significant effort (through emails, faxes, couriered packages, and phone calls) to both contact and speak directly with First Nations organizations associated with the fishing and fisheries management of salmon in British Columbia, Canada. Although these efforts were made, SCS was unable to gain any traction with First Nations. Two alternative approaches were also used to try and improve on the communications with First Nations. First, Ken Wilson was asked by SCS to use his contacts amongst First Nations to try and determine if First Nations would like to provide any comments, of any kind, to SCS regarding the assessment of the Canadian government's management of salmon fisheries. This too yielded little result, except for increasing the awareness of First Nations groups about the ongoing assessment. Second, Mr. Karl English, a member of the assessment team, offered to assist SCS in getting in touch with First Nations organizations. While discussing other aspects of fisheries with various groups, Mr. English also explained the activities and overall aspects of the MSC assessment for sockeye salmon. In June 2005, representatives from the BC Aboriginal Fisheries Commission (BCAFC), Cowichan Tribes and Secwepemc Fisheries Commission requested an opportunity to meet with Mr. English, a member of the SCS evaluation team. In the interest of efficiency SCS agreed and Karl English met with each of these groups on the following dates: June 9, 2005 for the BCAFC, June 30, 2005 for Cowichan Tribes, and July 29, 2005 for the Secwepemc Fisheries Commission. Subsequent to these meeting the Secwepemc Fisheries Commission submitted a letter, dated August 3, 2005, to SCS describing their concerns related to MSC Certification of BC Salmon Fisheries (see Vol 2: Appendix 4).

8.0 MSC Sockeye Stock Status and Trends

Stock Status and Trends

During the initial fishery reviews and scoring process conducted in 2005, the assessment team was provided estimates of the annual harvest and escapement for each of the four sockeye fisheries through 2003 or 2004 depending on the fishery. Concerns have been raised regarding the currency of the information used to derive the scores in the July 2009 sockeye evaluation report and the potential for changes in stock status or trends over the past 4 years. This section has been added to the report to provide up to date information on stock status and trends for each of the BC sockeye unit of certification fisheries under review.

Nass and Skeena Sockeye

Estimates of the total annual abundance (catch and escapement) for Nass and Skeena sockeye are derived from annual run reconstruction estimate prepared by the PSC Northern Boundary Technical Committee (English et al. 2004; 2005; Alexander et al. 2009). These analyses require estimates of the stock composition of harvests in Northern Boundary (AK / BC) sockeye fisheries which were initially derived from the 1982-83 international tagging studies (English et al. 1984; Gazey and English 2000) and are currently derived from analyses of scale samples from Alaskan fisheries and DNA samples from Canadian fisheries. The Alaska scale sample results are typically provided 12-14 months after the fishing season so the most recent run reconstruction results available for Nass and Skeena sockeye are through 2007 (Alexander et al. 2009). Figures 2 and 4 show a summary of the 1982-07 abundance estimates for Nass and Skeena sockeye in relation to the Limit Reference Points (LRPs) and Target Reference Points (TRPs) defined for these stocks.

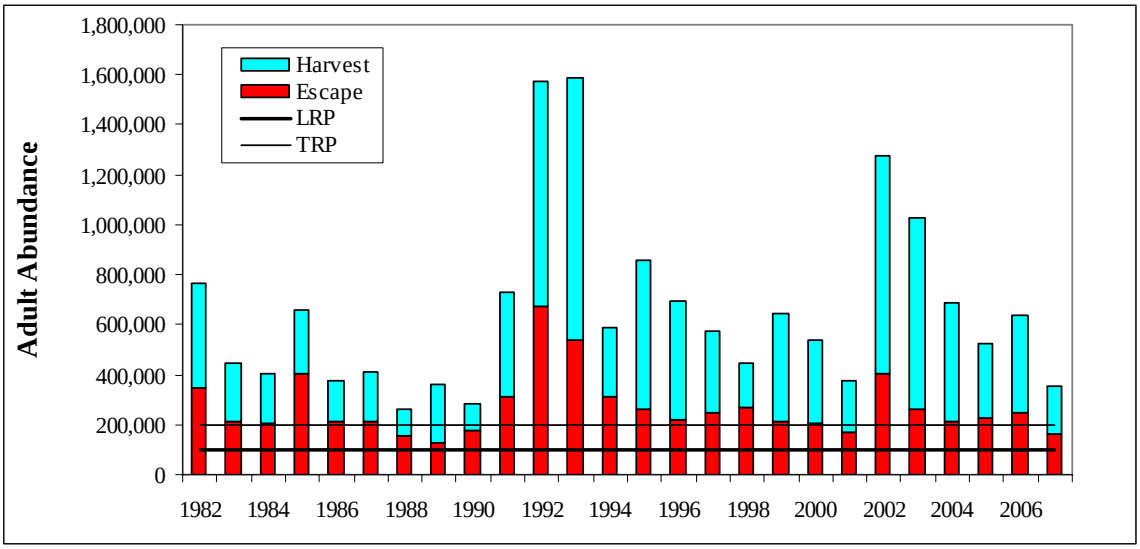


Figure 2. Annual estimates of the number of Nass sockeye that escape to spawning areas within the Nass watershed (escapement), the harvest of Nass sockeye stocks in Canadian fisheries and the management escapement goals (LRP and TRP) for Nass sockeye, 1982-07.

Escapement estimates for Nass sockeye have been consistently above the LRP for Nass sockeye and at or above the TRP in 8 of the past 10 years (Figure 2). Nass sockeye escapement has been less than the TRP 5 times in this 26 year period. Nass sockeye are currently managed using an aggregate escapement goal of 200,000 for all Nass stocks and a goal of 160,000 for the Meziadin CU. Since 1992, the annual total escapement estimates for Nass sockeye have been derived by using mark-recapture data to estimate escapement to the lower Nass River at Gitwinksilkhw and subtracting catch estimates for in-river fisheries between Gitwinksilkhw and the spawning areas. Escapement estimates for the Meziadin CU have been derived from rigorous counts at the Meziadin fishway. Escapement trends for all non-Meziadin CUs are monitored by subtracting the Meziadin counts from the total Nass escapement estimate (Figure 3). The escapement estimates are available for some specific non-Meziadin CUs but these estimates tend to be less reliable or intermittent. The escapement estimates for non-Meziadin stocks indicate that these stocks usually represent 15-40% of the total escapement, averaging 31% over the past 10 years; which is very close to the long term average of 30%.

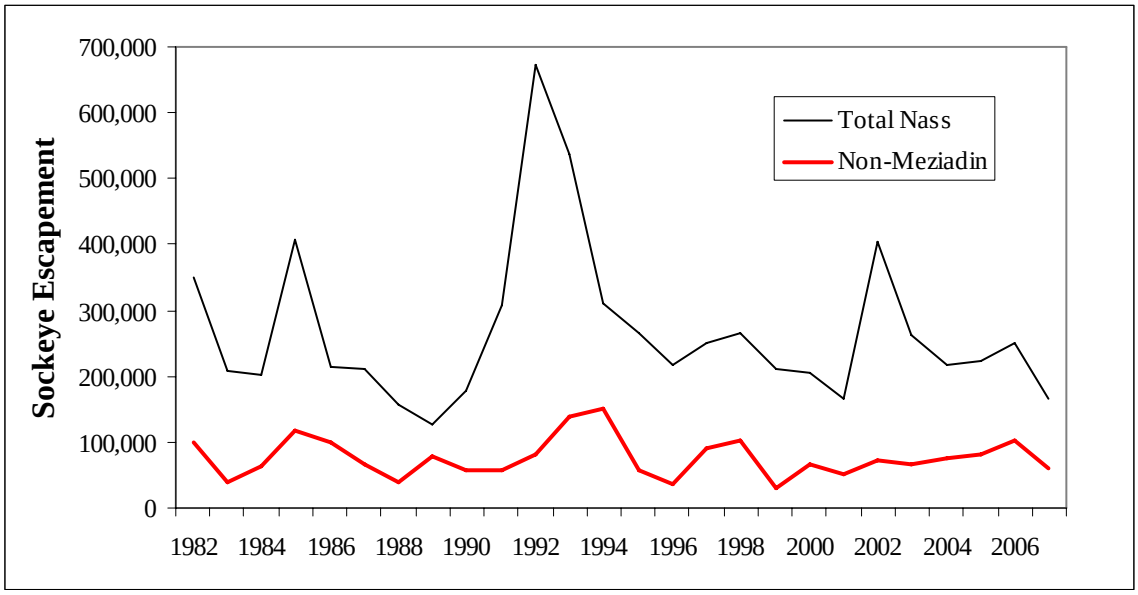


Figure 3. Annual escapement estimates for Nass sockeye and the non-Meziadin component of Nass sockeye stocks, 1982-2007.

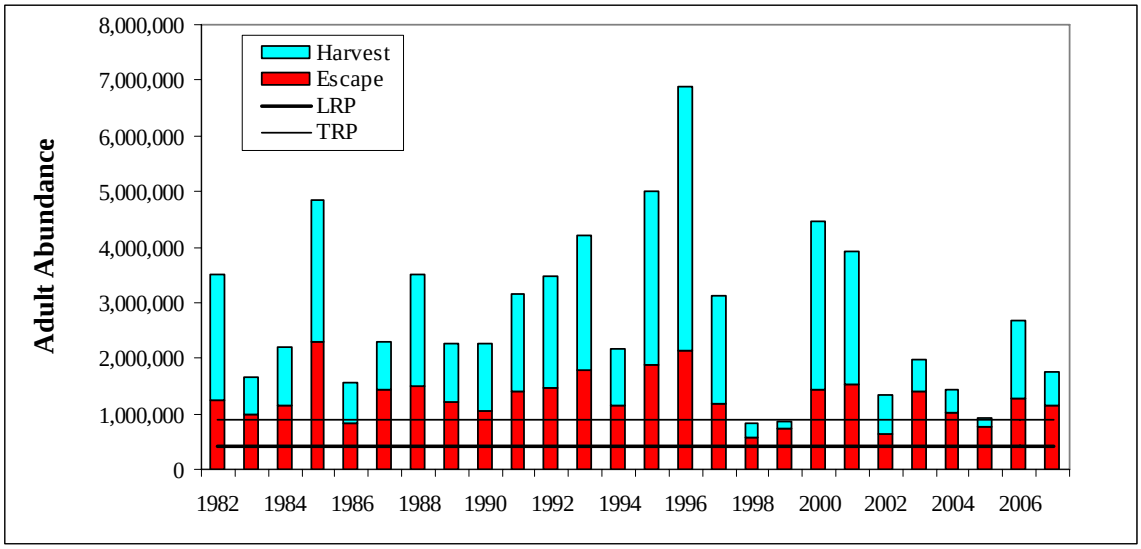


Figure 4. Annual estimates of the number of Skeena sockeye that escape to spawning areas within the Skeena watershed (escapement), the harvest of Skeena sockeye stocks in Canadian fisheries and the management escapement goals (LRP and TRP) for Skeena sockeye, 1982-07.

Escapement estimates for Skeena sockeye have been consistently above the Skeena sockeye LRP and at or above the TRP in 6 of the past 10 years (Figure 4). Skeena sockeye escapement has been less than the TRP 5 times in this 26 year period. In three of those years (1998, 1999 and 2005), the pre-season forecast indicated that the total return to Canada would be at or below the TRP, so Canadian fisheries targeting Skeena sockeye were limited to First Nation fisheries for food, social or ceremonial purposes (FSC).

Skeena sockeye are currently managed using an aggregate escapement goal of 900,000 for all Skeena stocks, with 85-90% of the sockeye spawning within the Babine Lake CU. Escapement to Babine Lake is monitored using a counting fence. Escapement estimates for most non-Babine stocks are derived from visual surveys. The observed escapement for non-Babine stocks are typically expanded by 3.6 to account for low observer efficiencies and spawning areas not surveyed (Cox-Rogers, DFO Prince Rupert, pers. comm.). The total escapement estimate for Skeena sockeye is derived by adding the estimate for non-Babine stocks to the Babine fence count and subtracting fishery removals at or above the Babine fence (Figure 5). The escapement estimates for non-Babine stocks indicate that these stocks usually represent 7-16% of the total escapement, averaging 12% over the past 10 years; which is identical to the long term average.

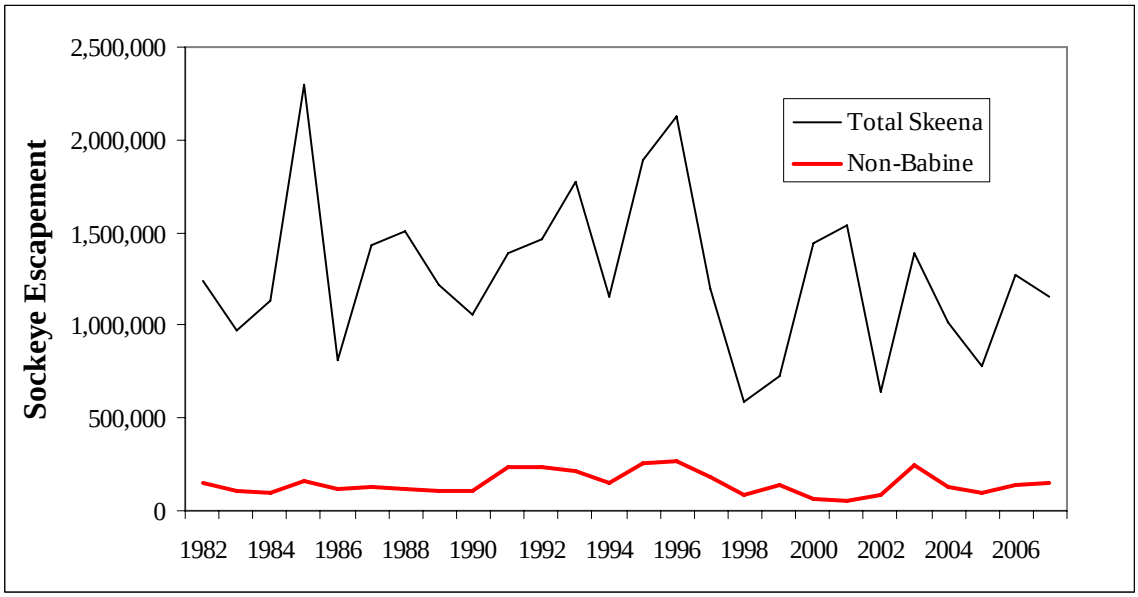


Figure 5. Annual escapement estimates for Skeena sockeye and the non-Babine component of Skeena sockeye stocks, 1982-2007.

Escapement trends for the Babine CU and 16 of the non-Babine CUs within the Skeena watershed have been compiled and presented in the SISRP report (Walters et al. 2008). Appendix D of the SISRP report provided the following description of escapement trends for Skeena sockeye CUs:

> *"Escapement trends for Skeena sockeye CUs are provided in Figures D1-D4. Most of the sockeye CUs show a large amount of interannual variability in escapement. The Club Lake sockeye CU is the only sockeye CU with reliable escapement data that shows a clear declining trend during the 1982-06 period and the escapement estimates of this CU have been consistently low since 1999. It should be noted that Figures D1-D4 define the recent escapement trends for 17 sockeye CU. The available data are not sufficient to define escapement trends for the other 8 sockeye CUs which include some very small and potentially threatened stocks (e.g. Maxan Lake)."*

Barkley Sound Sockeye

Estimates of the total annual abundance (catch and escapement) for Somass River component of the Barkley Sound sockeye stocks were derived by summing the sockeye catch estimates for all Area 23 fisheries (First Nation, commercial and recreational) and the escapement estimates for the Sproat Lake and Great Central Lake sockeye CUs (Diana Dobson, DFO Nanaimo, pers. comm.). These two CUs represent the vast majority of the sockeye spawning in Barkley Sound and the escapements estimates for these stocks are obtained using electronic fish counters located in fishways near the outlet for each of these lakes. Escapement estimates for the other Barkley Sound sockeye CU (Henderson Lake) are much less reliable and are currently under review. Figure 6 show a summary of the 1980-07 abundance estimates for Somass sockeye in relation to the Limit Reference Points (LRPs) and Target Reference Points (TRPs) defined for these stocks.

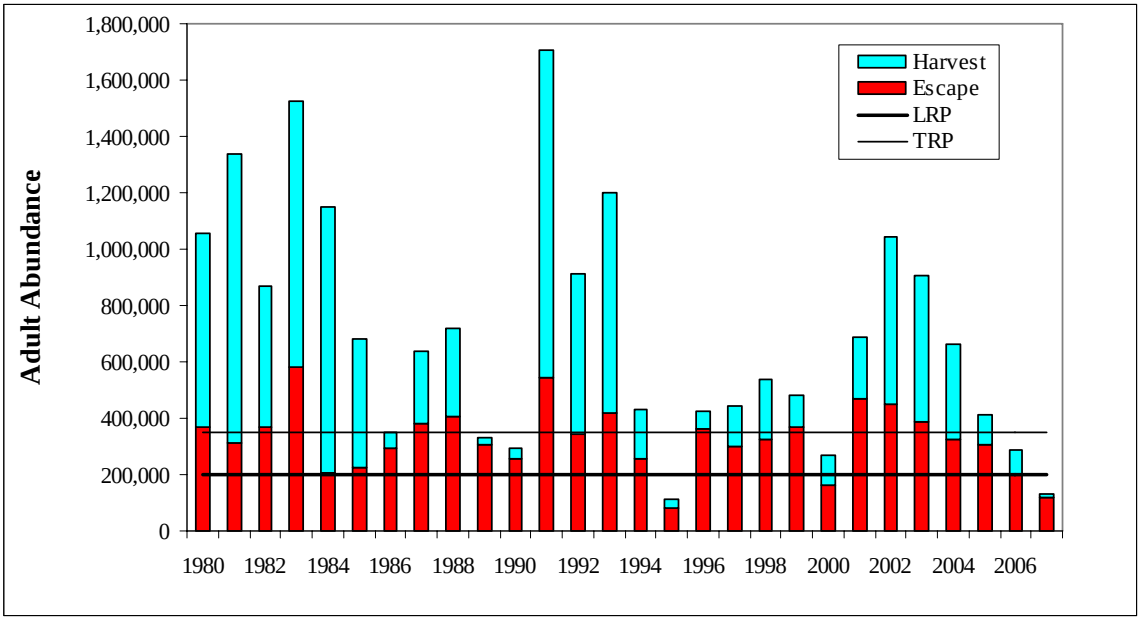


Figure 6. Annual estimates of the number of Somass sockeye that escape to spawning areas within the Somass watershed (escapement), the harvest of Somass sockeye stocks in Canadian fisheries and the management escapement goals (LRP and TRP) for Somass sockeye, 1980-07.

The escapement for Somass sockeye has been above the LRP in 8 of the last 10 years but below TRP in 6 of these years. Somass sockeye escapement has been less than the LRP 3 times in this 28 year period. In two of these years (1995 and 2007), Canadian fisheries targeting Somass sockeye were limited to First Nation fisheries for food, social or ceremonial purposes (FSC).

Barkley sockeye fisheries are currently managed using an interim escapement goal of 400,000 for Somass sockeye. Time and area restrictions are used to minimize the harvest of Henderson Lake sockeye when returns are large enough to support marine commercial and recreational fisheries for Somass River sockeye. As indicated above, the escapement estimates for Henderson Lake sockeye are much less reliable than those for Somass River stocks but they do provide an indication of the relative magnitude of these stocks (Figure 7). The escapement estimates for Henderson sockeye usually represent less than 10% of the total escapement for Barkley Sound stocks, averaging 4% over the past 10 years; which is less than the long term average of 7% for 1980-07.

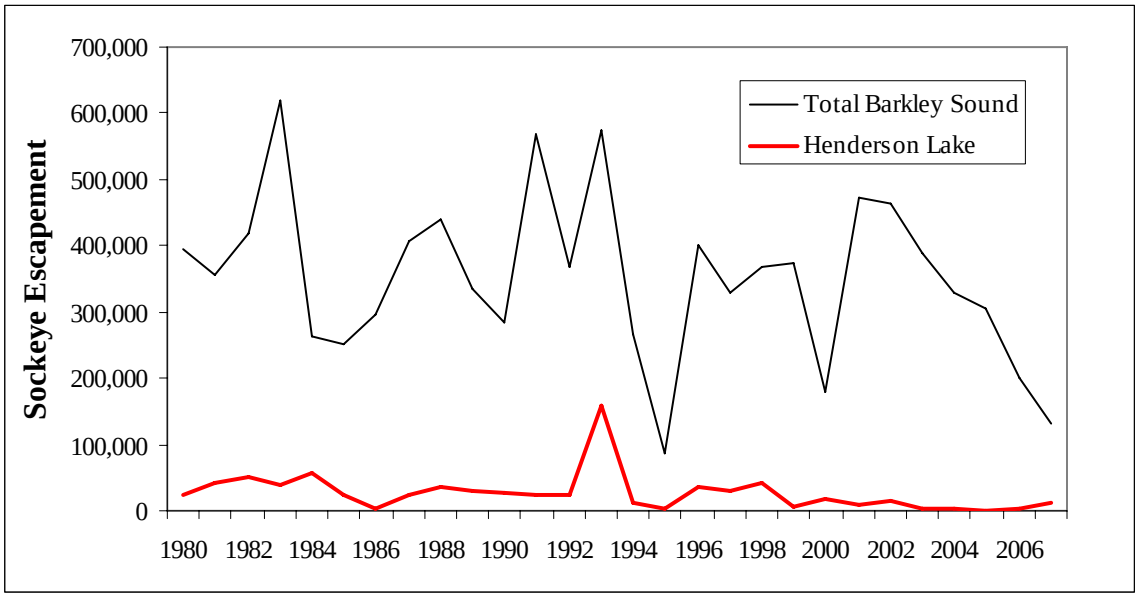


Figure 7. Annual escapement estimates for Barkley Sound sockeye and the Henderson Lake component of Barkley Sound sockeye stocks, 1980-2007.

Fraser Sockeye

Fraser sockeye fisheries are managed by an international panel to achieve year specific harvest rate or escapement goals for each of four run-timing groups. The definition of management goals (LRPs and TRPs) for Fraser sockeye is complicated by the historical pattern of cyclic dominance for several of the largest sockeye CUs. This cyclic dominance pattern can result in returns being more than 100 times larger on the dominant cycle line than off-cycle lines. Since most Fraser sockeye return at age 4, the dominant, sub-dominant and off-cycle patterns have been maintained for these cyclic dominant CUs over many years. Consequently, through the Fraser River Sockeye Spawning Initiative (FRSSI), DFO has defined the "operational reference points" for Fraser sockeye relative to the average of the 4-yr sequence of escapements for each of the 19 indicator stocks (Table 8.1, DFO 2009). The Fraser River Sockeye Spawning Initiative (FRSSI) has been a multi-year collaborative planning process to develop a long-term escapement strategyFraser River. The interim benchmarks for low escapement for each indicator stock are the current operational equivalents for the LRPs. These low escapement benchmark values are the highest value out of the following five alternatives calculated for each stock:

- 20% of the average of the 4-yr sequence of escapements that maximizes recruitment (Bayesian estimate, Larkin fit)
- 40% of the average of the 4-yr sequence of escapements that maximizes recruitment
- 20% of the average of the 4-yr sequence of escapements that maximizes the log of recruitment
- 40% of the average of the 4-yr sequence of escapements that maximizes the log of recruitment
- Smallest observed 4-year average.

The low escapement benchmark for each of the four run-timing groups is the sum of the benchmarks for the identified indicator stocks within each run-timing group.

Table 8.1. Operational reference points for Fraser sockeye by run-timing group (information extracted from Fraser Sockeye Escapement Strategy 2009, DFO 2009).

		Five Alternatives for Low Escapement Benchmark					**Low Esacpement Benchmark** max. of five alternatives (Max. LRP)	**Fixed Escapement Target** "No Fishing Point" (Min. TRP)
		Production BM x% of average for optimal 4yr escapement sequence				**Potential Conservation Reference Point** Smallest Observed 4yr average		
Timing Group	Indicator Stocks	% of max. run size 20%	% of max. run size 40%	% of max. log(run size) 20%	% of max. log(run size) 40%			
Early Stuart								
	E. Stuart	25,200	50,300	24,100	48,300	10,200	50,300	108,000
Early Summer								
	Bowron	2,500	4,900	2,500	4,900	3,000	4,900	
	Fennell	1,100	2,200	1,100	2,200	500	2,200	
	Gates	1,700	3,500	1,100	2,300	1,500	3,500	
	Nadina	2,900	5,700	2,000	3,900	5,800	5,800	
	Pitt	3,400	6,800	3,400	6,800	11,200	11,200	
	Raft	2,600	5,200	2,500	4,900	2,600	5,200	
	Scotch	900	1,800	2,000	4,000	2,200	4,000	
	Seymour	9,500	19,000	9,500	19,000	9,100	19,000	
	total	24,600	49,100	24,100	48,000	35,900	55,800	120,000
Summer								
	Chilko	66,400	132,900	66,400	132,900	164,500	164,500	
	Late Stuart	39,100	78,300	39,100	78,300	29,500	78,300	
	Quesnel	77,300	154,500	41,100	82,200	7,800	154,500	
	Stellako	22,700	45,400	22,700	45,400	37,000	45,400	
	total	205,500	411,100	169,300	338,800	238,800	442,700	520,000
Lates								
	Birkenhead	19,700	39,300	19,700	39,300	23,200	39,300	
	Cultus	3,700	7,300	3,700	7,300	1,800	7,300	
	Harrison	2,000	4,100	2,000	4,100	3,600	4,100	
	Portage	100	300	600	1,200	1,300	1,300	
	Weaver	8,900	17,800	8,600	17,300	14,500	17,800	
	L. Shuswap	111,100	222,100	111,100	222,100	320,500	320,500	
	total	145,500	290,900	145,700	291,300	364,900	390,300	500,000
Total		400,800	801,400	363,200	726,400	649,800	939,100	1,248,000

The definition of the current operational equivalent, as defined by the FRSSI,for the target reference point is even more complex:

> *"Escapement strategies in the FRSSI model are defined as a Total Allowable Mortality Rule (TAM rule) that specifies the total allowable mortality rate at different run sizes. The escapement strategies are designed around three fundamental considerations (Figure 1 in the 2009 Escapement Memo):*

- *No fishing at very low run size, except for test fishing. The No-Fishing point is intended to keep component Conservation Units out of the red zone (see p. 8 in DFO 2009) with a specified risk tolerance.*
- *Fixed escapement at low run sizes to protect the stocks and reduce process-related challenges at this critical stage (e.g. uncertain run size)*
- *Fixed total allowable mortality rate at larger run sizes. This cap on mortality serves two purposes: It ensures robustness against uncertainty (e.g. estimates of productivity and capacity, changing run-size estimates) and protects stocks that are less abundant, less productive, or both.*

This approach is equivalent to specifying a target escapement that changes with run size. For example, if the total allowable mortality for a run size of 1 Million is 60%, then the corresponding target escapement is 400,000 and the available exploitation rate for a run size greater than 1 Million is 60% minus a management adjustment which accounts for the difference between fish counted at Mission and fish counted on the spawning grounds.

The exact shape of the escapement strategy for each management group (i.e. the run sizes at which it changes from no fishing to fixed escapement, and then to a fixed mortality rate) is selected based on simulated performance and reviewed annually in public consultation.

These escapement strategies specify 3 operational reference points: Cap on allowable mortality, No-fishing point, and Cut-back point."

Table 8.1 provides these ORP for each of the four timing groups. DFO has indicated that

"The fixed escapement target over the run size range between the "Cut-back point" and the "No fishing point" is therefore interpreted as the lower end of the target range (i.e. this is the escapement we are trying to maintain by reducing total allowable mortality as run size decreases)."

In Figures 8 - 11 (provided by DFO), the line labeled "No Fishing Point" is the operational equivalent to the TRP line and the line labeled "Low Escap BM" is the operational equivalent to the LRP line.

The 4yr average escapement for Early Stuart sockeye has been above the Low Escapement Benchmark (LEB) for most of the years since 1970 and 7 of the last 10 years (Figure 8). The 4yr average escapement dropped below the LEB line from 2005-08 because of the very low returns from 2002-2008. No commercial fisheries have been permitted to target Early Stuart sockeye stocks during this period and First Nation fisheries for FSC purposes have been very limited.

The 4yr average escapement for Early Summer sockeye has been consistently above the LEB for this run-timing group since 1975 (Figure 9). In fact, there are no years since 1990 when the annual total escapement for this run-timing group has been less than the LEB. . The Early Summer sockeye run-timing group includes 8 indicator stocks with defined LEBs. We compared these LEBs with the historical escapement estimates for these stocks. Since the early 1980's, the 4yr moving averages of the annual escapement estimates have consistently exceeded the LEBs for each of the Early Summer indicator stocks, except Bowron sockeye. The 4yr moving average for Bowron sockeye was consistently above the Bowron LEB prior to 2006 but lower than the LEB in 2007 and 2008. Fisheries were not permitted to target the Bowron stocks and other components of the Early Summer run-timing group in these two years.

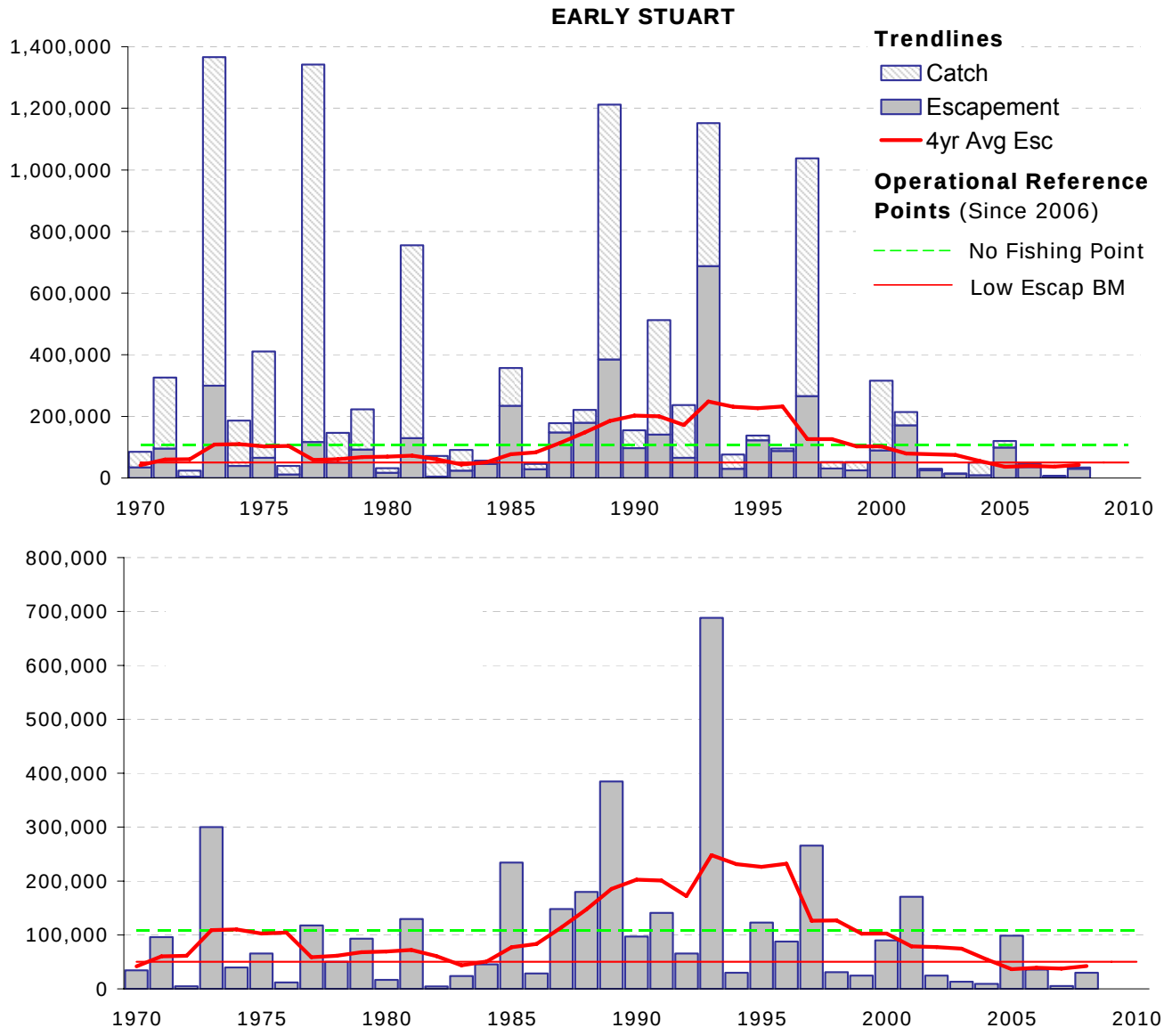


Figure 8: Catch, escapement and operational reference points for Early Stuart sockeye. The top panel shows catch and escapement over the last 40 years relative to the two operational reference points developed through the FRSSI process and implemented since 2006. The lower reference point (thin red line=50,300) is the interim benchmark intended to delineate low escapement for this stock, and should be compared to the 4-yr running average of escapement (thick red line). The upper reference point (green dashed line=108,000) corresponds to the *No Fishing Point* in the TAM rule for Early Stuart (i.e. this is the target escapement at lower run sizes, triggering a reduction in total allowable mortality – refer to TAM rule explanation earlier). The lower panel plots only escapement, to better illustrate the strong 4-year cycle pattern and the peak in the late 1980s and early 1990s (across cycle lines).

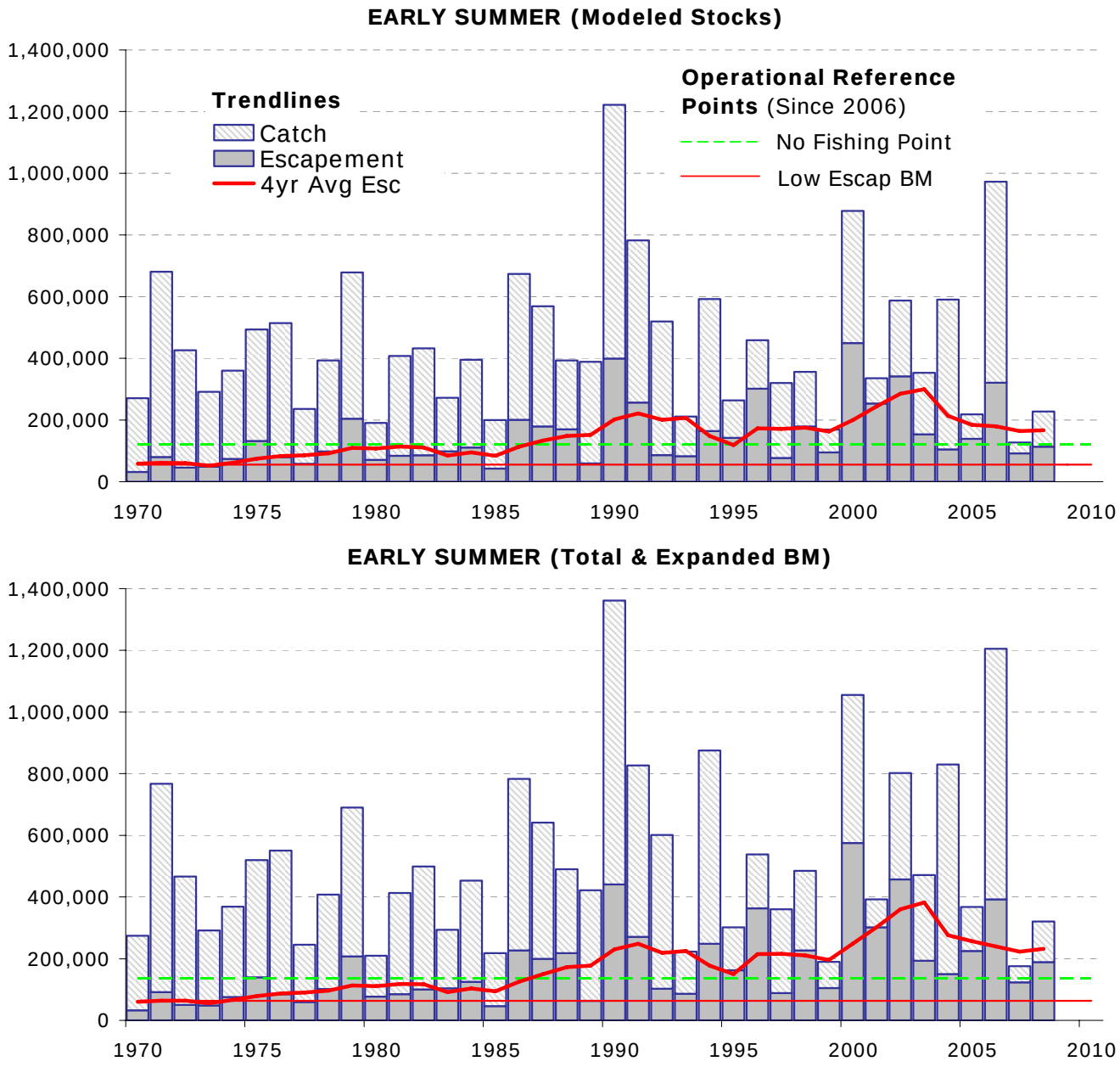


Figure 9: Catch, escapement and operational reference points for Early Summer sockeye. The Early Summer run timing group includes 8 stocks: Bowron, Fennel, Gates, Nadina, Upper Pitt, Raft, Scotch, and Seymour, as well as variable contribution from miscellaneous populations. Both panels show catch and escapement over the last 40 years relative to the two operational reference points developed through the FRSSI process and implemented since 2006. The top panel shows only the 8 modeled stocks. Here the lower reference point (thin red line=55,800) is the sum of the interim benchmarks intended to delineate low escapement for each stock, and should be compared to the 4-yr running average of escapement (thick red line). The upper reference point (green dashed line=120,000) corresponds to the *No Fishing point* in the TAM rule for the Early Summer timing group (i.e. this is the target escapement at lower run sizes, triggering a reduction in total allowable mortality). The lower panel shows the same for the total Early Summer group, with benchmarks scaled up to account for the long-term average contribution of miscellaneous populations (12%).

The 4yr average escapement for Summer sockeye has been consistently above the LEB for this run-timing group since 1980 (Figure 10). The annual total escapement for this run-timing group dropped below the LEB once in the past 10 years (2004), when in-river migratory conditions resulted in substantial mortalities between Mission and the spawning grounds. In 2007 and 2008, when escapements have approached the LEB, commercial fisheries were not permitted and First Nation fisheries for FSC purposes were substantially reduced. The Summer sockeye run-timing group includes 4 indicator stocks with defined LEBs. These LEBs were compared with the historical escapement estimates for these stocks and confirmed that the 4yr moving averages of the annual escapement estimates have consistently exceeded the LEBs for each of the Summer indicator stocks since the early 1980's.

The 4yr average escapement for Late-run sockeye has been consistently above the LEB for this run-timing group since 1970 (Figure 11). The LEB and 4yr average values are heavily influenced by the dominant cycle line, where run size can be 100 times larger than those observed in off-cycle years. Consequently, the annual total escapement for this run-timing group is usually substantially above the LEB in dominant cycle years (e.g. 2002), close to the LEB in sub-dominant cycle years (e.g. 2003), and less than the LEB for the two off-cycle years (e.g. 2000 and 2001). As for the other run-timing groups, commercial fisheries are closed or very limited in years when run sizes approach the LEB and most of the catch is taken in First Nation FSC fisheries. In recent years, fishing opportunities in dominant cycle years (e.g. 1998, 2002, 2006) have been greatly reduced from historical levels due to conservation concerns related to Cultus sockeye. The 4yr running average of the annual escapement estimates have been consistently below the LEB for Cultus sockeye since 1990 (Figure 12). Prior to 1996, fisheries harvested a substantial portion of the annual return for Cultus sockeye but fisheries restrictions implemented in 1998 have resulted in very limited harvests of Cultus sockeye over the past 10 years. In addition to Cultus, the Late-run timing group includes 5 indicator stocks. The LEBs for these other indicator stocks were compared with the historical escapement estimates and we confirmed that the 4yr moving averages of the annual escapement estimates have consistently exceeded the LEBs for each of these stocks since the early 1970's.

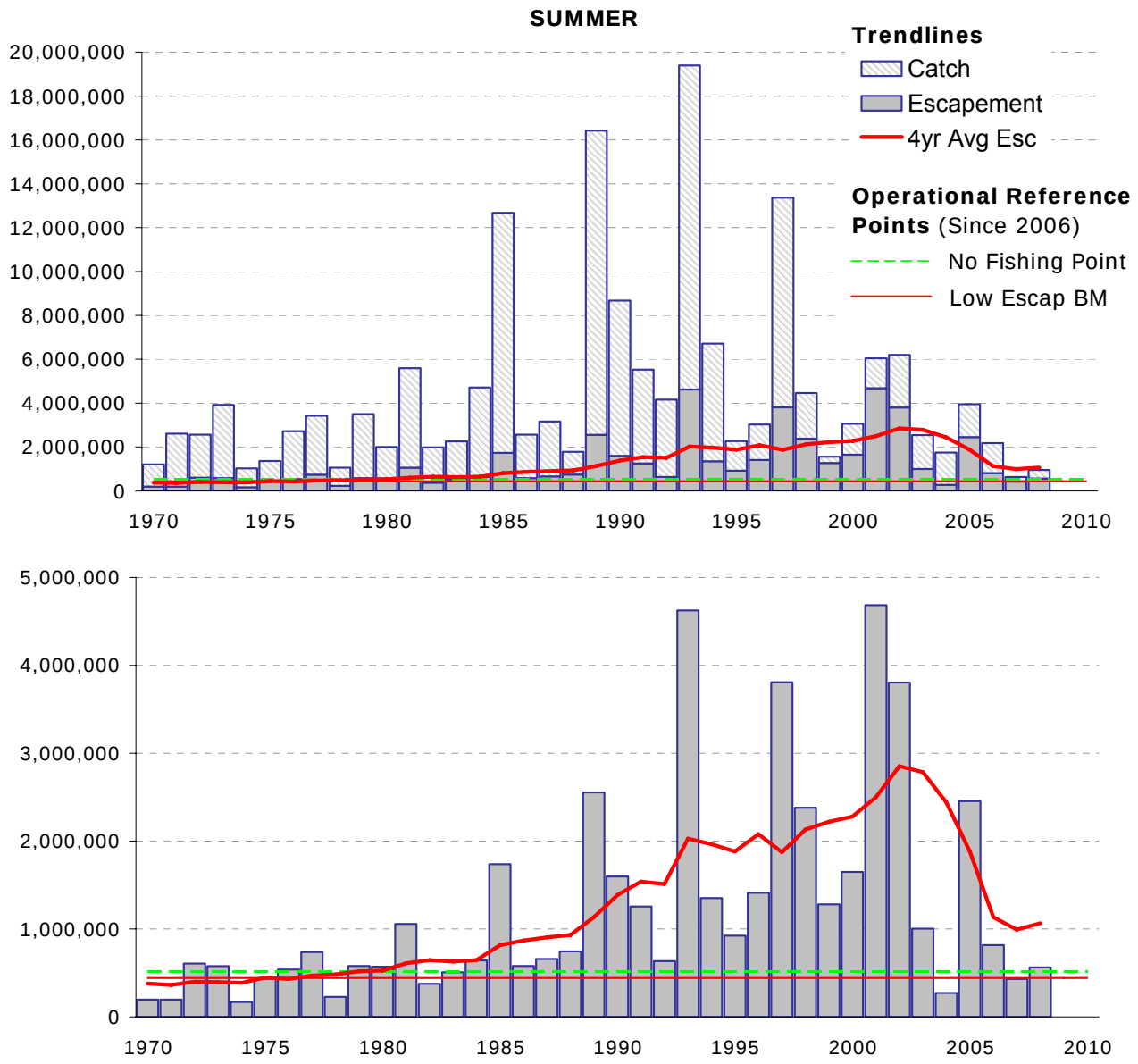


Figure 10: Catch, escapement and operational reference points for Summer-run sockeye. The Summer run timing group includes 4 stocks: Chilko, Quesnel, Late Stuart, and Stellako. Quesnel and Late Stuart follow a pronounced 4-year cyclic pattern. The top panel shows catch and escapement over the last 40 years relative to the two operational reference points developed through the FRSSI process and implemented since 2006. The lower reference point (thin red line=442,700) is the sum of the interim benchmarks intended to delineate low escapement for each stock, and should be compared to the 4-yr running average of escapement (thick red line). The upper reference point (green dashed line=520,000) corresponds to the *No Fishing Point* in the TAM rule for the Summer timing group (i.e. this is the target escapement at lower run sizes, triggering a reduction in total allowable mortality – refer to TAM rule explanation earlier). The lower panel plots only escapement, to better illustrate the observed pattern. The two reference points fall close together numerically, for three reasons: (1) Interpretation of the lower reference point in a mixture of cyclic and non-cyclic stocks (i.e. 4yr average mainly driven by dominant year). (2) Productivity and capacity estimates shaped by recent peak abundances leading to high stock-specific benchmarks. (3) TAM rule specifying a gradual decline in TAM between the cut-back point of 1.3 Million and the no fishing point of 520,000 (i.e. fixed target escapement over this range).

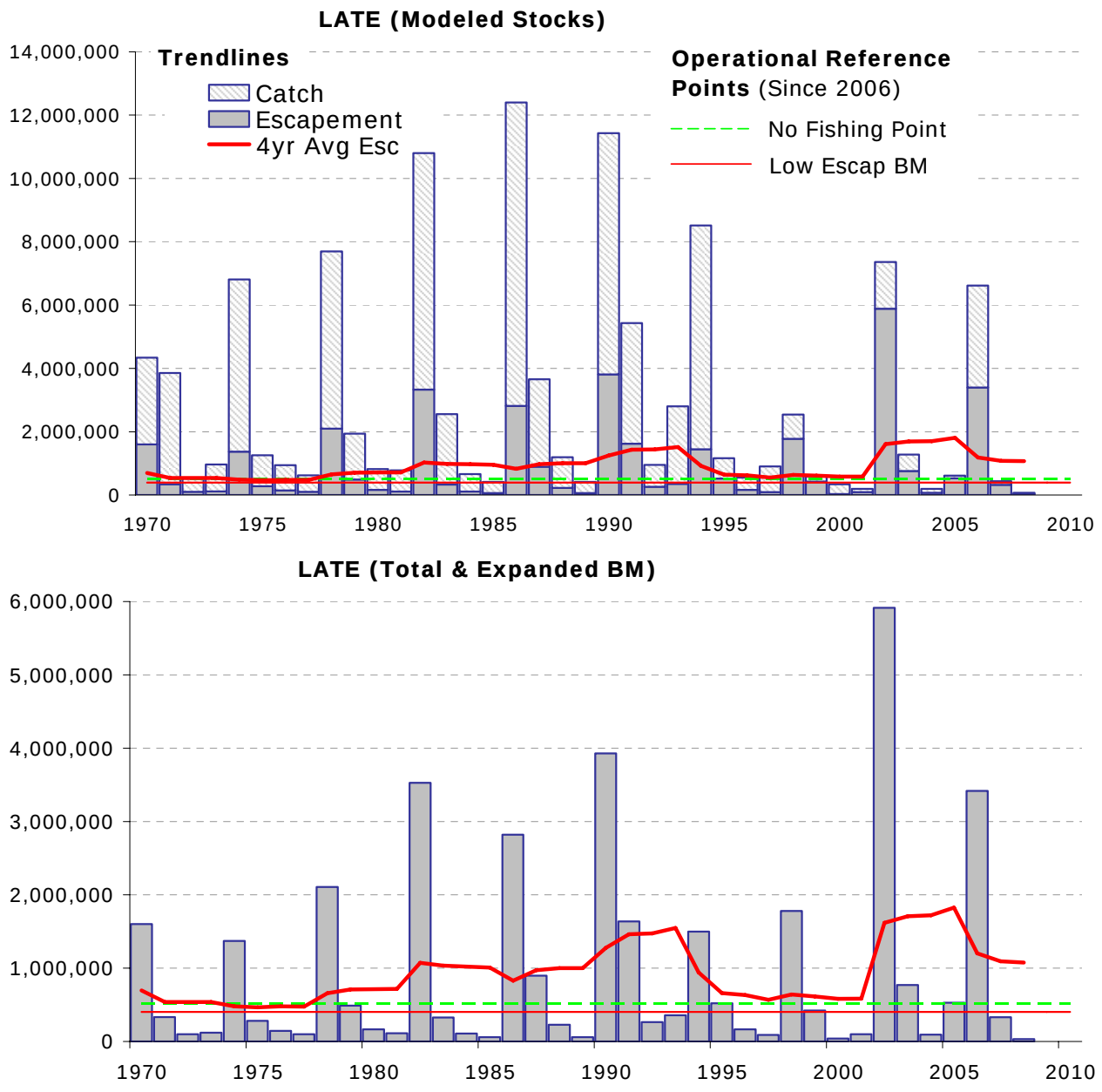


Figure 11: Catch, escapement and operational reference points for Summer-run sockeye. The Late run timing group includes 6 stocks: Late Shuswap (incl. Adams, Lower Shuswap), Birkenhead, Weaver, Cultus, Harrison, and Portage, as well as variable contribution from miscellaneous populations. Late Shuswap follow a pronounced 4-year cyclic pattern. The top panel shows catch and escapement over the last 40 years relative to the two operational reference points developed through the FRSSI process and implemented since 2006. The lower reference point (thin red line=390,300) is the sum of the interim benchmarks intended to delineate low escapement for each stock, and should be compared to the 4-yr running average of escapement (thick red line). The upper reference point (green dashed line=500,000) corresponds to the *Minimum ER point* in the TAM rule for the Late timing group (i.e. this is the target escapement at lower run sizes, triggering a reduction in total allowable mortality down to an ER floor of 20%. The lower panel plots only escapement, to better illustrate the observed pattern. The two reference points fall close together numerically, for two reasons: (1)

Interpretation of the lower reference point in a mixture of cyclic and non-cyclic stocks (i.e. 4yr average mainly driven by dominant year of Late Shuswap). (2) TAM rule specifying a gradual decline in TAM between the cut-back point of 1 Million and the *Minimum ER* point of 500,000 (i.e. fixed target escapement over this range, below this point the strategy switches to an ER floor of 20%). *Note that this figure does not account for variable and frequently substantial amounts of en-route losses for this timing group.*

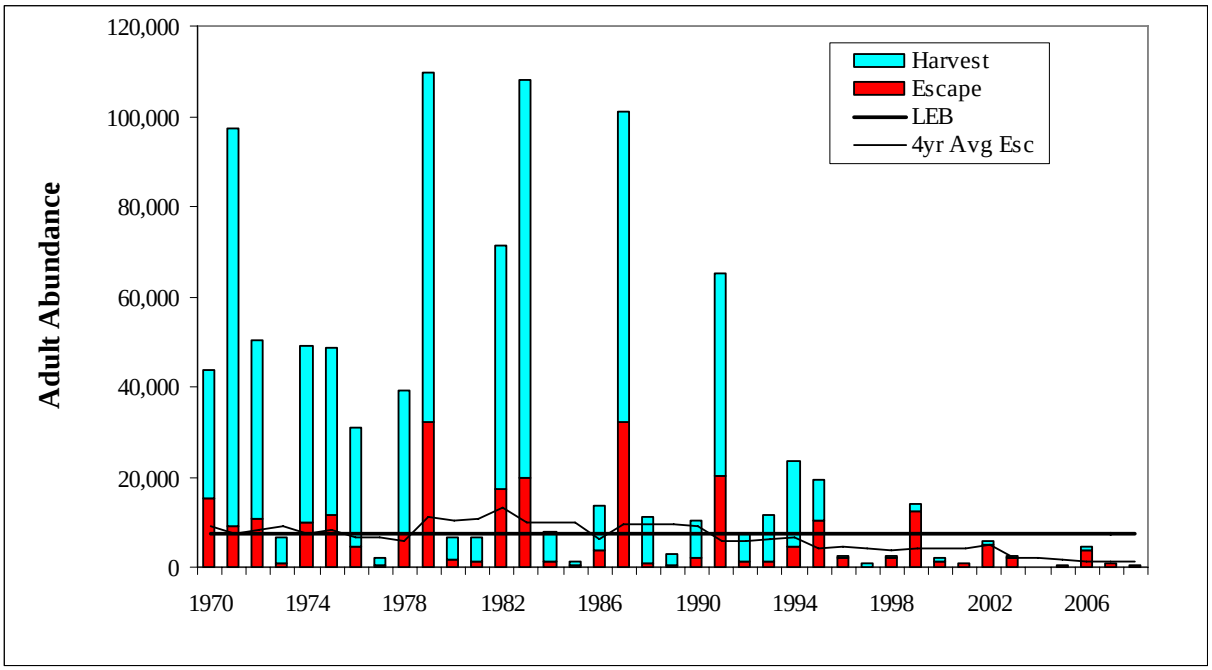


Figure 12. Annual escapement and harvest estimates for Cultus Lake sockeye along with the 4yr running average of escapement and Low Escapement Benchmark (LEB) for Cultus sockeye, 1970-08.

9.0 IUCN Listing of Sockeye

On 8 October 2008, The International Union for the Conservation of Nature (IUCN) placed sockeye salmon on the IUCN Red List of Threatened Species based on an evaluation process documented in: http://www.stateofthesalmon.org/IUCN/downloads/IUCN_Red_List_Assessment_for_Oncorhynchus_nerka_24S.

The IUCN report states that: "At the global population level, sockeye salmon were assigned a Red List status of Least Concern (LC)". Using their evaluation criteria, they found no evidence of a threat to the global population of sockeye salmon. However, at the sub-population level they found that "sockeye populations inhabiting southern portions of their range are in decline whereas those in northerly regions are generally stable.

Within British Columbia, sockeye sub-populations that spawn within the Nass watershed and Barkley Sound were given a rating of LC while both the Skeena and Fraser watersheds included sub-populations with more threatened ratings. Within the Skeena, two sub-population were listed as Endangered (Lower Skeena and Upper Skeena) and one as Critically Endangered (Nanika). Within the Fraser, one sub-population was listed as Vulnerable (Widgeon), three as Endangered (Chilliwack, Bowron, and the middle Fraser), and one as Critically Endangered (Gates).

Skeena Sockeye

The IUCN assessment listed three sub-populations within the Skeena watershed with endangered (Lower Skeena and Upper Skeena) or critically endangered ratings (Nanika). Each of these sub-populations includes stocks or CUs that have been previously identified as stocks of concern and historical trends for these CUs were assess as part of the Skeena ISRP process (Walters et al. 2008) and the Team's rescoring of the Skeena sockeye fishery. The Lower Skeena sub-population included four sites (Alistair, Southend, Kitsumkalum, Schulbuckhand). Alistair and Southend are the two major spawning areas for the Alistair Lake sockeye stock and therefore these two data time series should have been combined prior to the trend analyses. When analyzed together, the average escapement for the last 4 years in the IUCN time series was very similar to the long-term average escapement of 6,600 for the Alistair Lake CU. The IUCN assessment for Kitsumkalum sockeye indicated a positive 56% increase for this CU. The Schulbuckhand site is one of three monitored spawning sites for the Lakelse Lake CU. The escapement estimates for the other two spawning sites (Williams and Sockeye creeks) should have been combined with the Sculbuckhand estimates. Regardless, previous analyses have identified Lakelse sockeye as stock of concern (Cox-Rogers et al. 2004) and DFO has prepared a recovery plan for this CU (LLSRP, 2005).

The IUCN's assessment of the Upper Skeena sub-population included two sites (Azuklotz and Salix). The average escapement for the most recent 4 years of data (2001-2004) for the Salix was similar to the long-term average while recent escapements for the Azuklotz were roughly half the long-term average. Both of these stocks are included in the category of Upper Skeena non-Babine stocks of concern. The Skeena ISRP report identified reductions in harvest rates for mixed-stock fisheries need to protect these populations from further decline.

Fraser Sockeye

Immediately following the release of the IUCN report, the Pacific Salmon Commission prepared a response to the IUCN's status assessment of Fraser sockeye (Lapointe 2008). The PSC response identified several problems with the IUCN's analyses and definition of sub-populations for Fraser sockeye. For example the PSC response states:

> *"We disagree with the aggregation of Cultus and Chilliwack as one subpopulation because of the high degree of temporal isolation in their spawning time (peak spawning periods for these two populations differ by 2-3 months). As a consequence of this isolation they should be treated as distinct subpopulations in status evaluations and they have been assigned to distinct conservation units under Canada's Wild Salmon Policy.*
>
> *We believe the assignment of Endangered to the Fraser_Middle subpopulation is misleading because this subpopulation is an aggregate of several populations and it encompasses a very large geographic region including most of the Fraser watershed upstream of the Thomson confluence. This subpopulation encompasses 14 of Canada's sockeye Conservation units."*

The PSC response also identified several constraints in the IUCN evaluation approach in which lead to incorrect conclusions for several of the Fraser sub-populations. The most problematic of these constraints is that the IUCN threat assignments are based entirely on observed trends over the past 3 generations. The PSC identified two examples (Gates and Bowron) where unusually high escapements occurred early in the 3 generation assessment period and thus the observed declines were from historical maximum values and therefore do not reflect extinction risk. A similar concern was identify for the Meziadin sockeye stock, within the Nass sub-population, because the IUCN analyses reported a -45% decline in escapements over the 3 generations after the record escapements of 1992 and 1993 which proved to be 2-3 times the optimal escapement goal for the Meziadin sockeye stock. The limitation of the IUCN risk assessment to a 3 generation time period has also hidden trends that would have resulted in higher threatened status for Widgeon Creek if a longer time series was examined.

The IUCN's findings regarding Fraser sockeye did not alter our scoring of Fraser sockeye for the following reasons:

1. Cultus sockeye had already been assessed by COSEWIC as an endangered sockeye stock;
2. Widgeon Creek sockeye has been previously identified by DFO and PSC as a stock of concern that should benefit from the measures taken to reduce harvest rates on Cultus sockeye;
3. We agree with the PSC assessment that bulk of the historical time series for Gates and Bowron sockeye does not support the IUCN's assessment that Gates is critically endangered and Bowron is endangered;
4. We also agree with the PSC assessment that the IUCN's assessment of the Middle Fraser sub-population is misleading because 25 of the 33 sites assessed are from the 4 Stuart area CUs and the remaining 8 sites include the Chilko, Stellako and Horsefly populations, which are of non-threatened status;

5. Concerns regarding the recent trends for both Early Stuart and Late Stuart stocks were raised prior to the IUCN report and have resulted in significant research and management actions regarding these stocks.

The Nanika sub-population was classified as critically endangered because of the 90% decline in spawner abundance from 1989-2004. As identified above for several Fraser stocks and Meziadin sockeye, the recent apparent decline in the Nanika sockeye stock has been magnified by the fact that 1991-97 escapements (the first half of the 3 generation time series) were the largest escapements observed for this stock since the early 1950's (averaging over 31,000). Recent escapement, while substantially reduced from this level, are much closer to the long-term average of 9,000 for 1950-2006.

10.0 Assessment Results

After completing all the reviews and interviews, the assessment team is tasked with utilizing the information it has received to assess the performance of the fishery. Under the MSC program, the process for assessing the fishery is performed by prioritizing and weighting the indicators relative to one another at each level of the performance hierarchy established when the assessment team developed the set of performance indicators and scoring guideposts for the fishery. The weightings in this assessment are shown in the tables provided for each fishery. Subsequent to this, the assessment team assigns numerical scores between 0 and 100 to each of the performance indicators. All of this is accomplished using decision support software known as Expert Choice, which utilizes a technique known as AHP (Analytical Hierarchy Process). A full description of the AHP process can be found on the MSC web site (www.msc.org). In essence, the process requires that all team members work together to discuss and evaluate the information they have received for a given performance indicator and come to a consensus decision on weights and scores (see Section 7.2 for an explanation).

Scoring Process and Results Presentation

The scoring for these units of certification (4), as well as the large number of populations was a lengthy process for the assessment team. The team met on 2 different occasions for several days each to be able to complete the scoring for all of the certification units. In addition, the assessment team needed to rescore some indicators in a couple of the units of certification as new information was acquired. As in any fishery assessment, rescoring is driven by the assessment Team's need to continue to get clarification on issues. Additional time requirements were not the result of either the client or the stakeholders failing to provide information.

The approach used by the assessment team is important to understand. The decision to aggregate all sockeye stocks into 4 fisheries requires that a Unit of Certification only get certified if the management of the stocks meets the standard, not just the majority.

It is also worth noting here that there are a number of "conditions" identified in this report. Given the number of fisheries handled under one project, it should not be surprising that there are a number of conditions, and that this number may appear to be higher than in other fishery assessment projects. When viewed on a per fishery or per population basis, the number of conditions is in keeping with other fishery assessment projects, if not lower.

The tables in the evaluations below provide summaries of the scoring details for each fishery. All of our findings have been colour coded to indicate the degree to which scoring guideposts have been achieved for each indicator, which also provides the basis for the actual scores on each indicator. The color coding is:

Green – The requirements of the guidepost have been met.
Red – The requirements of the guidepost have not been met.
Orange – The requirements of the guidepost have partially been met.
Black – The requirements of the guidepost are not applicable to the specific sockeye fishery.

The color coding also allows the reader to determine a score for an indicator, simply by following the table from right to left across each row. If the color for an item/cell is green, it receives 100% of the available points, if it is orange it receives 50% of the available points, and if it is red it receives 0% of the available points and blocks progress to the next level of scoring guidepost. The available points for

each item/cell are determined by dividing the number of available points between scoring guideposts (20 points available between 60 and 80 scoring guideposts, and 20 points available between 80 and 100 scoring guideposts) by the number of cells or scoring items achieving scores. To assign a score based on the items/cells leading up to the 60 scoring guidepost, it is simply enough to determine if any one item is orange or red. If so, then the fishery receives a score of less than 60 and the fishery fails certification. Therefore, a place holder value of 55 is assigned.

Example:

Summary for Fraser Sockeye (Draft - 11 Sep. 2006)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
Indicator A	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx																	

In the above example (i.e. a specific performance indicator) there are 3 cells scored for the 60 scoring guidepost and they are all green; there are 4 cells scored between 60 and 80 scoring guideposts and they are all green; and there are 4 cells scored between the 80 and 100 scoring guidepost and 2 are green, one is orange, and one is red. The 3 items/cells that are green before the 60 scoring guidepost shows that the fishery minimally meets the score of 60, which requires looking to the next level (between 60 and 80 scoring guideposts). Since the items/cells between 60 and 80 are all green, the fishery has now achieved at least a score of 80 for the indicator, which now requires a review of the scoring between 80 and 100 scoring guideposts. Since 2 cells/items are green, these 2 cells receive full points of 5 each (since each of 4 items can get 5 points for a total of 20 points between 80 and 100). The orange cell receives 50% of the available points for that item which equals 2.5 points (50% of 5 points). The red cell or item receives 0 points. This means the final score for the specific performance indicator is 92.5 or 93 when rounding.

Fishery specific findings follow the summary are crafted in such a way as not to repeat information that is available in other documents, but provide an overview of where the information submitted did and did not show the fisheries met a minimum score of 80. For example, on the Fraser River sockeye fishery, the first indicator with a written summary is 1.1.1.3. Both 1.1.1.1 and 1.1.1.2 scored over 80. This means the information provided by the client as well as stakeholders was sufficient to show that the fishery meets or exceeds a score of 80. For those indicators where the fishery scored above 80, the team has not provided a specific explanation for all scoring because these explanations would substantially increase the size of this document and have little or no effect on the certification of the fishery. In every case, scores above 80 were derived from the evaluation of the information provided in the DFO submissions for each principle and fishery. Thus, the reader is referred to the DFO submissions for further details. In many cases, the Team's evaluation of the 100 Scoring Guidepost criteria was similar to that suggested by DFO in their submissions. However, there were instances where the team did not agree with the DFO evaluation for a specific criterion. Occasionally, the score was higher than that suggested by DFO but, in most instances where the Team's evaluation differed from DFO, the assessment team downgraded their evaluation from green to yellow (i.e. pass to partial pass) or yellow to red (i.e. partial pass to fail).

For indicator 1.1.1.3 the Fraser fishery only scored 77. The MSC process requires that certification conditions be written for each indicator that scores between 60 and 80. Thus, the scoring rationale focuses on these indicators, including: colour coded ratings for each criterion, a brief description of the deficiencies for criteria at the 80 Scoring Guidepost and the condition(s) that needs to be address for the fishery to be certified. To further minimize the need for the reader to review the performance indicator and scoring guideline criteria descriptions (SCS 2003), text describing the Team's interpretation of MSC criteria have been included, where appropriate, along with the Team's assessment findings for Fraser

sockeye (the first fishery in the evaluation sequence). These descriptive details are not repeated for the other fisheries.

Certification Assessment Transition

The initial scoring process for BC sockeye fisheries was conducted in the summer of 2005. However, a variety of issues resulted in delays in preparing the draft report for review by the client and stakeholders which was released on 27 August 2007. During this interval, significant concerns were raised regarding the conduct of the 2006 and 2007 Skeena sockeye fisheries which resulted in detailed scientific review of the health Skeena stocks, Skeena fisheries and fishery management processes and culminated in the 2008 Report of the Skeena Independent Science Review Panel (Walters *et al.*, 2008). Given the nature of the concerns and scope of the ISRP report, all parties agreed that it would be prudent to re-score the affected fisheries prior to initiating the peer review of this report.

In June 2008, members of the BC sockeye MSC assessment team met in Sidney BC to discuss the ISRP report and other comments received on the 27 August 2007 draft report. The review team identified 12 of the indicators for Skeena sockeye that required adjustments to the 2005 scoring and conditions based on the findings in the ISRP report and other comments received. Four of these rescores were under Principle 1, one under Principle 2 and seven under Principle 3. Two of the indicators under Principle 3 for Nass sockeye required adjustments to the scoring for criteria at the 100 Scoring Guidepost but no adjustments at the 80 Scoring Guidepost because the concerns identified in the ISRP report related to the Area 3 and 4 marine fisheries represent a small component of the harvest for Nass stocks. The scoring adjustments are identified in the various summary tables using bright blue shading in the cells that contain the score for a specific indicator. For example: in Tables 1.1 and 1.4 the Skeena scores for indicators 1.1.1.5, 1.1.2.1, 1.1.2.2, and 1.1.2.4 have been highlighted because the previous scores of 70, 97, 80 and 95 have been reduced to 60, 77, 77, and 77, respectively.

The above re-scoring resulted in several additional conditions for Skeena sockeye and some revisions to previous conditions. In order to facilitate reference to the 27 August 2008 client/ stakeholder draft report and the various comments provided on the draft report, the team did not renumber the conditions but added letters to identify the new or adjusted conditions.

DFO submitted comments during the fall 2007 public comment period, however no scoring adjustments were made on the basis of those comments. DFO suggested many of the conditions defined in the draft report were met as a result of analyses conducted since 2005 and activities related to the implementation of the WSP, the Fraser sockeye stock assessment frameworks and on-going improvements to catch monitoring and escapement monitoring protocols. However, the review team was not provided results of those analyses or evidence of improvements to the data or management procedures for these sockeye fisheries. The team recommends that evidence be provided in order to assess whether the conditions were met after this phase of the certification process for BC sockeye fisheries has been completed.

Formulation of Conditions and Client Corrective Action Plans

To be granted an MSC Fishery Certificate, the client must contractually agree to meet the requirements of the 80 scoring guidepost for each performance indicator within the five year certification validity period when the 80 Scoring Guideposts are not met.

Typically, clients are required to formulate an action plan that will achieve the requirements of the 80 scoring guidepost. The draft report provides specific wording of conditions which have been described

by the assessment team as necessary to achieve compliance with the 80 scoring guidepost. It must be noted that prescription of corrective actions by the assessment team is non-binding. It is the client's responsibility to ensure that an action plan is achievable on their part and acceptable to the Certification Assessment Team as an appropriate action to meet the 80 scoring guidepost requirements. Clients are required to supply corrective action plans inclusive of suggested timelines and deliverables. The assessment team has the authority to request changes to the action plan, deliverables or timelines if the team does not consider that the 80 scoring guidepost will be met in a reasonable timeframe.

In the instance that additional conditions were added as a result of rescoring activities, new conditions are identified with a number followed by a letter (e.g. Condition 13a). This approach was adopted to maintain the original list of conditions which have been cited in client, DFO and stakeholder communications with the certification bodies and assessment team. Addition of the letter signifies that the condition has been added as a result of rescoring by TAVEL Certification in June 2008.

10.1 MSC Principle 1

Principle 1 **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.**

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 stocks 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.

Principle 1 Summary

The Principle 1 evaluation results for the four sockeye fisheries reveal some consistencies and several substantial differences between the northern (Skeena and Nass) fisheries and southern (Fraser and Barkley Sound) fisheries (Table 10.1.1). The purpose of the following summary is to describe the Criteria/Sub-criteria where each fishery met or exceeded the 80 scoring guidepost, in sequential order:

1. the stock units were generally well defined for all fisheries;
2. the monitoring systems for assessing the geographic range for the harvests of each stock management unit is more consistently conducted for northern fisheries;
3. Indicator stocks are not used as a primary source of information for making management decision for Barkley Sound, Skeena and Nass sockeye fisheries;
4. No sockeye enhancement activities have been undertaken in the Nass but enhancement in the form of spawning channels and lake enrichment has played a significant role in the other fisheries;
5. The monitoring and assessment systems are generally very good for the major components of each fisheries but there are specific areas where these systems must be improved;
6. to date the management goals have been more clearly defined for the northern fisheries but further clarification of these goals is necessary and expected through the implementation of the WSP;
7. The indicators associated with the recovery of depleted stocks are not applicable to the northern sockeye fisheries because the target stocks have never been depleted below their LRPs;

8. in contrast, both the Fraser and Barkley Sound fisheries have had periods when target stocks were depleted and varying success regarding recovery; and
9. lastly, the level of understanding regarding the effects of fishing on age, size, sex and genetic structure of the target stocks is generally very good for these sockeye fisheries.

In the fishery specific sections that follow, we provide a summary of the areas where the fishery and management practices have been consistent with MSC principles and criteria and details on each of the indicators where scores were less than the 80 scoring guidepost.

Table 10.1.1 Summary of scores under MSC Principle 1 by Performance Indicator and fishery for all BC Sockeye fisheries.

Summary for sockeye fisheries	Scores				Weights	Weighted Scores			
	Fraser	Barkley	Skeena	Nass	Weighting	Fraser	Barkley	Skeena	Nass
PRINCIPLE 1 - Fishery Management for Target Populations					0.333	82.8	86.1	82.2	91.6
Criterion 1.1 - Maintain high productivity of target population & associated ecosyster					0.794	83.8	83.7	81.6	91.7
Subcriterion 1.1.1 - Stock units					0.400				
Indicator 1.1.1.1 Stock management units defined	95	100	100	100	0.317				
Indicator 1.1.1.2 Scientific agreement on units	97	93	97	100	0.194				
Indicator 1.1.1.3 Geographic distribution known	77	80	90	90	0.108				
Indicator 1.1.1.4 Indicator Stocks	70	na	na	na	0.064				
Indicator 1.1.1.5 Enhanced Stocks	90	75	60	na	0.317				
Subcriterion 1.1.2 - Monitoring and assessment					0.400				
Indicator 1.1.2.1 Reliable estimates of removals	73	90	77	100	0.274				
Indicator 1.1.2.2 Reliable estimates of escapement	90	77	77	74	0.369				
Indicator 1.1.2.3 Information on fish age and size	100	90	90	90	0.112				
Indicator 1.1.2.4 Productivity estimates	73	85	77	100	0.246				
Subcriterion 1.1.3 - Management goals					0.200				
Indicator 1.1.3.1 Limit reference points	70	75	87	75	0.667				
Indicator 1.1.3.2 Target reference points	70	75	70	100	0.333				
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)					0.136	72.5	94.0	na	na
Indicator 1.2.1 Well-defined and effective strategy	70	93	na	na	0.500				
Indicator 1.2.2 Stocks not depleted and harvest rates are sustainable	75	95	na	na	0.500				
Criterion 1.3 - Fishing does not impair reproductive capacity					0.070	100.0	97.0	90.0	90.0
Indicator 1.3.1 Age, sex and genetic structure are monitored	100	97	90	90	1.000				

Fraser Sockeye – Criterion Summaries

The level of effort applied to the management and assessment of Fraser sockeye is greater than that for the other three sockeye fisheries combined. A summary of our evaluations for each Principle 1 indicator and guidepost is provided in 10.1.2. The assessment team did not rescore any Principle 1 performance indicators in June 2008.

Table 10.1.2. Summary of the evaluations for each Principle 1 criteria and indicator for the Fraser sockeye fishery.

Summary for Fraser Sockeye (Nov. 2009)		Criteria @ 100					Criteria @ 80						Criteria @ 60				
	Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 1 - Fishery Management for Target Populations																	
Criterion 1.1 - Maintain high productivity of target population & associated ecosystem.																	
Subcriterion 1.1.1 - Stock units																	
Indicator 1.1.1.1 Stock management units defined	95	P															
Indicator 1.1.1.2 Scientific agreement on units	97		P														
Indicator 1.1.1.3 Geographic distribution known	77								P								
Indicator 1.1.1.4 Indicator Stocks	70						P	P									
Indicator 1.1.1.5 Enhanced Stocks	90	P															
Subcriterion 1.1.2 - Monitoring and assessment																	
Indicator 1.1.2.1 Reliable estimates of removals	73	P						P	P								
Indicator 1.1.2.2 Reliable estimates of escapement	90	P	P														
Indicator 1.1.2.3 Information on fish age and size	100																
Indicator 1.1.2.4 Productivity estimates	73	P						P	P								
Subcriterion 1.1.3 - Management goals																	
Indicator 1.1.3.1 Limit reference points	70																
Indicator 1.1.3.2 Target reference points	70			P			P	P									
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)																	
Indicator 1.2.1 Well-defined and effective strategy	70						P	P									
Indicator 1.2.2 Stocks not depleted and harvest rates are sustainable	75							P									
Criterion 1.3 - Fishing does not impair reproductive capacity																	
Indicator 1.3.1 Age, sex and genetic structure are monitored	100																

Note: Scores for indicators 1.1.1.1, 1.1.1.2 and 1.1.1.5 were corrected to be consistent with guidepost evaluations provided in the table.

Fraser Sockeye – Performance Indicators scoring >80

The guideposts where the fishery exceeded the 80 Scoring Guidepost are generally considered the highlights (i.e. good news) for the fishery. The highlights associated with the various Principle 1 guideposts for Fraser sockeye are summarized sequentially for each group of indicators below:

1. stock units are well defined and the level of agreement on the stock units used to manage the fisheries is generally very good (Indicators 1.1.1.1, 1.1.1.2);
2. the procedures in place to assess the catch and escapement of target stocks are very good, however, there are some notable deficiencies regarding assessment procedures for non-target stocks (Indicators 1.1.2.1, 1.1.2.2, 1.1.2.3);
3. the management goals are becoming more clearly defined for the target stocks and should continue to improve with the implementation of the WSP (Indicators 1.1.3.1, 1.1.3.2);
4. a rigorous analysis of alternative management options to rebuild Cultus Lake sockeye has been completed and procedures are underway to select and implement an option that will achieve the recovery goals within a specified time frame (Indicator 1.2.1, 1.2.2); and
5. PSC and DFO programs provide all the necessary age, size, sex and genetic stock composition information required for stock assessment and effect fisheries management (Indicator 1.3.1).

The following sections provide explanations for why these indicators passed all 80 guideposts and identify those guideposts that were not met at the 100 SG. The indicators that received partial scores were given half the number of points (unweighted) available for a particular indicator.

Indicator 1.1.1.1: The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.7) suggested that a score of 100 was appropriate for this indicator. An independent review of the DFO submission for Fraser sockeye prepared by Ken Wilson identified some concerns related to the definition of the early summer and late summer run-timing groups. From Mr. Wilson's point of view, the 100 guideposts were not met and only one of the 80 guideposts was met (Wilson 2005). The Team found that information provided was sufficient to pass one guidepost at the 100 SG and partially meet the requirements for the other:

- There is an unambiguous description of each stock unit, including: its geographic location, run timing, details on all the component stocks, and rational for its definition.

A partial score was awarded because the documents and references provided (DFO Fraser 2003a, p.1-6) contained a detailed description of the stock units for each run-timing stock group and the stock resolution used for in-season assessment, production estimation and escapement monitoring. However, the concerns in Wilson (2005) indicate that their remains some ambiguity in the definition for some of the run-timing groups. The Team's score for this indicator was 95.

Indicator 1.1.1.2: There is general scientific agreement that the stock units are appropriate.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2004a, p.10) suggested that a score of 100 was appropriate for this indicator. Wilson (2005) identified some concerns regarding the definition of the early summer run-timing group and he contended that there is not general scientific agreement that all the stock units are appropriate. The Team found that information provided was sufficient to pass all guideposts except the second guidepost at the 100 SG:

- There is general agreement among regional fisheries scientist outside the management agency that the stock units are appropriate.

A partial score for this guidepost was awarded because there are some scientists outside the management agency that do not agree with the definitions for some Fraser stocks and the run-timing group aggregations used to manage the fisheries. The DFO (Cass 2002) and PSC documents (PSC Fraser Panel Reports for 1997-2000) provided with DFO Fraser 2004a did confirm that: 1) the stock units have been reviewed and found to be scientifically defensible by PSARC and the PSC; 2) there is general scientific agreement regarding the stock units for non-target species; 3) there has been general agreement among regional fisheries scientists within the management agency that the stock units are appropriate for target species; and 4) there is no significant scientific disagreement regarding the stock units used by the management agency to formulate management decision for the fishery. The Team's score for this indicator was 97.

Indicator 1.1.1.5: Where stock units are composed of significant numbers of fish from enhancement activities, the management system provides for identification of the enhanced fish

and their harvest without adversely impacting the diversity, ecological function or viability of unenhanced stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.16) suggested that all guideposts at the 80 SG were met and the second guidepost at the 100 SG was met. The DFO submission indicated that:

> "There is little enhancement done to Fraser River sockeye stocks. There are four spawning channels—Nadina River, Horsefly River, Gates Creek and Weaver Creek—one hatchery program working with the Upper Pitt River stock and fertilization of, and fry release into, Adams Lake in 1997 and 2001. In the Fraser, for the most part enhanced stocks are not significant contributors to any of the stock timing groups. The one exception to this is the contribution of enhanced Weaver sockeye which historically has been a relatively significant contributor to the Late run time Group in 2 of the four cycle years (cycle lines 2000 and 2001)."
>
> and
>
> "The impact of harvesting Weaver Creek enhanced production on Cultus Lake sockeye, whose migration timings are similar and that are harvested in some of the same fisheries, remains a concern."

Consequently, the first guidepost at the 100 SG was only partially met.

- Fisheries targeting enhanced stocks are geographically removed from unenhanced stocks and separate terminal harvest areas are established for these fisheries.

The DFO submission also suggested that the third guidepost at the 100 SG was not applicable but the Team's assessment was that this guidepost was applicable and was partially met because DFO do have real time DNA identification for one of the enhanced stocks (Weaver Creek) that is used in the regulation of the fishery.

- There is real time mark recovery program during the prosecution of the fishery that allows determination of harvest rates of the enhanced component of the run and this data is used in regulation of the fishery.

Concerns related to the Cultus sockeye stock have resulted in substantial reduction of the harvest rates on late-run stocks in recent years, thus we agreed that the second guidepost at the 80 SG had been met. The Team's score for this indicator was 93.

Indicator 1.1.2.2: Estimates exist of the spawning escapement for each stock unit.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.19) suggested that a score of 100 was appropriate for this indicator. The Team found that information provided was sufficient to pass all guideposts at the 80 SG and partially pass each of the guideposts at the 100 SG:

- Estimates are available for the annual escapement for each stock unit harvested in the fishery.
- In-season escapement data are collected for all stock units and used to regulate the fishery.

Annual and in-season escapement estimates are available for most but not all the stock units harvested in the fishery (Schubert 1994; PSC Fraser Panel Report 2000; Keri Benner, DFO Kamloops, pers. comm.). The Team's score for this indicator was 90.

Indicator 1.1.2.3: The age and size of catch and escapement have been considered, especially for the target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.21) suggested that a score of 100 was appropriate for this indicator. Wilson (2005) indicated that all scoring guideposts were met for this indicator. The Team agreed with the DFO submission because there are annual monitoring programs that provide data on the age and size of sockeye in catch and escapements for Fraser sockeye and these programs have a clear scientific basis (Gable and Cox-Rogers 1993). The Team's score for this indicator was 100.

Indicator 1.3.1: Information on biological characteristics such as the age, size, sex and genetic structure of the target stocks is considered prior to making management decisions and management actions are consistent with maintaining healthy age, size, sex and genetic structure of the target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.35) suggested that a score of 100 was appropriate for this indicator. The Team agreed with the DFO submission because information on age, size, sex and genetic structure of the target stocks have been collected and analyzed for many years and the knowledge gained from these data are used extensively in the decision making process for Fraser sockeye fisheries (Gable and Cox-Rogers 1993; Cass 2002; PSC Fraser Panel Reports for 1997-2000). The Team's score for this indicator was 100.

Fraser Sockeye – Performance Indicators scoring <80

Under Principle 1, there were eight indicators where Fraser sockeye did not achieve the 80 scoring guidepost. The following sections identify indicators and criteria where these deficiencies occur and the actions required to attain full MSC certification.

MSC Criterion 1.1

The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.

Our interpretation of MSC Criterion 1: The performance indicators listed under Criteria 1 focused on the adequacy of the information used to manage the fisheries and stocks. For our assessment, we have organized the performance indicators into the three sub-criteria: 1) the definition of the stock units for each fishery; 2 the information available on the harvests, escapement, biological characteristic, and productivity; and 3) the management goals for each stock unit. As in the evaluations of other fisheries, the effect of the fishery on the associated ecological community will be primarily dealt with under Principle 2. However, the indicators for 100 scoring guideposts related to management goals under Principle 1 cannot be achieved unless information is collected on the associated ecological community and used in setting management goals.

Indicator 1.1.1.3: The geographic range for harvest of each stock management unit in the fishery is known.

100 Scoring Guidepost

- The geographic range for harvests of each stock management unit in the fishery is estimated and documented each year.
- The information on the geographic range of harvests is monitored during the fishing season and used when making in-season management decisions.

80 Scoring Guidepost

- The geographic range for harvests of target stocks is defined.
- The information on the geographic range of the harvests of target stocks is monitored during the fishing season and is sufficient to prevent the over harvesting of these stocks.
- The information available on the geographic range for harvest of non-target stocks is sufficient to prevent the over harvesting of these stocks.

60 Scoring Guidepost

- 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 management unit.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.12) suggested that a score of 100 was appropriate for this indicator. An independent review of the DFO submission for Fraser sockeye (Wilson 2005) suggested that the 60 scoring guidepost was not met "due to the over harvesting of and decline of inside non-Fraser sockeye stocks. The Team found that the information on the geographic range of harvests is probably adequate to prevent the over harvesting of Sakinaw sockeye; however, deficiencies in the information and analysis on run timing through Johnstone Strait have likely resulted in some over harvesting of Sakinaw sockeye. References to Sakinaw sockeye include other inside south coast non-Fraser sockeye stocks with similar marine distributions and run-timing. The Team's score was 77 for this indicator.

Condition 1 - Certification is conditional until a review of the run timing and harvest rates for Sakinaw sockeye has been completed and the fisheries management plan is consistent with the goal of minimizing the harvest rate on Sakinaw sockeye, within one year (**Fraser Condition #1.1**).

Indicator 1.1.1.4: Where indicator stocks are used as the primary source of information for making management decisions on a larger group of stocks in a region, the status of the indicator stocks reflects the status of other stocks within the management unit.

100 Scoring Guidepost

- The status of the indicator stocks is well correlated with the stocks that are most at risk from a conservation point of view, not just correlated with the most productive stocks in the region.

- The indicator stocks used have been reviewed and found to be scientifically defensible and appropriate by the Pacific Stock Assessment Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientists outside the management agency that the indicator stocks are appropriate.
- The relationships between indicator stocks and stocks of interest are assessed every three to five years.

80 Scoring Guidepost

- There is general agreement among regional fisheries scientists within the management agency that the status of indicator stocks reflects the status of other stocks within the management unit.
- There is no significant scientific disagreement regarding the indicator stocks used by the management agency to formulate management decisions for the fishery.

60 Scoring Guidepost

- There is no significant scientific disagreement regarding the indicator stocks used by the management agency to formulate management decisions for the fishery.
- There is a scientific basis for the indicator stocks used in the management of the fishery.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.14) suggested that a score of 90 was appropriate for this indicator. Wilson (2005) suggested that one of the 80 guide posts was not met. While there is not complete agreement among regional fisheries scientists outside the management agency regarding the adequacy of the indicator stocks for formulating management decision, there does not appear to be significant disagreement regarding the stocks used. However, there remains a need to assess the degree to which these stocks represent the status of the other stocks within each management unit (i.e. run timing group). Hence, the two evaluation criteria under SG 80 have not been fully met and the Team's score was 70.

Condition 2 –Certification will be conditional until a rigorous review has been completed to confirm that the indicator stocks reflect the status of the other stocks within each management unit, within one year (**Fraser Condition #1.2**).

Indicator 1.1.2.1: Estimates exist of the removals for each stock unit.

100 Scoring Guidepost

- Catch estimates are available for all fisheries in Canadian waters that harvest the target and non-target stocks harvested in the fishery being evaluated.
- Mortality rates are available for the fish released or discarded during the fishery.
- Catch estimates are available for fisheries outside Canadian waters that harvest the stocks that are the target of the fishery being evaluated.

80 Scoring Guidepost

- Catch estimates are available for all target stocks harvested in the fishery.

- Catch estimates are available for non-target stocks where the catch of the non-target stock may represent a significant component of the harvest of that stock.
- Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 5 years.

60 Scoring Guidepost

- Catch estimates for the majority of target stocks are available.
- Catch estimates are available for non-target stocks where the catch of the non-target stocks may represent a significant component of that stock.
- Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 10 years.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.18) suggested that a score of 100 was appropriate for this indicator. Wilson (2005) suggested that one of the 60 scoring guidepost was not met because harvests of non-Fraser sockeye stocks "are not directly estimated". The Team found that current catch estimates and fisheries management guidelines for Sakinaw sockeye are based on preliminary analyses that require further review and refinement. Two of the 80 guideposts were not met so the Team's score was 73.

Condition 3 - Certification is conditional until the harvest rate analysis for Sakinaw sockeye has been updated using the best available data from the Pacific Salmon Commission sockeye run reconstruction analyses and appropriate fisheries management actions are consistent with the goal of reducing harvest rates for Sakinaw sockeye and rebuilding this depleted stock, within one year. (**Fraser Condition #1.3**).

Indicator 1.1.2.4: The information collected from catch monitoring and stock assessment programs is used to compute productivity estimates for the target stocks and management guidelines for both target and non-target stocks.

100 Scoring Guidepost

- Scientifically defensible productivity estimates (e.g. stock/recruitment relationships) have been derived for all target stocks and the relative productivity of non-target stocks is known.
- Risk assessment has been conducted to determine the impact of alternative harvest strategies on non-target stocks. The risk assessment should include an assessment of the uncertainties with estimates of stock productivity for both the target and non-target stocks.

80 Scoring Guidepost

- There is adequate information to identify the harvest limitations and production strategies required to maintain the high productivity of the target stocks.
- 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.
- The harvest limitations for target stocks take into consideration the impacts on non-target stocks and the uncertainty of the productivity for these stocks.

60 Scoring Guidepost

- The available information and analyses are adequate to identify the harvest limitations and production strategies required to maintain the productivity of the majority of target stocks.
- The relative productivity of the non-target stocks is considered in the management strategy, where the fishery harvests may represent a significant component of those non-target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.25) suggested that a score of 90 was appropriate for this indicator. Wilson (2005) suggested that one of the 60 scoring guidepost was not met because there are "no harvest guidelines in place to protect the 13 non-target stocks that are harvested during fisheries for Fraser sockeye". The Team found that were harvest guidelines in the IFMP that were developed for the protection of these non-target stocks but information on the productivity of the Sakinaw stock relative to co-migrating Fraser sockeye stocks needs to be assess and harvest rates adjusted accordingly. The Team's score was 73.

Condition 4 -Certification is conditional until a review of the relative productivity of Sakinaw sockeye has been completed and the fisheries management plan is consistent with the estimated productivity and goal of rebuilding the Sakinaw sockeye stock, within one year (**Fraser Condition #1.4**).

Indicator 1.1.3.1: Limit Reference Points or operational equivalents have been set and are appropriate to protect the stocks harvested in the fishery.

100 Scoring Guidepost

- The Limit Reference Point for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the LRP's are appropriate.
- There is general scientific agreement regarding the LRP's for non-target species.

80 Scoring Guidepost

- There is some scientific basis for the LRP's for target stocks and these LRP's are defined to protect the stocks harvested by the fisheries.
- There is no significant scientific disagreement regarding the LRP's used by the management agency to formulate management decision for the fishery.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the LRP's or equivalent are appropriate to achieve the management goals for target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.27-28) suggested that a score of 80 was appropriate for this indicator. Wilson (2005) questioned if the 60 scoring guidepost was met because "conservation units can decline within an aggregate even though the aggregate is meeting or exceeding the escapement goal". The Team found that the management agency has operational LRPs for the 19 Fraser sockeye indicator stocks and is in the process of defining LRPs

for Fraser sockeye stocks in order to implement the WSP. Bradford and Wood (2004) provide the scientific basis for setting minimum population sizes and recovery objectives for Cultus and Sakinaw sockeye stocks. The Team's score was 70.

Condition 5 - Certification is conditional until the Conservation Units have been defined for Fraser sockeye using the methods described in Holtby and Ciruna (2007) and LRP's for each Fraser sockeye conservation unit are defined and peer reviewed, within two years. (**Fraser Condition #1.5**).

Indicator 1.1.3.2: Target Reference Points or operational equivalent have been set.

100 Scoring Guidepost

- The Target Reference Point (TRP) for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the TRP's are appropriate.
- The TRP's for the target stocks take into account variability in the productivity of each component of the target stock and productivity of non-target stocks.

80 Scoring Guidepost

- There is no significant scientific disagreement regarding the TRP's used by the management agency to formulate management decision for the fishery.
- The TRP's 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.

60 Scoring Guidepost

- There is general agreement among fisheries scientist within the management agency that the TRP's are appropriate for the target stocks.
- 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.
- The management agency has taken into account the relative productivity of non-target stocks when setting the TRP's for the majority of target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.29) suggested that a score of 100 was appropriate for this indicator. Wilson (2005) indicated that two of the 60 scoring guidepost were not met because he questioned if "the escapement goals set for the four timing aggregates of Fraser sockeye are the operational equivalent of TRPs". The Team found that the fixed escapement goals at low run size set for each of the four run-timing aggregates qualified as operational equivalents of TRPs that have been set relatively low because of concerns regarding the differential productivity of stocks within these timing groups. The Team recognizes that there continues to be considerable scientific debate regarding the TRP's for both target and non-target stocks. It is anticipated that the implementation of the WSP will provide a clear definition of the TRP's for Fraser sockeye. A score of 70 was awarded.

Condition 6 -Certification is conditional until the Management Units have been defined for Fraser sockeye and the management agency defines the TRP's for each Fraser sockeye management unit taking into account the productivity of target and non-target stocks within each management unit, by May 2012. (**Fraser Condition #1.6**).

MSC Criterion 1.2

Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

Our interpretation of MSC Criterion 1.2: This criterion refers to "populations" where our indicators and evaluation criteria refer to stocks or stock units. 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. Note that this criterion focuses on the recovery of depleted target stocks and is similar MSC Criterion 2.3 which focus on the recovery of depleted non-target stocks.

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.

100 Scoring Guidepost

- There are comprehensive and pre-agreed responses to low stock size that utilize a range of management measures to ensure rapid recovery.
- Stocks are allowed to recover to the TRP before commercial fisheries are permitted that target these stocks.
- The management agency does not use artificial propagation as a substitute for maintaining or recovering wild stocks.

80 Scoring Guidepost

- In the event of severe depletion, recovery plans are developed and implemented to facilitate the recovery of the depleted stocks with 3 reproductive cycles. (*SCS Intent – Although this indicator was set for use in salmon fisheries, the cyclic nature of the runs within the Fraser River system require that this statement is interpreted within the context of the cyclic aspects of the Fraser, and not just as 3 reproductive cycles of the species.*)
- Stocks are allowed to recover to more than 150% of the LRP for abundance before any fisheries are permitted that target these stocks.

60 Scoring Guidepost

- In the event of severe depletion, recovery plans are developed and implemented to facilitate the recovery of the depleted stocks within 5 reproductive cycles
- Stocks are allowed to recover to more than 125% of the LRP for abundance before any fisheries are permitted that target these stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.31) suggested that a score of 75 was appropriate for this indicator. Wilson (2005) indicated that one of the 60 scoring guidepost was not met because "DFO has no clear strategy for protecting and rebuilding individual stocks or CU's that decline consistently within an aggregate where the aggregate goals are still being met". Cultus sockeye is an example of a severely depleted target Fraser sockeye stock within one of the run-timing aggregates where DFO does have a strategy for protecting and rebuilding the stock. However, the Team found that there were significant concerns regarding the implementation of the recovery plan for Cultus sockeye. The Team's score was 70.

Condition 7 - Certification is conditional until the management agency provides a clear commitment to implement the recovery plan for Cultus sockeye and evidence that fisheries management actions are consistent with the recovery goals for Cultus sockeye, within one year. (**Fraser Condition #1.7**).

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.

In contrast to Indicator 1.2.1, which evaluates the strategy for stock recovery, this indicator evaluates the current status of the target species or stocks, and the basis for being reasonably certain about their status. The Scoring Guideposts are arranged hierarchically, so that evaluation of the current status depends on the assessment, which in turn depends on data and knowledge about the stocks and the fishery.

100 Scoring Guidepost

- There is general agreement among regional fisheries scientist outside the management agency that the methods of estimating escapements and exploitation rates for the target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 10 consecutive years, for any of the target stocks.

80 Scoring Guidepost

- There is general agreement among regional fisheries scientist inside the management agency that the methods of estimating escapements and exploitation rates for the target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 5 consecutive years, for any of the target stocks.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist inside the management agency that the methods of estimating escapements and exploitation rates for the majority of target stocks are scientifically defensible.
- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in no more than two years in a period of the most recent 5 consecutive years, for the majority of the target stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003a, p.33) suggested that a score of 90 was appropriate for this indicator. Wilson (2005) indicated that one of the 80 scoring guidepost was not met because of the concerns regarding the "health of component CUs or stocks" within a run timing group. In 2009, concerns were raised regarding the current status of Fraser sockeye relative to the interim LRPs defined for the target stock groups. Consequently, the new section on "Stock Status and Trends was added to the report (Section 8). The trend plots for Fraser sockeye show that the 4yr average escapement has been above the Low Escapement Benchmark (LEB) for all run-timing groups except Early Stuart sockeye.

The 4yr average escapement for Early Stuart sockeye has been below its LEB of 108,000 in four of the past five years. While this LEB is believed to be a relatively high LRP, management actions have reduced fishing in years when returns for the Early Stuart target stock approach the LEB and no commercial fisheries have been permited to target Early Stuart sockeye in each of the four recent years where the 4 yr average escapement has dropped below the LEB line. A few First Nation's have been allowed to harvest Early Stuart sockeye for FSC purposes in these years and these harvests have been factored into the LEB for this run-timing group. Since commercial fisheries have not resulted in escapements that approach or are below the LEB escapement goal in any years in a period of the most recent 5 consecutive years, the Fraser sockeye fishery passed the 60 guideposts for Early Stuart and other run-timing groups. The new Stock Status and Trends Section 8 provides some of the information required for Condition 8, however, formal LRPs have not been defined for each of the target stocks for the Fraser sockeye fishery. The management agency has made considerable progress towards the definition of LRPs over the past few years so it should be possible to address Condition 8 within one year of the certification date. The Team's score was 75 for this indicator.

Condition 8 - Certification is conditional until the management agency defines the LRP's for the target stocks and the management agency provides documentation that fisheries have not resulted in escapements that approach or are below the LRP in more than one year in a period of the most recent 5 cycle years, for any of the target sockeye stocks. The intent for this condition is to resolve the effects of fisheries, not other factors, on the stock and to recognize that the Fraser River sockeye undergo cycles so that these cycles must also be taken into account when examining whether the stocks are being maintained above LRPs. This condition should be addressed within two years (**Fraser Condition #1.8**).

Barkley Sound Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 1 indicator and guidepost is provided in Table 10.1.3. The assessment team did not rescore any Barkley Sound Principle 1 performance indicators in June 2008.

Table 10.1.3. Summary of the evaluations for each Principle 1 criteria and indicator for the Barkley Sound sockeye fishery.

Summary for Barkley Sound Sockeye (April 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 1 - Fishery Management for Target Populations																		
Criterion 1.1 - Maintain high productivity of target population & associated ecological community																		
Subcriterion 1.1.1 - Stock units																		
Indicator 1.1.1.1	Stock management units defined	100																
Indicator 1.1.1.2	Scientific agreement on units	93																
Indicator 1.1.1.3	Geographic distribution known	80																
Indicator 1.1.1.4	Indicator Stocks		na	na	na	na		na	na					na				
Indicator 1.1.1.5	Enhanced Stocks	75							P									
Subcriterion 1.1.2 - Monitoring and assessment																		
Indicator 1.1.2.1	Reliable estimates of removals	90	P															
Indicator 1.1.2.2	Reliable estimates of escapement	77	P	P					P									
Indicator 1.1.2.3	Information on fish age and size	90	P															
Indicator 1.1.2.4	Productivity estimates	85	P															
Subcriterion 1.1.3 - Management goals																		
Indicator 1.1.3.1	Limit reference points	75							P									
Indicator 1.1.3.2	Target reference points	75			P				P									
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)																		
Indicator 1.2.1	Well-defined and effective strategy	93																
Indicator 1.2.2	Stocks not depleted and harvest rates are sustainable	95		P														
Criterion 1.3 - Fishing does not impair reproductive capacity																		
Indicator 1.3.1	Age, sex and genetic structure are monitored	97	P															

Barkley Sound Sockeye – Performance Indicators scoring >80

The following points describe the highlights for Barkley Sound sockeye:

1. stock units are well defined and the level of agreement on the stock units used to manage the fisheries is very good (Indicators 1.1.1.1, 1.1.1.2, 1.1.1.3);
2. the procedures in place to assess the catch and escapement of target stocks are very good, but similar information for non-target stocks, specifically Henderson Lake sockeye, requires improvement. (Indicators 1.1.2.1, 1.1.2.2, 1.1.2.3);
3. the management goals are clearly defined for the target stocks, however, the goals for non-target stocks have not been clearly defined (Indicators 1.1.3.1, 1.1.3.2);
4. Given that Henderson Lake sockeye are no longer considered to be a target stock in the Barkley Sound fishery, there are no depleted target stocks. In the few years when returns to Great Central and Sproat Lakes were less than the LRP for these stocks, appropriate management actions were taken to reduce harvest pressure and escapements have only fallen below the LRP twice since 1980. (Indicator 1.2.1, 1.2.2); and
5. DFO programs provide all the necessary age, size, sex and genetic stock composition information required for stock assessment and effective fisheries management (Indicator 1.3.1).

The following sections provide explanations for why these indicators passed all 80 guideposts and identify those guideposts that were not met at the 100 SG.

Indicator 1.1.1.1: The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.4) suggested that a score of 100 was appropriate for this indicator. The independent review by John Nelson (Nelson 2005) suggested that DFO failed to pass the 60 guidepost for this indicator. Mr. Nelson raised questions and issues related to the stock structuring within the Sproat Lake and Great Central Lake CUs. The Team did not agree with Mr. Nelson's criticisms and found that information provided on the description and rationale for each stock unit (Steer et al. 1987; DFO Barkley Sound 2004a, p.1-4) met all the guideposts for this indicator. The Team's score for this indicator was 100.

Indicator 1.1.1.2: There is general scientific agreement that the stock units are appropriate.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.6) suggested that a score of 100 was appropriate for this indicator, however, the DFO submission did confirm that the "appropriateness of the stock units has not been specifically reviewed by PSARC". The Team found that all guideposts for this indicator were met, except the first guidepost at the 100 SG:

- The stock units for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.

The independent review (Nelson 2005) suggested that none of the 100 SG guideposts were met. He claimed that the stocks units have never been specifically reviewed and there is no evidence presented or cited regarding stocks units for steelhead. While a PSARC review has not been conducted, there appears to be general agreement among regional fisheries scientists that stock units for both target and non-target stocks are appropriate. The Team was provided information in addition to the DFO submission that adequately defined the stock units for steelhead (Johnston et al. 2002; Walters et al. 2008). The Team's score for this indicator was 93.

Indicator 1.1.1.3: The geographic range for harvest of each stock unit in the fishery is known.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.8) suggested that a score of 100 was appropriate for this indicator. The Team found that all guideposts at the 60 and 80 SG for this indicator were met but the 100 guideposts were not met:

- The geographic range for harvests of each stock unit in the fishery is estimated and documented each year.

- The information on the geographic range of harvests is monitored during the fishing season and used when making in-season management decisions.

DFO's submission and related documents provided sufficient evidence that the geographic range of the harvests of target stocks is monitored during the fishing season using DNA stock composition techniques. However, no evidence was provided on how this information is used in the in-season management process and annual documentation is not sufficient to pass the 100 guideposts. Mr. Nelson's review suggested that none of the guideposts were met. The Team disagreed and found that the geographic range for harvests of target stocks was reasonably defined and the information available

for target and non-target stocks was sufficient to prevent overharvesting of theses stocks. The Team's score for this indicator was 80.

Indicator 1.1.2.1: Estimates exist of the removals for each stock unit.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.14) suggested that a score of 93 was appropriate for this indicator. The Team found that all guideposts at the 60 and 80 SG for this indicator were met but one of 100 guideposts waspartially met and one wasnot met:

- Catch estimates are available for all fisheries in Canadian waters that harvest the target and non-target stocks harvested in the fishery being evaluated.

- Catch estimates are available for fisheries outside Canadian waters that harvest the stocks that are the target of the fishery being evaluated.

The DFO confirmation that catch estimates for all First Nation, sport, commercial and test fisheries are made daily and reviewed after each fishing season was sufficient to evidence to pass the 60 and 80 guideposts. Further details on stock composition for all relevant Canadian fisheries and estimates of the harvest of target stocks in foreign fisheries is required to pass the above two 100 guideposts. The Team's score for this indicator was 90.

Indicator 1.1.2.3: The age and size of catch and escapement have been considered, especially for the target stocks.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.17) suggested that a score of 100 was appropriate for this indicator. The Team agreed with the DFO submission that most of the guideposts were met but the one guidepost at the 100 SG was only partially met:

- Annual monitoring programs collect data on the age and size of the catch and escapement for target and non-target stocks where there is a clear scientific basis for collecting these data.

While data on the age and size of catch and escapement has been obtained for the target stocks harvested in the Barkley Sound sockeye fisheries, no evidence was provided that these data are collected for non-target stocks. The Team's score for this indicator was 90.

Indicator 1.1.2.4: The information collected from catch monitoring and stock assessment programs is used to compute productivity estimates for the target stocks and management guidelines for both target and non-target stocks.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.19) and Nelson (2005) suggested that a score of 90 was appropriate for this indicator. The Team was not convinced that the first guidepost at the 100 SG was completely met and agreed with the DFO that the second guidepost at the 100 SG was not met:

- Scientifically defensible productivity estimates (e.g. stock/recruitment relationships) have been derived for all target stocks and the relative productivity of non-target stocks is known.

- Risk assessment has been conducted to determine the impact of alternative harvest strategies on non-target stocks. The risk assessment should include an assessment of the uncertainties with estimates of stock productivity for both the target and non-target stocks.

Scientifically defensible productivity estimates are available for the target stocks and some non-target hatchery stocks of Chinook and coho, however, reliable estimates are not available for non-enhanced Chinook and coho stocks. The Team's score for this indicator was 85.

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.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.24) suggested that a score of 100 was appropriate for this indicator, assuming that the second guidepost at the 100 SG is not applicable. The Team found that all guideposts were applicable and that DFO did permit commercial fisheries in 2000 and 2006 when the run was less than the TRP for the target stocks:

- Stocks are allowed to recover to the TRP before commercial fisheries are permitted that target these stocks.

The historical data on annual harvest rates and run size for Somass sockeye provided sufficient evidence that these target stocks have been successfully managed back up to fishable levels from low abundance with a single brood cycle and commercial fisheries have not been permitted when the forecast return is less than 150% of the LRP. The Team's score for this indicator was 93.

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 management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.27) suggested that a score of 95 was appropriate for this indicator. The Team agreed with the DFO submission for this indicator:

- Management actions have reduced fishing as the target stocks approach the LRP and fisheries have only resulted in escapements that approach or are below the LRP escapement goal in one year in a period of the most recent 10 consecutive years, for any of the target stocks.

In two of the past 10 years (2000 and 2006), the escapement was less than the LRP and fisheries were permitted. The Team's score for this indicator was 95.

Indicator 1.3.1: Information on biological characteristics such as the age, size, sex and genetic structure of the target stocks is considered prior to making management decisions and management actions are consistent with maintaining healthy age, size, sex and genetic structure of the target stocks.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004a, p.30) suggested a score of 97 for this indicator. Team agreed that the first guidepost at the 100 SG was only partially met:

- There is comprehensive knowledge of the effect of fishing on biological characteristics such as the age, size, sex and genetic structure of the target stocks and the impact of changes in these factors on the reproductive capacity of the target stocks.

While the available information is not comprehensive it is certainly adequate to pass all but one of the guideposts. DFO's submission contained plots that show the size, sex and age composition for the two target stocks over a recent 6 year period. No substantive changes in sex ratios or average length have been observed for either target stock. The plots of age composition by brood year were less informative. The Team's score for this indicator was 97.

Barkley Sound Sockeye - Performance Indicators scoring <80

Under Principle 1, there were four indicators where Barkley Sound sockeye did not achieve the 80 scoring guidepost. The following sections identify indicators and criteria where these deficiencies occur and the actions required to attain full MSC certification.

Indicator 1.1.1.5: Where stock units are composed of significant numbers of fish from enhancement activities, the management system provides for identification of the enhanced fish and their harvest without adversely impacting the diversity, ecological function or viability of unenhanced stocks.

100 Scoring Guidepost

- Fisheries targeting enhanced stocks are geographically removed from unenhanced stocks and separate terminal harvest areas are established for these fisheries.
- Times and areas have been identified where the majority of enhanced fish migrate through the general fishery.
- There is real time mark recovery program during the prosecution of the fishery that allows determination of harvest rates of the enhanced component of the run and this data is used in regulation of the fishery.

80Scoring Guidepost

- In fisheries where both enhanced and un-enhanced stocks are harvested at the same time, the harvest guidelines are based on the goals and objectives established for the un-enhanced stocks.
- There are adequate data and analyses to determine that the presence of enhanced fish in the management units do not adversely impact the unenhanced fish stocks.

60 Scoring Guidepost

- 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.
- 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 management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003a, p.11) suggested that this indicator was not applicable because the target stocks are not directly enhanced through hatchery releases. Nelson (2005) contended that the annual fertilization of Great Central Lake (GCL) is an enhancement activity. The Team accepted DFO's argument that the fertilization of GCL has reduced the productivity differences between the two target sockeye stocks and thus made the mixed stock fishery easier to manage. At the time of our initial assessment, the Henderson Lake hatchery was the only enhancement activity (200,000 fry released per year) associated with Barkley Sound sockeye. Sockeye fry were marked with strontium, but there has not been any assessment of whether this marking approach will be sufficient to separate hatchery from wild fish. The Team considered that the numbers of sockeye fry produced by the Henderson Lake hatchery were probably too low to have a significant effect on the unenhanced stock. However, the Team concluded that the available data was not adequate to determine the effect of the enhancement initiative on unenhanced stocks. The Team's score was 75.

Condition 9 - Certification will be conditional until an assessment is completed regarding the effect of Henderson Lake enhancement efforts on non-enhanced stocks, within one year (**Barkley Sound Condition #1.1**).

Indicator 1.1.2.2: Estimates exist of the spawning escapement for each stock unit.

100 Scoring Guidepost

- Estimates are available for the annual escapement for each stock unit harvested in the fishery.
- In-season escapement data are collected for all stock units and used to regulate the fishery.

80 Scoring Guidepost

- Estimates are available for the annual escapement of each target stock harvested in the fishery.
- Fishery independent indicators of abundance are available for the non-target species harvested in the fishery.
- In-season escapement data are collected for the target stocks and used to regulate the fishery.

60 Scoring Guidepost

- Escapement estimates for target stocks are available, where escapement estimates are necessary to protect the target stock from overexploitation.
- Fishery independent indicators of abundance are available for non-target stocks where the fishery harvests may represent a significant component of the harvest of that stock.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003a, p.16) suggested that a score of 100 was appropriate for this indicator. Nelson (2005) indicated that one of the 60 scoring guidepost was not met because "escapement to Henderson Lake (a non-target stock) is not done regularly. The Team found that annual estimates of escapement were available for the Henderson Lake stock but the reliability of these estimates is questionable. The Team's score was 77.

Condition 10 - Certification will be conditional until a more reliable escapement estimates are available for Henderson Lake sockeye, within one year (**Barkley Sound Condition #1.2**).

Indicator 1.1.3.1: Limit Reference Points or operational equivalents have been set and are appropriate to protect the stocks harvested in the fishery.

100 Scoring Guidepost

- The Limit Reference Point for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the LRP's are appropriate.
- There is general scientific agreement regarding the LRP's for non-target species.

80 Scoring Guidepost

- There is some scientific basis for the LRP's for target stocks and these LRP's are defined to protect the stocks harvested by the fisheries.
- There is no significant scientific disagreement regarding the LRP's used by the management agency to formulate management decision for the fishery.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the LRP's or equivalent are appropriate to achieve the management goals for target stocks.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003a, p.21) suggested that a score of 80 was appropriate for this indicator. Nelson (2005) indicated that none of the scoring guidepost were met because "DFO has not established LRPs for target stock". Nelson clearly did not accept the interim LRP for Somass sockeye as an adequate LRP for management of the target sockeye stocks. The Team did not agree with Nelson's point of view but recognized that there is some scientific disagreement regarding the LRP used by the management agency and thus the second guidepost at the 80 SG was only partially met. The Team's score was 75.

Condition 11 - Certification will be conditional until a LRP has been defined for Henderson Lake and there is no significant scientific disagreement regarding this LRP. These tasks should be completed within two years (**Barkley Sound Condition #1.3**).

Indicator 1.1.3.2: Target Reference Points or operational equivalent have been set.

100 Scoring Guidepost

- The Target Reference Point (TRP) for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the TRP's are appropriate.
- The TRP's for the target stocks take into account variability in the productivity of each component of the target stock and productivity of non-target stocks.

80 Scoring Guidepost

- There is no significant scientific disagreement regarding the TRP's used by the management agency to formulate management decision for the fishery.
- The TRP's 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.

60 Scoring Guidepost

- There is general agreement among fisheries scientist within the management agency that the TRP's are appropriate for the target stocks.
- 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.
- The management agency has taken into account the relative productivity of non-target stocks when setting the TRP's for the majority of target stocks.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003a, p.21) suggested that a score of 100 was appropriate for this indicator. Nelson (2005) indicated that none of the scoring guidepost were met because "DFO has not established target reference points for individual target stocks". Nelson clearly did not accept the interim TRP for Somass sockeye as an adequate TRP for management of the target sockeye stocks. The Team did not agree with Nelson's point of view but the management agency has not provided any evidence that the productivity of non-target stocks was considered when the interim TRP was defined for Somass sockeye. Therefore, one of the 80 scoring guideposts was only partially met and the Team's score was 75 for this indicator.

Condition 12 - Certification will be conditional until evidence has been provided that the productivity of non-target stocks was considered when the interim TRP was defined for Somass sockeye, by May 2012. (**Barkley Sound Condition #1.4**).

Skeena Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 1 indicator and guidepost is provided in Table 10.1.4. The assessment team rescored four Skeena River Principle 1 performance indicators in June 2008, which are indicated in the aqua blue colour in the table below.

Table 10.1.4. Summary of the evaluations for each Principle 1 criteria and indicator for the Skeena sockeye fishery. (light blue highlighted scores indicates rescoring in June 2008)

Summary for Skeena Sockeye (July 2009)		Criteria @ 100					Criteria @ 80						Criteria @ 60				
		1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 1 - Fishery Management for Target Populations																	
Criterion 1.1 - Maintain high productivity of target population & associated ecological community																	
Subcriterion 1.1.1 - Stock units																	
Indicator 1.1.1.1 Stock management units defined	100																
Indicator 1.1.1.2 Scientific agreement on units	97			P													
Indicator 1.1.1.3 Geographic distribution known	90																
Indicator 1.1.1.4 Indicator Stocks		na	na	na	na		na	na					na				
Indicator 1.1.1.5 Enhanced Stocks	60	P															
Subcriterion 1.1.2 - Monitoring and assessment																	
Indicator 1.1.2.1 Reliable estimates of removals	77	P						P									
Indicator 1.1.2.2 Reliable estimates of escapement	77							P									
Indicator 1.1.2.3 Information on fish age and size	90	P															
Indicator 1.1.2.4 Productivity estimates	77		P					P									
Subcriterion 1.1.3 - Management goals																	
Indicator 1.1.3.1 Limit reference points	87	P	P														
Indicator 1.1.3.2 Target reference points	70																
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)																	
Indicator 1.2.1 Well-defined and effective strategy		na	na	na			na	na					na	na			
Indicator 1.2.2 Stocks not depleted and harvest rates are sustainable		na	na	na			na	na					na	na			
Criterion 1.3 - Fishing does not impair reproductive capacity																	
Indicator 1.3.1 Age, sex and genetic structure are monitored	90			P													

Skeena Sockeye – Performance Indicators scoring >80

The following points describe the highlights for Skeena sockeye:

1. stock units are well defined and the level of agreement on the stock units used to manage the fisheries is very good (Indicators 1.1.1.1, 1.1.1.2, 1.1.1.3);
2. the procedures in place to assess the catch and escapement of target stocks are very good. (Indicators 1.1.2.1, 1.1.2.2, 1.1.2.3);
3. the management goals are clearly defined for the target stocks and some non-target (Indicators 1.1.3.1, 1.1.3.2);
4. Given that Babine Lake sockeye is the only target stock, there are no depleted target stocks. In these few years when returns to Babine Lake were small appropriate management actions were taken to reduce harvest pressure and escapements have been consistently above LRP since 1982 despite large variations in annual returns. (Indicator 1.2.1, 1.2.2); and
5. DFO programs provide all the necessary age, size, sex and genetic stock composition information required for stock assessment and effect fisheries management (Indicator 1.3.1).

The following sections provide explanations for why these indicators passed all 80 guideposts and identify those guideposts that were not met at the 100 SG.

Indicator 1.1.1.1: The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

The management agency's detaileded submission for Skeena sockeye (DFO Skeena 2004a, p.6) and the independent review (Bocking 2005) suggested that a score of 100 was appropriate for this indicator. The Team agreed that information provided on the description and rationale for each stock unit (Cox-Rogers et al. 2004; DFO Skeena 2004a, p.2-5) met all the guideposts for this indicator. The Team's score for this indicator was 100.

Indicator 1.1.1.2: There is general scientific agreement that the stock units are appropriate.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004a, p.7) suggested that a score of 100 was appropriate for this indicator. The Team, and the independent review (Bocking 2005), found that all guideposts for this indicator were met, except the third guidepost at the 100 SG:

- There is general scientific agreement regarding the stock units for non-target species.

While there is scientific agreement on the stock units for most non-target species, a partial score was awarded because scientific agreement has not been achieved regarding the stock units for Skeena steelhead, which is one of the most controversial non-target species affected by Skeena sockeye fisheries. The Team's score for this indicator was 97.

Indicator 1.1.1.3: The geographic range for harvest of each stock unit in the fishery is known.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004a, p.9) suggested that a score of 100 was appropriate for this indicator. The Team found that all guideposts for this indicator were met, except the first guidepost at the 100 SG:

- The geographic range for harvests of each stock unit in the fishery is estimated and documented each year.

The annual sockeye stock assessment systems and run reconstruction process provides a sound basis for the geographic range for harvest of the aggregate Skeena sockeye stock. However, the information provided does not support the DFO contention that the above guidepost is met for all stock units in the fishery. No evidence was provided that the geographic range of the harvests of non-target sockeye and steelhead stocks is estimated and documented each year. Bocking (2005) argued that the following two guideposts were only partially met because of deficiencies in the information provided on pink, chum, Chinook and steelhead.

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.

The Team agrees that DFO's 2004 submission was deficient but other information provided to the Team, including the ISRP report (Walters et al. 2008), provided sufficient evidence that the available information on the geographic range for these non-target species is sufficient to pass all guideposts except the first one at the 100 SG. The Team's score for this indicator was 90.

Indicator 1.1.2.3: The age and size of catch and escapement have been considered, especially for the target stocks.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004a, p.17) suggested that a score of 90 was appropriate for this indicator. The Team agreed with the DFO submission that the one guidepost at the 100 SG was only partially met:

- Annual monitoring programs collect data on the age and size of the catch and escapement for target and non-target stocks where there is a clear scientific basis for collecting these data.

The deficiencies in the annual catch monitoring programs with regard to non-target species are sufficient to justify a partial score for this guidepost. The periodic sampling programs for non-target species combined with annual sampling programs for all ocean fisheries and the Skeena test fishery were found to be sufficient to pass all other guideposts under this indicator. The Team's score for this indicator was 90.

Indicator 1.1.3.1: Limit Reference Points or operational equivalents have been set and are appropriate to protect the stocks harvested in the fishery.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004a, p.21) suggested the three guideposts at the 100 SG were partially met:

- The Limit Reference Point for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the LRP's are appropriate.
- There is general scientific agreement regarding the LRP's for non-target species.

The Team found that the third guidepost had not been met because of the lack of LRPs for most non-target species. The Team agreed with the DFO submission that the first two guidepost at the 100 SG were partially met because LRPs have been defined and reviewed for the target sockeye stocks and several of the non-target sockeye stocks (Shortreed et al. 1997). The Team's score for this indicator was 87.

Indicator 1.3.1: Information on biological characteristics such as the age, size, sex and genetic structure of the target stocks is considered prior to making management decisions and management actions are consistent with maintaining healthy age, size, sex and genetic structure of the target stocks.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004a, p.26) suggested that two of the three guideposts at the 100 SG were met. The Team agreed that the first guidepost at the 100 SG was not met and found that the third guidepost was only partially met:

- There is comprehensive knowledge of the effect of fishing on biological characteristics such as the age, size, sex and genetic structure of the target stocks and the impact of changes in these factors on the reproductive capacity of the target stocks.

- Enhanced fish are identified and managed as separate target stocks.

The enhanced Babine stocks are managed as separate target stocks using terminal fisheries in Babine Lake. However, many of the fisheries for Skeena sockeye are conducted in mixed-stock areas where the enhance fish can not be identified and managed as separate stocks. Bocking (2005) identified concerns regarding the following guidepost at the 60 SG:

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. The Team found that most of the concerns regarding un-enhanced stocks are associated with the non-target sockeye and steelhead stocks and thus addressed under Principle 2 (see Indicator 2.3.1 Certification Conditions 21b and 22). The Team's score for this indicator was 90.

Skeena Sockeye – Performance Indicators scoring <80

After rescoring, there were four indicators under Principle 1 where Skeena sockeye did not achieve the 80 scoring guidepost. The following sections identify indicators and criteria where these deficiencies occur and the actions required to attain full MSC certification.

Indicator 1.1.1.5: Where stock units are composed of significant numbers of fish from enhancement activities, the management system provides for identification of the enhanced fish and their harvest without adversely impacting the diversity, ecological function or viability of unenhanced stocks.

100 Scoring Guidepost

- Fisheries targeting enhanced stocks are geographically removed from unenhanced stocks and separate terminal harvest areas are established for these fisheries.
- Times and areas have been identified where the majority of enhanced fish migrate through the general fishery.
- There is real time mark recovery program during the prosecution of the fishery that allows determination of harvest rates of the enhanced component of the run and this data is used in regulation of the fishery.

80 Scoring Guidepost

- In fisheries where both enhanced and un-enhanced stocks are harvested at the same time, the harvest guidelines are based on the goals and objectives established for the un-enhanced stocks.
- There are adequate data and analyses to determine that the presence of enhanced fish in the management units do not adversely impact the unenhanced fish stocks.

60 Scoring Guidepost

- 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.

- 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 management agency's detailed submission for Skeena sockeye (DFO Skeena 2003a, p.12) suggested that a score of 90 was appropriate for this indicator. Bocking (2005) scoring for this indicator was similar to that provided in the DFO submission. Hill (2007) contended that the two 60 scoring guideposts were not met because he does not believe there is an empirical basis for any internal DFO agreement that may exist regarding the impact of enhancement on un-enhanced fish stocks and he believes that "the majority of weak sockeye stocks are routinely fished at exploitation rates above their estimated MSY". The Team found that there was general scientific agreement within the management agency that the primary target for Skeena sockeye fisheries are the enhanced Babine sockeye produced from the Pinkut and Fulton spawning channels and fisheries targeting these enhanced stocks have had a significant impact on the Skeena's wild sockeye stocks and other co migrating salmon and steelhead. However, recent harvest rates are significantly reduced from historical levels and managers have indicated that the available stock-recruitment data provides a scientific basis that current harvest rates set for the mixed-stock fisheries should not adversely affect the majority of un-enhanced stocks within each stock unit (i.e. Babine and non-Babine sockeye).

The Skeena Independent Science Review Panel (ISRP) recommended "a comprehensive assessment of the advantages and disadvantages of either reducing channel production substantially, or eliminating it entirely in favour of sustaining the wild stock fishery." The ISRP identified a number of deficiencies in the information available to assess trends in marine survival and the impact of enhanced stocks on the wild stocks. The reinstatement of the Babine sockeye smolt monitoring program was identified as one of the top priorities. Other scientists have proposed provisional LRP's for most of the un-enhanced Skeena sockeye stocks (Wood, 1999) but to date these LRP's have not been formally used in the development of harvest plans for Skeena sockeye. The Team's score was 60.

Condition 13 - Certification will be conditional until a peer reviewed (e.g. PSARC) assessment of the impact of production from Pinkut and Fulton spawning channels on wild sockeye stocks has been completed and the TRPs and LRPs have been clearly defined for the un-enhanced sockeye stocks, within two years (**Skeena Condition #1.1**).

Indicator 1.1.2.1: Estimates exist of the removals for each stock unit.

100 Scoring Guidepost

- Catch estimates are available for all fisheries in Canadian waters that harvest the target and non-target stocks harvested in the fishery being evaluated.
- Mortality rates are available for the fish released or discarded during the fishery.
- Catch estimates are available for fisheries outside Canadian waters that harvest the stocks that are the target of the fishery being evaluated.

80 Scoring Guidepost

- Catch estimates are available for all target stocks harvested in the fishery.
- Catch estimates are available for non-target stocks where the catch of the non-target stock may represent a significant component of the harvest of that stock.

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

60 Scoring Guidepost

- Catch estimates for the majority of target stocks are available.
- Catch estimates are available for non-target stocks where the catch of the non-target stocks may represent a significant component of that stock.
- Mechanisms exist to ensure accurate catch reporting and these mechanisms are evaluated at least once every 10 years.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003a, p.14) suggested that a score of 100 was appropriate for this indicator. Bocking (2005) indicated that two of the 100 scoring guideposts have not been met but all of the 60 and 80 guideposts were met. Hill (2007) contended that one of the 60 scoring guideposts was not met because he believes that "many commercial fishers engage in 'token reporting' and personal retention of non-target bycatch". After a detail review of all the methods used to estimate catch or exploitation rates for Skeena steelhead stocks, the Skeena ISRP concluded that "The state of affairs today is that we actually have no idea how reliable DFO's estimates of steelhead exploitation rates are." While the steelhead bycatch in fisheries targeting Skeena sockeye can represent a significant portion of the harvest of Skeena steelhead, the steelhead harvest rates are believed to be relatively low, and thus a much less significant component of the steelhead stock in most years. However, there is an urgent need to improve the procedures used to estimate the catch for these non-target steelhead stocks. The Team's score was 77.

Condition 13a - Certification is conditional until the management agencies implement a scientifically defensible program for estimating steelhead catch in the Skeena sockeye fisheries, within two years (**Skeena Condition #1.1a**).

Indicator 1.1.2.2: Estimates exist of the spawning escapement for each stock unit.

100 Scoring Guidepost

- Estimates are available for the annual escapement for each stock unit harvested in the fishery.
- In-season escapement data are collected for all stock units and used to regulate the fishery.

80 Scoring Guidepost

- Estimates are available for the annual escapement of each target stock harvested in the fishery.
- Fishery independent indicators of abundance are available for the non-target species harvested in the fishery.
- In-season escapement data are collected for the target stocks and used to regulate the fishery.

60 Scoring Guidepost

- Escapement estimates for target stocks are available, where escapement estimates are necessary to protect the target stock from overexploitation.

- Fishery independent indicators of abundance are available for non-target stocks where the fishery harvests may represent a significant component of the harvest of that stock.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003a, p.15-16) suggested that a score of 90 was appropriate for this indicator. Bocking (2005) suggested that the second guidepost at the 60 SG was only partially met because the Tyee fishery does not provide stock specific indicators of abundance for all species. Hill (2007) contended that the first guidepost at the 60 guideposts was not met because he considers "any sockeye stock subject to harvest in the commercial fishery is a *de facto* target stock". The Team found that the fishery passed these guideposts because fishery independent indicators of abundance are not required for all non-target stocks and the Team assessment has always been based on the premise that the Babine sockeye is target stock for the Skeena sockeye fishery. The Team found that escapement estimates for the non-target sockeye stocks (i.e. non-Babine stocks) were less reliable than those for Babine sockeye. The shift towards management by conservation unit (CU), would require more information on the abundance within each CU. The management agency has recently defined 32 sockeye CUs within the Skeena watershed and the ISRP concluded that "the available data are not sufficient to define escapement trends or assess stock status for 15 of the sockeye CUs". This is flagged as a gap in the current annual stock assessment program that could be addressed by the approaches defined in the Core Stock Assessment Review for North and Central Coast salmon stocks. The Team's score was 77.

Condition 13b - Certification is conditional until the management agencies implement the escapement and fall fry monitoring plans for Skeena sockeye as defined in the Core Stock Assessment Review for North and Central Coast salmon stocks or a similar scientifically defensible program to address this key information gap, within two years (**Skeena Condition #1.1b**).

Indicator 1.1.2.4: The information collected from catch monitoring and stock assessment programs is used to compute productivity estimates for the target stocks and management guidelines for both target and non-target stocks.

100 Scoring Guidepost

- Scientifically defensible productivity estimates (e.g. stock/recruitment relationships) have been derived for all target stocks and the relative productivity of non-target stocks is known.
- Risk assessment has been conducted to determine the impact of alternative harvest strategies on non-target stocks. The risk assessment should include an assessment of the uncertainties with estimates of stock productivity for both the target and non-target stocks.

80 Scoring Guidepost

- There is adequate information to identify the harvest limitations and production strategies required to maintain the high productivity of the target stocks.
- 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.
- The harvest limitations for target stocks take into consideration the impacts on non-target stocks and the uncertainty of the productivity for these stocks.

60 Scoring Guidepost

- The available information and analyses are adequate to identify the harvest limitations and production strategies required to maintain the productivity of the majority of target stocks.
- The relative productivity of the non-target stocks is considered in the management strategy, where the fishery harvests may represent a significant component of those non-target stocks.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003a, p.18-19) suggested that a score of 90 was appropriate for this indicator. Bocking (2005) concurred with the DFO scoring for this indicator. As indicated above, there is general scientific agreement that the catch of the non-target sockeye stocks in fisheries that target Babine sockeye can represent a significant component of the harvest of those stocks. The Team found that the second guidepost at the 80 SG was not fully met because the data available for some non-target sockeye stocks is not adequate to estimate the relative productivity for these non-target stocks. The fishery passed the second guidepost at the 60 SG because there is evidence in the annual fishing plans that the likely lower productivity for some non-target stocks has been considered in the management strategy for Skeena sockeye fisheries. The Team's score was 77.

Condition 13c -Certification is conditional until the management agencies have implemented the programs necessary to provide periodic assessments of the relative productivity for each Skeena sockeye CU or justification for the use of currently monitored populations as indicator stocks, within two years (**Skeena Condition #1.1c**).

Indicator 1.1.3.2: Target Reference Points or operational equivalent have been set.

100 Scoring Guidepost

- The Target Reference Point (TRP) for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the TRP's are appropriate.
- The TRP's for the target stocks take into account variability in the productivity of each component of the target stock and productivity of non-target stocks.

80 Scoring Guidepost

- There is no significant scientific disagreement regarding the TRP's used by the management agency to formulate management decision for the fishery.
- The TRP's 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.

60 Scoring Guidepost

- There is general agreement among fisheries scientist within the management agency that the TRP's are appropriate for the target stocks.

- 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.
- The management agency has taken into account the relative productivity of non-target stocks when setting the TRP's for the majority of target stocks.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003a, p.22) suggested that a score of 70 was appropriate for this indicator. Bocking (2005) contended that the second scoring guidepost at the 60SG could not be met because it is the same as the second guidepost at the 100 SG, which has not been met. The Team recognizes that these guideposts appear to be redundant because no reference was made to the management agency. Where agreement is required at the 60 guidepost it is generally only required within the management agency. Consequently, the Team agreed with DFO's assessment that they passed the 60 guideposts but did not pass all the 80 and 100 guideposts. The management agency has indicated that historically the TRP for the Babine stock did not take into account the productivity of non-target Skeena stocks. The current TRP for the target Babine sockeye stock is based on the plans to limit harvests in mixed-stock fisheries to levels that take into account the lower productivity of non-target stocks and harvest the surplus production of the Babine stock in areas where only Babine stocks are present (i.e. within the Babine watershed). The WSP calls for the definition of conservations units for each salmon species and the definition of management guidelines for each conservation unit. The Team's score was 70.

Condition 14 - 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, within one year (**Skeena Condition #1.2**).

Nass Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 1 indicator and guidepost is provided in Table 10.1.5. The assessment team did not rescore any Nass Sockeye Fishery Principle 1 performance indicators in June 2008.

Table 10.1.5: Summary of the evaluations for each Principle 1 criteria and indicator for the Nass sockeye fishery.

Summary for Nass Sockeye (July 2009)		Criteria @ 100					Criteria @ 80						Criteria @ 60				
	Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 1 - Fishery Management for Target Populations																	
Criterion 1.1 - Maintain high productivity of target population & associated ecological community																	
Subcriterion 1.1.1 - Stock units																	
Indicator 1.1.1.1 Stock management units defined	100																
Indicator 1.1.1.2 Scientific agreement on units	100																
Indicator 1.1.1.3 Geographic distribution known	90																
Indicator 1.1.1.4 Indicator Stocks		na	na	na	na		na	na					na				
Indicator 1.1.1.5 Ehanced Stocks		na	na	na			na	na					na	na			
Subcriterion 1.1.2 - Monitoring and assessment																	
Indicator 1.1.2.1 Reliable estimates of removals	100																
Indicator 1.1.2.2 Reliable estimates of escapement	74																
Indicator 1.1.2.3 Information on fish age and size	90	P															
Indicator 1.1.2.4 Productivity estimates	100		na														
Subcriterion 1.1.3 - Management goals																	
Indicator 1.1.3.1 Limit reference points	75						P										
Indicator 1.1.3.2 Target reference points	100																
Criterion 1.2 - Fishery allows for the recovery of depleted stocks (Target Stocks)																	
Indicator 1.2.1 Well-defined and effective strategy		na	na	na			na	na					na	na			
Indicator 1.2.2 Stocks not depleted and harvest rates are sustainable		na	na	na			na	na					na	na			
Criterion 1.3 - Fishing does not impair reproductive capacity																	
Indicator 1.3.1 Age, sex and genetic structure are monitored	90			na					na						na		

Nass Sockeye – Performance Indicators scoring >80

The following points describe the highlights for Nass sockeye:

1. stock units are well defined and the level of agreement on the stock units used to manage the fisheries is very good (Indicators 1.1.1.1, 1.1.1.2, 1.1.1.3);
2. Indicator stocks are not used to manage Nass sockeye and there are no enhanced sockeye stocks in the Nass area, so Indicators 1.1.1.4 and 1.1.1.5 are not applicable.
3. the procedures in place to assess the catch and escapement of target stocks are very good. (Indicators 1.1.2.1, 1.1.2.3, 1.1.2.4);
4. the management goals are clearly defined for the target stocks and some non-target stocks (Indicators 1.1.3.1, 1.1.3.2);
5. 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 (Indicator 1.2.1, 1.2.2); and
6. DFO programs provide all the necessary age, size, sex and genetic stock composition information required for stock assessment and effect fisheries management (Indicator 1.3.1).

The following sections provide explanations for why these indicators passed all 80 guideposts and identify those guideposts that were not met at the 100 SGs.

Indicator 1.1.1.1: The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.3) and an independent review by David Levy (Levy 2005) suggested that a score of 100 was appropriate for this indicator. The Team agreed with their assessment and found that information provided on the description and rationale for each stock unit (DFO Nass 2004a, p.1-4) met all the guideposts for this indicator. The Team's score for this indicator was 100.

Indicator 1.1.1.2: There is general scientific agreement that the stock units are appropriate.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.5) and Levy (2005) suggested that a score of 100 was appropriate for this indicator. The Team also found that all guideposts for this indicator were met. The salmon stocks harvested in fisheries targeting Nass sockeye have been the subject for intensive studies conducted by Nisga'a Fisheries Program in cooperation with DFO and the BC Ministry of Environment (MOE) over the past 17 years. As part of these studies there have been extensive reviews of the stock definitions and assessment data for each stock. There is scientific agreement among fisheries scientists inside and outside the management agency regarding the stock units for target and non-target stocks. The Team's score for this indicator was 100.

Indicator 1.1.1.3: The geographic range for harvest of each stock unit in the fishery is known.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.8) suggested that a score of 100 was appropriate for this indicator. The Team found that all guideposts at the 60 and 80 SG for this indicator were met but one of the 100 guideposts was not met:

- The geographic range for harvests of each stock unit in the fishery is estimated and documented each year.

DFO's submission and related documents provided sufficient evidence that the geographic range of the harvests of target stocks is monitored during the fishing season using effort and catch rate data from Alaskan and Canadian fisheries, and documented in PSC and Nisga'a reports each year. However, the geographic range for harvests of the non-target species caught in Nass sockeye fisheries has not been estimated and documented each year. The Team's score for this indicator was 90.

Indicator 1.1.2.1: Estimates exist of the removals for each stock unit.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.14) and Levy (2005) suggested that a score of 100 was appropriate for this indicator. The Team found that all were met. The catch monitoring data available for Nass sockeye fisheries is widely recognized to be highly reliable. Catch estimates are documented in reports prepared by the PSC Northern Boundary Technical Committee (English et al 2004); Nisga'a Joint Technical Committee (JTC 2004); and Nisga'a Fisheries Program (Baxter and Azak 2003; Baxter 2003). The Team's score for this indicator was 100.

Indicator 1.1.2.3: The age and size of catch and escapement have been considered, especially for the target stocks.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.17) suggested that a score of 90 was appropriate for this indicator. The Team and Levy (2005) agreed with the DFO

submission that most of the guideposts were met and one guidepost at the 100 SG was only partially met:

- Annual monitoring programs collect data on the age and size of the catch and escapement for target and non-target stocks where there is a clear scientific basis for collecting these data.

While annual data on the age and size of catch and escapement has been obtained for the target stocks harvested in the Nass sockeye fisheries, periodic monitoring programs are used to obtain these data for non-target stocks. The Team's score for this indicator was 90.

Indicator 1.1.2.4: The information collected from catch monitoring and stock assessment programs is used to compute productivity estimates for the target stocks and management guidelines for both target and non-target stocks.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.19) suggested that a score of 90 was appropriate for this indicator because they evaluated the second guidepost at the 100 SG as not met:

- Risk assessment has been conducted to determine the impact of alternative harvest strategies on non-target stocks. The risk assessment should include an assessment of the uncertainties with estimates of stock productivity for both the target and non-target stocks.

The Team interpreted this guidepost to be primarily applicable to non-target sockeye stocks. Since all sockeye stocks in the Nass area are considered to be target stocks, this guidepost was excluded from the evaluation. However, the team should have evaluated this guidepost for non-target species. Information annual documents prepared by the Nisga'a fisheries program show that managers routinely evaluate the impact of alternative harvest strategies on the non-target Chinook, coho and steelhead stocks that co-migrate with Nass sockeye. Thus, including or excluding this particular guidepost would not change the evaluation for this indicator. The Team's score for this indicator was 100.

Indicator 1.1.3.2: Target Reference Points or operational equivalent have been set.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.5) suggested that a score of 100 was appropriate for this indicator. The Team also found that all guideposts for this indicator were met. The salmon stocks harvested in fisheries targeting Nass sockeye have been the subject for intensive studies conducted by Nisga'a Fisheries Program in cooperation with DFO and the BC Ministry of Environment (MOE) over the past 17 years. As part of these studies there have been extensive reviews of the stock definitions, assessment data and the TRPs for the target stocks and non-target species. The TRP for the target stocks have been reviewed and found to be scientifically appropriate by PSARC (Bocking et al 2002). There is scientific agreement among fisheries scientists inside and outside the management agency regarding the TRPs for the target stocks and non-target species. The Team's score for this indicator was 100.

Indicator 1.3.1: Information on biological characteristics such as the age, size, sex and genetic structure of the target stocks is considered prior to making management decisions and management actions are consistent with maintaining healthy age, size, sex and genetic structure of the target stocks.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004a, p.30) suggested a score of 90 for this indicator. Team agreed that the first guidepost at the 100 SG was not met:

- There is comprehensive knowledge of the effect of fishing on biological characteristics such as the age, size, sex and genetic structure of the target stocks and the impact of changes in these factors on the reproductive capacity of the target stocks.

While the available information is not comprehensive it is certainly adequate to pass all but one of the guideposts. Management actions are generally consistent with maintaining the biological characteristics of the target stock. Age, size, and sex data have been collected from the Nass test fisheries and Meziadian fishway for over 50 years. Recent DNA sampling and analyses are improving the understanding of the contribution of Nass stocks to marine fisheries and genetic structure of the target stocks. The Team's score for this indicator was 90.

Nass Sockeye – Performance Indicators scoring <80

Under Principle 1, there were two indicators where Nass sockeye fisheries did not achieve the 80 scoring guidepost. The following sections identify indicators and criteria where these deficiencies occur and the actions required to attain full MSC certification.

Indicator 1.1.2.2: Estimates exist of the spawning escapement for each stock unit.

100 Scoring Guidepost

- Estimates are available for the annual escapement for each stock unit harvested in the fishery.
- In-season escapement data are collected for all stock units and used to regulate the fishery.

80 Scoring Guidepost

- Estimates are available for the annual escapement of each target stock harvested in the fishery.
- Fishery independent indicators of abundance are available for the non-target species harvested in the fishery.
- In-season escapement data are collected for the target stocks and used to regulate the fishery.

60 Scoring Guidepost

- Escapement estimates for target stocks are available, where escapement estimates are necessary to protect the target stock from overexploitation.
- Fishery independent indicators of abundance are available for non-target stocks where the fishery harvests may represent a significant component of the harvest of that stock.

The management agency's detailed submission for Nass sockeye (DFO Nass 2003a, p.14) suggested that a score of 95 was appropriate for this indicator. Levy (2005) concurred with the DFO score for this indicator. The Team found that reliable escapement estimates are computed for the aggregate sockeye return to the Nass River and the Meziadin sockeye stock. Annual estimates are not available in recent years for most of the smaller sockeye stocks (e.g. Bowser, Damdochax, Kwinageese), therefore, the first

scoring guidepost at the 80 SG was not met. The escapement of these stocks could be readily estimated using DNA samples obtained from the Lower Nass fishwheels. The Team's score was 74.

Condition 15 - Certification will be conditional until annual escapement estimates are computed for each of the Nass sockeye stocks targeted in the fisheries for Nass sockeye, within one year (**Nass Condition #1.1**).

Indicator 1.1.3.1: Limit Reference Points or operational equivalents have been set and are appropriate to protect the stocks harvested in the fishery.

100 Scoring Guidepost

- The Limit Reference Point for target species have been reviewed and found to be scientifically defensive and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- There is general agreement among regional fisheries scientist outside the management agency that the LRP's are appropriate.
- There is general scientific agreement regarding the LRP's for non-target species.

80 Scoring Guidepost

- There is some scientific basis for the LRP's for target stocks and these LRP's are defined to protect the stocks harvested by the fisheries.
- There is no significant scientific disagreement regarding the LRP's used by the management agency to formulate management decision for the fishery.

60 Scoring Guidepost

- There is general agreement among regional fisheries scientist within the management agency that the LRP's or equivalent are appropriate to achieve the management goals for target stocks.

The management agency's detailed submission for Nass sockeye (DFO Nass 2003a, p.18-19) suggested that a score of 100 was appropriate for this indicator. Levy (2005) disagreed with the DFO scoring but indicated that the Nass fishery was still above the MSC threshold for this indicator. The Team found that LRP's have been defined for the aggregate sockeye return to the Nass River and the Meziadin sockeye stock. LRP's have not been defined for any of the smaller sockeye stocks (e.g. Bowser, Damdochax, Kwinageese), therefore, the first scoring guidepost at the 80 SG was only partially met. It is anticipated that implementation of the WSP will include the definition of LRP's or their operational equivalent, in the near future. The Team's score was 75.

Condition 16 -Certification will be conditional until LRP's have been defined for each of the Nass sockeye stocks targeted in the fisheries for Nass sockeye, within two years (**Nass Condition #1.2**).

10.2 MSC Principle 2

Principle 2 **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.**

Principle 2 Summary

A comparison of the scores for the Principle 2 indicators that address ecosystem and non-target populations is provided in Table 10.2.1.

Table 10.2.1: Summary of scores for Principle 2 indicators for each fishery.

		Fraser	Barkley	Skeena	Nass	Weighting	Fraser	Barkley	Skeena	Nass
PRINCIPLE 2 - Ecosystem and Non-Target Populations						0.333	82.7	88.9	85.3	88.8
Criterion 2.1 - Maintain natural functional relationships among species						0.500	90.3	95.2	84.7	93.7
Indicator 2.1.1	Impacts on ecosystem processes can be identified	87	97	70	97	0.333				
Indicator 2.1.2	Provisions to reduce ecosystem impacts	90	90	90	90	0.333				
Indicator 2.1.3	Sufficient research on ecosystem impacts	93	97	93	93	0.111				
Indicator 2.1.4	Escapement goals address ecosystem needs	95	100	95	95	0.222				
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected spe						0.250	77.0	95.0	98.0	95.0
Indicator 2.2.1	Information on biological diversity used by managers	77	95	98	95	1.000				
Criterion 2.3 - Fishery allows for the recovery of depleted stocks (Non-target Stocks)						0.250	73.0	70.0	74.0	73.0
Indicator 2.3.1	Provide for recovery of non-target stocks	73	70	74	73	1.000				

The basis for Principle 2 evaluation is not surprisingly very similar for the four sockeye fisheries because the general policies of DFO that address Principle 2 apply to all fisheries. Although the use of ecosystem concepts in salmon management has been discussed for decades, the use of ecosystem approaches in establishing target and limit reference points for taking actions on fisheries is a relatively new. Because of the long standing limnological studies of lakes associated with lake fertilization programs in the province, there is a relatively advanced understanding of within lake, top-down and bottom-up processes that regulate sockeye salmon abundance. In some cases, escapement goals have been established using limnological data that relates lake habitat parameters to sockeye smolt production. Mechanisms associated with cyclic dominance and the role of fishing mortality versus ecological processes is still debated with a high degree of uncertainty but recently in the Fraser River, harvest policies that are robust to assumptions of the mechanisms are being explored.

In general, sockeye salmon harvests in the marine environment have little evidence of significant impacts on birds and mammals as indicated by log book records. Most concerns about impacts of fisheries on terrestrial birds and mammals feeding on harvested fish populations are addressed through assurances of limit reference points as set through escapement goals that are of sufficient magnitude to provide near maximal subsequent returns. Over the long term, if escapements are sustainable, the escaped fish populations will provide sustenance for piscivorous birds, mammals and fish, as well as providing nutrients that are sufficient to sustain smolt production within the lakes. Although in the future, more use of ecological data will likely occur in setting escapement goals, British Columbia sockeye salmon fisheries are far ahead of most fisheries in the world when considering the use of such

types of information in harvest policies. The use of ecological data and ecological principles in managing the sockeye salmon fisheries has been embraced in the recently enacted Wild Salmon Policy.

The differences between these fisheries with regard to Principal 2 criteria, result primarily from differences in the status and recovery of depleted non-target sockeye salmon stocks. In the case of the Nass fishery, there is no evidence of any known populations of sockeye salmon being depleted; hence there is no immediate concern about recovery of the depleted stocks. Within the Skeena fishery, there are a significant number of non-target sockeye stocks that have been identified as being below the potential carrying capacity of the nursery lakes. Recovery programs have been initiated, although the historical status and productivity of many of these systems is still in doubt because abundance information is primarily anecdotal so potential carrying capacity estimates are primarily made based on limnological data and the role of fishing in their depletion is less clearly established. Within Barkley Sound, Henderson Lake is clearly substantially below historical levels and fishing has likely had a significant role in their decline. A recovery plan is not yet fully developed for this system but recent analyses of probable harvest rates through run reconstruction suggests accommodations to the commercial fishery may limit the impact of commercial fishing activity on the recovery of this stocks. The Fraser River fisheries have been the biggest challenge, primarily because of the history of the fishery and the geography. With most of the historic exploitation occurring outside of the Fraser River, the multitude of diverse stocks within the river were often subjected to exploitation rates that were appropriate to sustaining escapements from the most productive and abundant fish stocks. When combined with other factors, severe depletion has occurred for some of the fish stocks with the most extreme well documented examples being Cultus and Sakinaw Lakes. Keeping harvest rates low while these stocks recover remains a challenge to harvest managers.

A comparative overview of the four fisheries as related to Principle 2 Criteria follows:

1. (Criterion 2.1) In general, salmon fisheries are inherently able to maintain natural functional relationships among species. Within the marine environment, there are usually two or more year classes at sea that are not subjected to human harvest, based on stock recruitment theory and supported by spawner-return data. Average annual fish abundance likely exceeds unharvested stocks, while providing a high rate of harvest of the returning mature fish. Within freshwater, harvests reduce escapements significantly below what on average would be available for piscivorous birds and mammals but for maximal yield to the fishery to occur, sufficient spawners are needed to provide for these species and should be reflected in escapement goals. All of the fisheries use some form of this approach in determining escapement goals. Only in fisheries that are depleted because of fishing effort, will maintaining functional relationships among species be a factor. Within the four fisheries, the Nass is the only system that has no identified depleted stocks, while recovery plans are in place for the depleted stocks on the Skeena. In the Babine system, there is concern for overharvest of sockeye spawning in natural systems while fully harvesting returns to spawning channels. Management plans and recent reductions in maximum harvest rates for all systems should ensure this is not a factor. Within the Barkley Sound fishery, the Henderson Lake stock is somewhat depleted and may be a factor in reducing local consumption of salmon by predators and scavengers but a recovery plan is being initiated. Within the Fraser, the collapse of the Sakinaw and Cultus Lake stocks is of concern although there are additional systems that have information suggesting weak stocks. However, in none of these systems has there been clear evidence presented of reduced abundance of fish consuming species, such as bears and eagles. The mobility of these species and the natural cycles of sockeye salmon has likely ensured behaviour where alternative food sources can be used during periods of reduced abundance. Understanding of limnological processes within lakes has been

broadly applied, particularly in determining recovery goals, but also in lake rehabilitation/enhancement activities through the application of fertilizer. The Barkley Sound fishery has a long history of enhancement through fishway construction and fertilizer application but this may have contributed to the reduction of Henderson Lake fishery while providing much higher than natural salmon returns to Great Central and Sproat Lakes. In comparison with other fisheries of the world, sockeye salmon fisheries have the most intense research and understanding of ecosystem relationships, primarily because of the large dependency of many species on their abundance and their intrinsic dependency upon food webs within lakes. This research has been concentrated within lakes of the Skeena, Barkley, and Fraser systems but the results are broadly applicable to sockeye salmon fisheries everywhere.

2. (Criterion 2.2) Sockeye salmon fisheries are primarily executed through gill net or seine fisheries with short opening times and within restricted areas. The fishery minimizes impacts on endangered, threatened or protected species. Log books have provided some of the basis for marine bird and mammal interactions. Only fisheries within the Fraser River have had impacts on white sturgeon. This population is the only reasonable healthy population of white sturgeon in British Columbia and has tentatively been excluded from SARA listing.

   Throughout British Columbia, there has been extensive use of genetic information in understanding the degree of isolation of populations from individual lakes, and sometimes from different spawning areas within the drainage of a rearing lake. The ongoing process of identifying Conservation Units in all of the fisheries under the wild salmon policy considerations is using this information. This type of information is probably more advanced in British Columbia sockeye salmon fisheries because DNA information is frequently used in identifying the stock of origin of commercially harvested fish and is used in the US Canada Treaty process to determine the international distribution of harvest. Since sockeye salmon have lesser straying rates than other species and the confinement of the freshwater rearing phase of their life history, in most cases, to lakes, both population dynamics and biodiversity center around individual or closely associated lakes in determining spatial definitions of individual populations that are to be conserved to maintain biodiversity as well as productivity of the associated fishery. This type of information has been used in all four of the sockeye salmon fisheries being investigated with degree of use dependent upon complexity of management problems faced and the importance of addressing depleted populations.

3. (Criterion 2.3). The recovery of non-target stocks is the one component of Principal 2 that had significant contrast between stocks. In the Nass system, there were no identified depleted stocks and available evidence suggests that small populations that are not monitored regularly have similar levels of productivity as do the targeted stocks. In the Skeena, several lakes have been at levels much below their apparent carrying capacity based on limnological data and their size. The historic productivity of these lakes is poorly documented, other than anecdotal evidence, so it is not clear as to what impact fishing had on their low abundance. However recovery plans have been developed with defined limit reference points, so harvest managers have clear objectives to follow when attempting to restore these populations. In Barkley sound, Henderson Lake is depressed substantially below historic abundance levels and historically, it was a target stock prior to enhancement of sockeye salmon fisheries further inland. A recovery plan has not yet developed but there have been analyses suggesting current management of the fisheries should be able to prevent further depletion. The Fraser River fishery has primarily been conducted somewhat distant from the final spawning areas on timing aggregations of multiple

stocks of fisheries populations. Several stocks (specifically Cultus and Sakinaw) have been depleted to such a degree they are threatened with extirpation as returns have been less than 100 fish. Because of the nature of the fishery, until these stocks were depleted, they would have been part of the targeted aggregations, based on their run timing. There are now recovery plans that are being developed and implemented for these stocks and attempts to manage the commercial fishery to reduce the commercial fisheries. There are other stocks within the Fraser River system that are part of the timing aggregates, where the conservation status has not been as thoroughly reviewed as the previous two examples.

In the fishery specific sections that follow, we provide a summary of the areas where the fishery and management practices have been consistent with MSC Principal 2 criteria and details on the each of the indicators is provided where scores were less than and greater than the7 80 scoring guidepost.

Fraser Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 2 indicator for Fraser sockeye fisheries is provided in Table 10.2.2. The assessment team did not rescore any Principle 2 performance indicators in June 2008.

Table 10.2.2: Summary of the evaluations for each Principle 2 criteria and indicator for the Fraser sockeye fishery.

Summary for Fraser Sockeye (Nov. 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	87		P	P													
Indicator 2.1.2	Provisions to reduce ecosystem impacts	90				P												
Indicator 2.1.3	Sufficient research on ecosystem impacts	93			P													
Indicator 2.1.4	Escapement goals address ecosystem needs	95	P															
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species																		
Indicator 2.2.1	by managers	77						P										
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	73			P			P		P	P	P						

Fraser has historically been the largest producer and is by far the most complex and difficult to manage fishery. A summary of our evaluations for each Principle 2 indicator and criteria is provided in Table 10.2.2. The criteria where the fishery exceeds the 80 Scoring Guidepost are generally considered the highlights (i.e. good news) for the fishery. The highlights associated with the various Principle 2 criteria for Fraser sockeye are summarize sequentially for each group of indicators below:

1. Natural Functional relationships are well maintained in the management of Fraser stocks. Ecosystem impacts are reasonably understood, based on limnological research on nutrient contribution of salmon carcasses and responses of lake trophic levels to high escapements as well as fertilizer additions. Mechanisms of cyclicity of some of the stocks are still uncertain and controversial as to how to best manage weak and strong year classes. Ecosystem impacts are as well understood, or most likely better with sockeye salmon fisheries in the Fraser than in most

fisheries of the world. The DFO and the major universities in British Columbia have decades of research and myriads of publications on ecosystem effects of salmon escapements. However, broad use of ecosystem data to establish carrying capacity of lakes in determining escapement goals has had limited implementation, most often because there is little definitive analysis as to the benefits of using information on carcass nutrients, top-down trophic cascades, piscivore consumption rates, and other habitat based information in setting escapement goals. This information is much more relied upon when stocks are depleted or there is limited stock recruitment data to use in estimating escapement goals or harvest rates. (Indicators 2.1.1 to 2.1.4.).

2. The acquisition and use of information on biodiversity is quite developed within British Columbia sockeye salmon fisheries. There is relatively little bycatch of other species and much genetic information has been developed to determine biodiversity within sockeye salmon that use the system. These findings generally support the risk of stock depletion as restoration through artificial propagation or introduction of sockeye salmon into new systems has been very difficult. However much is still not known about small stocks and their ability to reestablish after depletion from either anthropogenic or natural causes (Indicator 2.2.1).

3. The recovery of depleted non-target sockeye stocks is by far the biggest challenge and the most controversial element of the Fraser River sockeye salmon fishery. Part of the dilemma facing fisheries managers is that the marine commercial fishery, depending upon its timing, results in the harvest of many stocks, some of which are seriously depleted. The reduction of maximum exploitation rates to 60% of the aggregate timing group has been a major step to reduce the overall harvest pressure on weak stocks with reduced or no harvests during other periods when severely depleted stocks are present, will likely result in significantly reduced harvest pressure on non- target stocks. The rejection of the SARA listings of Cultus and Sakinaw sockeye salmon because of potential economic hardships to the fishing industry has created much apprehension within the conservation community. However, the Fisheries Minister has indicated that outside of SARA listing, the government will do what is necessary to restore these stocks, both which had commercial fishing as a significant component in their stock reduction. The recently enacted wild salmon policy contains provisions for recovery of depleted stocks and sets general guidelines but does not contain specific mandates for actions in the commercial fishery if a stock is depleted. This has required the reviewers to examine individual recovery plans, harvest management plans, and associated reports and analysis to determine if the explicit mandates for stock recovery probabilities of the MSC program are likely to be met and to provide confidence that economic realities will not result in the long term commitment of the Canadian government to waiver in the recovery of depleted salmon stocks. This issue is addressed in detail in understanding the ratings of the Fraser Salmon fishery to individual MSC Criteria, associated indicators and scoring guideposts.

Fraser Sockeye – Performance Indicators scoring >80

Indicator 2.1.1: The management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified.

100 Scoring Guidepost

- A monitoring program exists that provides estimates of bycatch that meet statistical criteria acceptable to external reviewers.
- All historic monitoring data is readily available to stakeholder groups and external reviewers.
- Quantities of gear lost are recorded, and the impacts of lost gear on target and nontarget species have been researched and accurate projections of impacts have been completed.

80 Scoring Guidepost

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

60 Scoring Guidepost

- Data on bycatch in the majority of the fisheries are available to determine impacts on non-target species.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003b, p.1-4) suggested that a score of 100 was appropriate for this indicator, with scoring element three at the 100SG as not applicable. An independent review of the DFO submission for Fraser sockeye prepared by Ken Wilson (2005) also concurred with this assessment. However the team identified concerns related to adequacy and availability of bycatch data related to sturgeon caught during the prosecution of these fisheries. No evidence was provided that the monitoring program for bycatch was sufficient to adequately describe catch rates of sturgeon nor was there evidence of external review of the monitoring program. Because of the bycatch monitoring program data availability for other species, a partial score was awarded for the second scoring element of the 100 SG. The impacts of lost gear were considered to be a minor issue, although not well documented, therefore a partial score for the third scoring element under the 100 SG.

Although there is little concern about lost gear, we did not agree that the third scoring element was not applicable. Although DFO provided information of requirements for logbooks and example data from the program, there was no evidence of assured quality of the program. The 80 and 60 SGlevels were considered met as there was a monitoring program in existence in areas of high known bycatch as provided by DFO in their submittal for Principal 2. This resulted in a score of 85.

Indicator 2.1.2 The management system includes measures to reduce marine ecosystem impacts.

100 Scoring Guidepost

- A risk assessment of bycatch concerns has been conducted as part of developing the management plan.
- The effect of the fishery on the marine ecosystem has been explicitly addressed in the management plan.
- Research has been conducted on marine piscivores that utilize the target species to ensure that commercial harvests do not present significant risks to the populations of these piscivores.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been the subject of an open review by stakeholders.
- This information is presented in documents that are made available to stakeholders.

80 Scoring Guidepost

- The effect of the fishery on the marine ecosystem has been addressed by the management system.
- Where problems are identified, fisheries managers make adjustments to reduce impacts on non-target species.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been made known to stakeholders through publicly available information sources.

60 Scoring Guidepost

- The management system does include measures to reduce marine ecosystem impacts to achieve management objectives.
- The management system has a history of responding to bycatch mortality problems and has procedures that are followed to limit bycatch.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003b, p.4-7) suggested that a score of 96 was appropriate for this indicator, with a partial score for scoring elements 4 and 5 at the 100 SG level and meeting all criteria at the 80 and 60 SG levels. Ken Wilson (2005) also concurred with this assessment. However the team was not provided any evidence of a risk assessment of bycatch nor was there explicit evidence of the impacts of the fishery on the marine ecosystem, such as harvest rates impacting marine mammals. Because of this, we did not believe a balance could have been achieved and presented to stakeholders through an open process (scoring element 2 at the 100SG level). However, because of the information available on reported bycatch and ongoing research, we provided a partial score for this fourth scoring element. We found no evidence that any of the information provided was not available to stakeholders on a timely basis. We agreed with DFO's submittal that all of the information provided suggests the remainder of the 80 and 60 scoring guideposts have been met. This resulted in a score of 90.

Indicator 2.1.3 Research efforts are ongoing to identify new problems and define the magnitude of existing problems, and fisheries managers have a process to incorporate this understanding into their management decisions.

100 Scoring Guidepost

- There is detailed knowledge of the relationship between the fishery and the marine ecosystem impacts or ongoing research is attempting to identify if such problems exist.
- The management agency has a proven history of incorporating new research findings into management plans.
- The management agency has a proven history of closing fisheries when bycatch mortality problems arise.
- The management agency has supported the development of more selective fishing practices.

80 Scoring Guidepost

- There is ongoing research of previously identified problems areas to determine if bycatch reduction measures are effective.
- When new problems are identified, the management plans require a new monitoring program be instituted to determine the effectiveness of bycatch reduction measures.

- The management plan allows for between season assessment and institution of new controls on the fishery or stakeholder consultation following the identification of bycatch problems or ecosystem related impacts.
- The management agency has a proven history of successfully arbitrating stakeholder concerns when balance between fish harvests and ecosystem concerns have arisen.

60 Scoring Guidepost

- The management agency collects or plans to collect data on bycatch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about bycatch problems into management actions.
- The management agency responds to data provided on bycatch problems by entities outside of their agency.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003b, p.8-12) suggested that a score of 100 was appropriate for this indicator. Ken Wilson (2005) also concurred with this assessment. However, the Team was not provided any evidence of a detailed knowledge of the relationship between the fishery and marine ecosystem impacts (at the 100 SG) but did find that the agency has a proven record of incorporation of research results into management. We gave a partial score for having an immediate response to bycatch issues for their response to the coho salmon crisis but gave a partial score because of incomplete information collection or response to steelhead and sturgeon bycatch issues We agreed with DFO's submittal that all of the information provided suggests the remainder of the 80 and 60 scoring guideposts have been met. This resulted in a score of 93.

Indicator 2.1.4 The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

100 Scoring Guidepost

- There is research to determine tradeoffs of fish harvests with ecosystem concerns such as providing for sustainable populations of dependent components of the aquatic ecosystem.
- Results and conclusions from research are made available to stakeholders.
- Results and conclusions from research are made available to stakeholders.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcass on freshwater ecosystem processes and identify any tradeoffs between harvests and freshwater ecosystem concerns.
- 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.

60 Scoring Guidepost

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

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003b, p.12-15) suggested that a score of 100 was appropriate for this indicator. Ken Wilson (2005) argued that we have a long way to go before we truly integrate ecosystem impacts into management with regard to effects on freshwater ecosystems but did agree that information was made available. The team concurred with this statement and provided a partial score for the first scoring element of the 100 SG level. However, the Team did find that the agency has a proven record of making information available to stakeholders. We agreed with DFO's submittal that all of the information provided suggests the remainder of the 80 and 60 scoring guideposts have been met. This resulted in a score of 95.

Fraser Sockeye – Performance Indicators scoring <80

Indicator 2.2.1 The management of the fishery includes provisions for integrating and synthesizing new scientific information on biological diversity at the genetic, species or population level of all species harvested in the fishery and impacts on endangered, threatened, protected or icon species.

The intent of this measure is to ensure that the management system incorporates available knowledge and considers the impacts of the fishery on biodiversity issues. This indicator includes the impacts of enhanced fishery harvests on these issues.

100 Scoring Guidepost

- A risk assessment has been conducted, based on current knowledge of direct and incidental mortalities from the fishery, to ensure the fishery does not pose a significant threat to the biodiversity of the target or non-target species.
- Stock composition including enhanced component, is known within Fishery Management Units with the likelihood of harvest of endangered, threatened, protected, or icon species has been estimated.
- Time and area of migrations of weak year classes, sub-stock or population components are known.
- The management system contains provisions to reduce harvests based on biodiversity concerns of affected endangered, threatened, protected or icon species, or weak year classes, of stocks, including the enhanced components, of the targeted species.

80 Scoring Guidepost

- The fishery has been monitored and the stock composition is assessed with a special effort to determine presence of rare, endangered, protected, or icon species.
- The management agency has a history of incorporating new research into management as new research data on impacts of fisheries on biodiversity become available.
- The fisheries management system includes provisions for harvest reduction when biodiversity concerns are identified for target or non-target species.

60 Scoring Guidepost

- Efforts are being made to assess the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.
- The impact of the fishery on endangered, threatened, and protected or icon species is identified and is considered in the management of fisheries.

- There are provisions in the management system to reduce the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

The DFO detailed submission for Fraser sockeye (DFO Fraser 2003b, p.16-22) suggested that a score of 95 was appropriate for this indicator, with partial scores on scoring elements 1 and 2 at the 100 scoring guidepost. At the 100 SG, we found no evidence of any risk assessment regarding steelhead, sturgeon and Sakinaw sockeye, nor was there evidence provided of stock composition of these species in the directed harvest that was credible. Evidence was provided that Sakinaw time and area historic harvests were known and an attempt was made to provide an estimate of the impact of the fishery on their harvests. The management system did contain provisions for limiting their harvests. We addressed the impacts on Cultus sockeye as a depleted target stock under Principle 1.

Ken Wilson (2005) argued that Fraser sockeye fisheries are a dominant factor in the general decline and poor stock status of inside sockeye populations, with the Sakinaw stock now listed and prospect for recovery very poor. He maintains that Cultus remains at considerable risk, and harvest objectives are higher than desirable for the recovery of Cultus sockeye, and in every case in the last four years (2002 – 2005) these harvest limits set by DFO for harvest of Cultus sockeye were exceeded. He further argues that Fraser sockeye fisheries pose a significant risk to the biodiversity of both target and non-target socks. DFO's understanding of the impacts of Fraser fisheries on inside sockeye stocks is marginal, and limits the effective regulation of these fisheries. He also states that sockeye fisheries impact on endangered white sturgeon, but impacts have not been assessed.

We agreed with DFO assessments at the 60 scoring guidepost, based on the work completed and submitted on Sakinaw and Cultus, along with the general provisions of the Wild Salmon Policy, that reasonable efforts were being made to assess impact on endangered, threatened, and protected or icon species, that the impacts were being considered in management and that there are provisions in the management plan to reduce impacts on these species.

At the 80 scoring guidepost, we were provided with substantial evidence that the agency has a history of responding to information where biodiversity may be impacted and there are provisions in the management plan to limit the impact of the fisheries on non-target species of special interest. The first scoring guidepost at the 80SG was considered partially met because stock composition analysis is generally assessed and efforts have been made to identify the presence of depleted stocks in the fishery, including Cultus Lake sockeye. However the team did find deficiencies with regard to Sakinaw sockeye, sturgeon, and steelhead in that little or no direct action had been taken to provide data indicating the impact of the fishery on these species. There has apparently been no special effort to identify Sakinaw sockeye salmon in the fishery or to monitor white sturgeon bycatch, a species currently undergoing SARA review. Steelhead catches are also not well documented and many of the steelhead stocks in the region have been highly depleted. This resulted in a score of 77, primarily because of the deficiency in the monitoring of the fishery on Sakinaw sockeye, sturgeon, and steelhead.

Condition 17 - Continued certification of the Fraser sockeye salmon fishery is contingent upon providing reasonable, reliable, and defensible estimates of the harvest of white sturgeon and steelhead within a reasonable time frame. See also Condition 1, 3, and 4 regarding Sakinaw sockeye, and the need to be able to identify and understand the impact of fish released from a supplementation program to assist in the recovery plan of Sakinaw sockeye and to be able to detect impacts on natural spawning produced returning adults. To be completed by May 2012. (**Fraser Condition 2.1**)

Indicator 2.3.1 Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

100 Scoring Guidepost

- The management plans and escapement goals have been shown to have a high (>80%) probability of achieving a long-term recovery of depleted non-target stocks using risk analysis.
- Historic data have been thoroughly examined to ensure fisheries restoration objectives are based on the likely habitat capacity, rather than on trends that cover only the most recent decades, thus avoiding the "moving baseline" syndrome.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Proposed management strategies have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- The management system supports the collection of data on non-fishing related human activity in the development of recovery plans for non-target stocks.

80 Scoring Guidepost

- The management system includes assessment of plans for the recovery of non-target stocks to levels above established LRPs.
- Objectives for recovery have at least some consideration of historic documents on stock abundance.
- The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.
- The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks

60 Scoring Guidepost

- The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.
- The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.
- The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003b, p.22-25) suggested that a score of 95 was appropriate for this indicator.

Ken Wilson (2005) argued that LRP's for non–target stocks have generally not been established. He also stated that recovery of non-target inside sockeye stocks has never been addressed except for Sakinaw

sockeye and that in the case of Sakinaw sockeye the impact of Fraser sockeye fisheries is not well understood. Further, he argues that DFO has not made provisions for restrictions to Fraser sockeye fisheries to enable the recovery of this stock, or other depleted inside sockeye stocks and that PSARC'S recommendations concerning the timing of Sakinaw sockeye through Fraser sockeye fisheries in Johnstone Strait have not been fully implemented. He also pointed out that recovery of both Sakinaw and Cultus sockeye remains highly uncertain particularly in light of Canada's decision not to protect these stocks under SARA. We agreed with many of Wilson's comments but agree with DFO scoring assessments at the 60 scoring guidepost, based on the work completed and submitted on Sakinaw and Cultus, along with the general provisions of the Wild Salmon policy.

The exploitation rate of 10-12% that is currently used as a harvest limit to ensure the fishery does not impair recovery of the Sakinaw stock. Run reconstruction results were provided as evidence that exploitation rates have been below the harvest goal in 2004-05, however, we have concerns regarding the assumptions made and the appropriateness of these harvest rate estimates. Exploitation rates based on the observed escapement timing could be biased low but the very few fish that escape during the later portion of the run. Estimates of the exploitation rates should be based on average historical run-timing and harvest rates of the more abundant Fraser stocks that occur in the same fishery.

In the absence of a risk analysis, low harvest rates should be imposed over a high proportion of the historical run timing to eliminate the possibility of the fishery inadvertently reducing returns or preventing the recovery of the later timed component of the run. It appears from the escapement timing information that the latter portion of the run has been reduced the most and consequently should receive at least equal conservation efforts. This is also of concern that because of the low numbers of fish returning, it is nearly impossible to directly measure exploitation rates specific to this stock and as a consequence there remains a high uncertainty as to what harvest rates actually are on the Sakinaw stock. The MSC scoring guidelines established for this indicator requires that to meet the 80 scoring guidepost, there should be at least a 60% probability that depleted stocks will recover. Based on the information provided to date for the Sakinaw sockeye stock, we believe that the fishery may still be a factor in the recovery of at least the latter half of the run. Although the recovery plan goes a long way in providing goals and procedures to ensure freshwater productivity is increased, in the absence of further risk analysis of the recovery strategy, we remain unconvinced that the current harvest policies and commercial closures have been adequately examined for their impact on the recovery of Sakinaw sockeye.

Beyond Cultus and Sakinaw sockeye, there are other small salmon stocks in the area of targeted Fraser River sockeye stocks that have recently had reduced returns. Although we had limited information as to what role harvests have had on these reductions, their recent reductions parallel those of the Sakinaw and may have a common cause. The management entities as part of meeting the Wild Salmon Policy guidelines are expected to develop the functional equivalent of Limit Reference Points for these stocks and if necessary, develop similar analysis and recovery strategies as those developed for Cultus and Sakinaw. Although sockeye salmon stocks are of primary concern, depleted stocks of other species that are a significant bycatch in the sockeye salmon directed fishery also must be addressed.

The Team found that all of the 60 scoring guideposts were met because DFO has taken measures to prevent the extirpation of non-target stocks and recovery plans have been developed for Sakinaw and Cultus sockeye that should promote the recovery of the majority of the depleted non-target stocks. While it is difficult to distinguish between a 50% probability of achieving long-term recovery at the 60 scoring level and a 60% at the 80 scoring level, the Team found that the management system has substantially

reduced the impact of fisheries on non-target stocks in recent years and the fishery is no longer the major factor determining the recovery of these stocks.

At the 80 scoring level, we found scoring elements 1,3,4 and 5 partially deficient because LRPs have not been defined for all non-target stocks, the probability of achieving long-term recovery of depleted non-target stocks is likely less than 60%; monitoring and assessment programs used to estimate harvest rates for Sakinaw sockeye must be improved; and escapement goals have yet to be defined for most non-target stocks. At the 100 level, we found that the agency used historic information for determining recovery objectives, scientific review from PSARC was used for development of management plans and evidence that non-fisheries information was used in the development of the recovery plans for Sakinaw and Cultus. There was no risk analysis of the recovery program for Sakinaw and the recovery plan did not provide sufficient detail to determine if the monitoring programs were to be sufficiently robust to determine if recovery was occurring or if commercial fishing impacts were minimal (partial score). Cultus was treated as a depleted target stock and has been addressed under Principle 1. This resulted in a score of 73, primarily because of an action plan for both implementation and monitoring to ensure the recovery plan was successful for Sakinaw sockeye.

Condition 18 - Fraser Sockeye Salmon Condition #2. Certification of the Fraser sockeye salmon fishery is contingent upon developing and implementing a risk assessment of the Sakinaw Lake recovery strategy that will include the following items: 1) Examination of the risk of differing temporal harvest rates on returning run and its implication on the probability of the recovery of the stock; and 2) Refinement and peer review of run reconstruction analyses for Sakinaw sockeye, both tasks to be competed within one year(**Fraser Condition 2.2)**

Condition 19 - Fraser Sockeye Salmon Condition #3. Certification will be conditional until Limit Reference Points or their equivalent have been defined for Fraser sockeye salmon stocks, and recovery plans have been developed and implemented for stocks harvested in Fraser sockeye fisheries that are below their LRP. The proposed recovery plans must provide information regarding the probability of recovery and the timing for recovery. To be completed by May 2012. (**Fraser Condition 2.3)**

Barkley Sound Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 2 indicator for Barkley Sound sockeye fisheries is provided in Table 10.2.3. The assessment team did not rescore any Barkley Sound Principle 2 performance indicators in June 2008.

Table 10.2.3: Summary of the evaluations for each Principle 2 criteria and indicator for the Barkley Sound sockeye fishery.

Summary for Barkley Sound Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	97		P														
Indicator 2.1.2	Provisions to reduce ecosystem impacts	90				P												
Indicator 2.1.3	Sufficient research on ecosystem impacts	97			P													
Indicator 2.1.4	Escapement goals address ecosystem needs	100																
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species																		
Indicator 2.2.1	Information on biological diversity acquired and used	95																
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	70			P			P		P	P		P					

Barkley Sound is located on the west side of Vancouver Island and has several large sockeye salmon fisheries that have been developed by improved fish passage and a very long term lake fertilization program. A summary of our evaluations for each Principle 2 indicator and criteria is provided in Table 10.2.3. The criteria where the fishery exceeds the 80% Scoring Guidepost are generally considered the highlights (i.e. good news) for the fishery. The highlights associated with the various Principle 2 criteria for Barkley Sound sockeye are summarize sequentially for each group of indicators below:

1. Natural Functional relationships are well maintained in the management of Barkley Sound stocks. Ecosystem impacts are reasonably understood, based on limnological research on nutrient contribution of salmon carcasses and responses of lake trophic levels to high escapements as well as fertilizer additions as the Great Central Lake has been the subject of much limnological research on factors limiting sockeye salmon production with a continuous data set approaching 30 years. Ecosystem impacts are as well understood, or most likely better with sockeye salmon fisheries in the major lakes in Barkley Sound than in most fisheries of the world. The DFO and the major universities in British Columbia have decades of research and myriads of publications on trophic level effects and other ecological processes in the major lakes within this system. Most of the classic limnological work on sockeye salmon nutrient dependence has been established through research on these lakes and top down responses to escapement levels coupled with bottom up responses from nutrient additions are very well researched in this system. These data have been heavy used in the establishment of escapement goals. (Indicators 2.1.1 to 2.1.4.).

2. The acquisition and use of information on biodiversity is quite developed with British Columbia sockeye salmon fisheries including the Barkley Sound fishery. There is relatively little bycatch of other species and much genetic information has been developed to determine biodiversity within sockeye salmon that use the system. These findings generally support the risk of stock depletion as restoration through artificial propagation or introduction of sockeye salmon into new systems has been very difficult. However much is still not known about small stocks and their ability to reestablish after depletion from either anthropogenic or natural causes. Although depleted, the Henderson stock is not endangered of extirpation and there are no known stocks that are threatened with extirpation. (Indicator 2.2.1).

3. The recovery and management of the depleted former target stock (but now a non-target stock) at Henderson Lake is the biggest challenge and the most controversial element of the Barkley Sound sockeye salmon fishery. Enhancement activities at Sproat and Great Central Lake, in addition to enhancement activities at Henderson Lake, had great success, resulting in much larger sustainable sockeye salmon runs than were historically observed. Harvesting these highly productive stocks while increasing escapements to Henderson Lake presents the most difficulty. Time and area management data that were summarized suggest reasonable success in lowering harvest rates on Henderson, but these policies have not resulted in the recovery of the stock to historic levels. The reduction of maximum exploitation rates to 60% of the aggregate timing group has been a major step to reduce the overall harvest pressure on weak stocks with reduced or no harvests during other periods. A forthcoming recovery plan for the Henderson Lake stock should provide a comprehensive view of recovery strategies that go beyond just the reduction in harvest rates. This issue is addressed in detail in understanding the ratings of the Barkley Sound sockeye salmon fishery to individual MSC Criteria, associated indicators and scoring guideposts. (Indicator 2.3.1).

Barkley Sound Sockeye – Performance Indicators scoring >80

The following sections provide explanations for why these indicators passed all 80SG criteria and identify those criteria that were not met at the 100SG.

Indicator 2.1.1: The management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified.

100 Scoring Guidepost

- A monitoring program exists that provides estimates of bycatch that meet statistical criteria acceptable to external reviewers.
- All historic monitoring data is readily available to stakeholder groups and external reviewers.
- Quantities of gear lost are recorded, and the impacts of lost gear on target and nontarget species have been researched and accurate projections of impacts have been completed.

80 Scoring Guidepost

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

60 Scoring Guidepost

- Data on bycatch in the majority of the fisheries are available to determine impacts on non-target species.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.1-3) suggested that a score of 100 was appropriate for this indicator. The independent review by John Nelson (Nelson 2005) suggested that DFO failed to pass the 60 guidepost for this indicator. Mr. Nelson suggested bycatch data were not available. We have obtained electronic data from the DFO website of the logbook data from DFO on bycatch of various salmon fisheries and consequently did not agree with this criticism (DFO Barkley Sound 2004b, p.1-4). The team agreed that because of the lack of ready access to the bycatch data, a partial score was given for scoring element 2 at the 100SG. The information provided by DFO supported full scores on the other criteria at the 100 and 80SG. The Team's score for this indicator was 97.

Indicator 2.1.2 The management system includes measures to reduce marine ecosystem impacts.

100 Scoring Guidepost

- A risk assessment of bycatch concerns has been conducted as part of developing the management plan.
- The effect of the fishery on the marine ecosystem has been explicitly addressed in the management plan.
- Research has been conducted on marine piscivores that utilize the target species to ensure that commercial harvests do not present significant risks to the populations of these piscivores.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been the subject of an open review by stakeholders.
- This information is presented in documents that are made available to stakeholders.

80 Scoring Guidepost

- The effect of the fishery on the marine ecosystem has been addressed by the management system.
- Where problems are identified, fisheries managers make adjustments to reduce impacts on non-target species.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been made known to stakeholders through publicly available information sources.

60 Scoring Guidepost

- The management system does include measures to reduce marine ecosystem impacts to achieve management objectives.
- The management system has a history of responding to bycatch mortality problems and has procedures that are followed to limit bycatch.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.3-6) suggested that a score of 92 was appropriate for this indicator, acknowledging the lack of a risk assessment (scoring element 1 at the 100SG, and partial scores for scoring elements 2, 3, & 4). The independent review by John Nelson (Nelson 2005) suggested that DFO passed the 60 and 80SGs and had similar scores as DFO and our team for the 100SG. We agreed with DFO about the lack of risk assessment but also noted that the effect of the fishery on the marine ecosystem has not explicitly been addressed in the management plan. We also found very little evidence of conflicts with the harvest and ecosystem concerns but no evidence of open review by stakeholders on this issue so a partial score was give to scoring element 4 at the 100SG. The information provided by DFO supported full scores on the other criteria at the 100 and 80SG. The Team's score for this indicator was 90.

Indicator 2.1.3 Research efforts are ongoing to identify new problems and define the magnitude of existing problems, and fisheries managers have a process to incorporate this understanding into their management decisions.

100 Scoring Guidepost

- There is detailed knowledge of the relationship between the fishery and the marine ecosystem impacts or ongoing research is attempting to identify if such problems exist.
- The management agency has a proven history of incorporating new research findings into management plans.
- The management agency has a proven history of closing fisheries when bycatch mortality problems arise.
- The management agency has supported the development of more selective fishing practices.

80 Scoring Guidepost

- There is ongoing research of previously identified problems areas to determine if bycatch reduction measures are effective.
- When new problems are identified, the management plans require a new monitoring program be instituted to determine the effectiveness of bycatch reduction measures.
- The management plan allows for between season assessment and institution of new controls on the fishery or stakeholder consultation following the identification of bycatch problems or ecosystem related impacts.
- The management agency has a proven history of successfully arbitrating stakeholder concerns when balance between fish harvests and ecosystem concerns have arisen.

60 Scoring Guidepost

- The management agency collects or plans to collect data on bycatch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about bycatch problems into management actions.
- The management agency responds to data provided on bycatch problems by entities outside of their agency.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.7-11) suggested that a score of 100 was appropriate for this indicator. The independent review (Nelson 2005) suggested that DFO passed the 60 and 80SGs but did not agree that there is detailed knowledge about marine ecosystem impacts or research that is identifying if such problems exist. We agreed with DFO that the citations and evidence provided was adequate to support their researching of potential problems with marine ecosystems in general. The management agency does have a history of closure of fisheries regarding the issues surrounding coho but we gave a partial score because of relatively slowness in addressing the declining chum salmon stocks. The information provided by DFO supported full scores on the other criteria at the 100 and 80SG. The Team's score for this indicator was 97.

Indicator 2.1.4 The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

100 Scoring Guidepost

- There is research to determine tradeoffs of fish harvests with ecosystem concerns such as providing for sustainable populations of dependent components of the aquatic ecosystem.
- Results and conclusions from research are made available to stakeholders.
- Results and conclusions from research are made available to stakeholders.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcass on freshwater ecosystem processes and identify any tradeoffs between harvests and freshwater ecosystem concerns.
- 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.

60 Scoring Guidepost

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

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.11-13) suggested that a score of 100 was appropriate for this indicator. The independent review (Nelson 2005) agreed with DFO. We agreed with DFO that the citations and evidence provided was adequate to support their scoring of 100 at all scoring guideposts. The Team's score for this indicator was 100.

Indicator 2.2.1 The management of the fishery includes provisions for integrating and synthesizing new scientific information on biological diversity at the genetic, species or population level of all species harvested in the fishery and impacts on endangered, threatened, protected or icon species.

100 Scoring Guidepost

- A risk assessment has been conducted, based on current knowledge of direct and incidental mortalities from the fishery, to ensure the fishery does not pose a significant threat to the biodiversity of the target or non-target species.
- Stock composition including enhanced component, is known within Fishery Management Units with the likelihood of harvest of endangered, threatened, protected, or icon species has been estimated.
- Time and area of migrations of weak year classes, sub-stock or population components are known.
- The management system contains provisions to reduce harvests based on biodiversity concerns of affected endangered, threatened, protected or icon species, or weak year classes, of stocks, including the enhanced components, of the targeted species.

80 Scoring Guidepost

- The fishery has been monitored and the stock composition is assessed with a special effort to determine presence of rare, endangered, protected, or icon species.
- The management agency has a history of incorporating new research into management as new research data on impacts of fisheries on biodiversity become available.
- The fisheries management system includes provisions for harvest reduction when biodiversity concerns are identified for target or non-target species.

60 Scoring Guidepost

- Efforts are being made to assess the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

- The impact of the fishery on endangered, threatened, and protected or icon species is identified and is considered in the management of fisheries.
- There are provisions in the management system to reduce the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.12-15) suggested that a score of 95 was appropriate for this indicator with partial scores for a risk assessment to the impacts on biodiversity and partial scores addressing the likelihood of harvesting species with special status. The independent review (Nelson 2005) suggested that DFO failed all three criteria at the 60SG and agreed with DFO's scoring at the 80 and 100SG, primarily because the author did not believe DFO had sufficient effort to assess impacts on marine mammals. The team did not agree with this assessment as we believed the existing log book data and the relative scrutiny under which these and other salmon fisheries are prosecuted provides sufficient evidence to indicate direct mortality from the fisheries. We also are aware that runs from the enhanced Somass sockeye system and the variation from year to year in marine survival would likely negate direct effects on food supply of marine mammals that utilized the salmon runs as part of their annual diet. We did agree that there has not been a formal risk assessment as to the likely impacts of this fishery on species of special status, given the current level of information. However, the limited reporting of marine mammal or other species of concern mortalities, suggests impacts would most likely be related to competition for food sources that may be affected by commercial removals. The information provided by DFO supported full scores on the other guideposts at the 100 and 80SGs. The Team's score for this indicator was 95.

Barkley Sound Sockeye – Performance Indicators scoring <80

Indicator 2.3.1 Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

100 Scoring Guidepost

- The management plans and escapement goals have been shown to have a high (>80%) probability of achieving a long-term recovery of depleted non-target stocks using risk analysis.
- Historic data have been thoroughly examined to ensure fisheries restoration objectives are based on the likely habitat capacity, rather than on trends that cover only the most recent decades, thus avoiding the "moving baseline" syndrome.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Proposed management strategies have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- The management system supports the collection of data on non-fishing related human activity in the development of recovery plans for non-target stocks.

80 Scoring Guidepost

- The management system includes assessment of plans for the recovery of non-target stocks to levels above established LRPs.

- Objectives for recovery have at least some consideration of historic documents on stock abundance.
- The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.
- The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks.

60 Scoring Guidepost

- The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.
- The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.
- The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

The management agencies detail submission for Barkley Sound sockeye (DFO Barkley Sound 2004b, p.16-19) suggested that a score of 95 was appropriate for this indicator with no score for a risk assessment on the likelihood of recovery of depleted stocks and that the requirement for external review at the 100 guidepost level was not applicable.

The Barkley Sound fishery issues center around the recovery of Henderson Lake and the likely impact that current fisheries have on this non-targeted stock. The independent review (Nelson 2005) suggested that DFO failed second guidepost at the 60 level for the Henderson Lake sockeye stock. At the 80 scoring level, the Team agreed with Nelson (2005) that LRPs have not been established for non-target stocks and the available information does not support a high probability of the recovery of the Henderson stock.

The first, third, fourth and sixth guideposts at the 80 level were considered partially met, primarily because of the lack of a completed recovery plan for this stock. There was information provided on the previous activities addressing nutrients and trophic status so partial score was given on the latter scoring criteria at the 80 level. In the absence of a recovery plan, the reassessment of escapement goals is not assured (guidepost five). Although there have been a significant number of management actions that have taken place to reduce harvest rates, confidence in the stock reconstruction is lacking and there is no reliable estimate of harvest rates of returning Henderson Lake sockeye. Without a completed recovery plan and reliable interception data of Henderson sockeye salmon, the effectiveness of the current management regime in the recovery of the Henderson stocks is uncertain. Although a formal risk analysis would also be desirable as part of the recovery plan, obtaining information and providing analysis as to the current harvest rates by time and area of Henderson Lake sockeye is of highest priority.

The Team found that all of the 60 scoring guideposts were met because DFO has taken measures to prevent the extirpation of non-target stocks. While it is difficult to distinguish between a 50% probability of achieving long-term recovery at the 60 scoring level and a 60% at the 80 scoring level, the Team found that the management system has taken actions to reduced the impact of fisheries on the

Henderson Lake sockeye stock in recent years and the fishery is no longer the major factor determining the recovery of this stock.

The Team's score for this indicator was 70, primarily based on the lack of a recovery plan and inadequate support for estimation of harvest rates on Henderson stocks.

Condition 20 - Barkley Sound Sockeye Salmon Condition #1. Certification will be conditional until Limit Reference Points or their equivalent have been defined for Barkley Sound sockeye salmon stocks, with particular reference to Henderson Lake sockeye, and recovery plans have been developed and implemented for stocks harvested in Barkley Sound sockeye fisheries that are below their LRP. The proposed recovery plans must provide information regarding the probability of recovery and the timing for recovery. To be completed by May 2012. (**Barkley Sound Condition 2.1**)

Skeena Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 2 indicator for Skeena sockeye fisheries is provided in Table 10.2.4. The assessment team rescored one Principle 2 performance indicator in June 2008.

Table 10.2.4: Summary of the evaluations for each Principle 2 criteria and indicator for the Skeena sockeye fishery.

Summary for Skeena Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
			1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 2 - Ecosystem and Non-Target Populations																		
Criterion 2.1 - Maintain natural functional relationships among species																		
Indicator 2.1.1	Impacts on non-target species can be identified	70		P				P	P									
Indicator 2.1.2	Provisions to reduce ecosystem impacts	90				P												
Indicator 2.1.3	Sufficient research on ecosystem impacts	93			P													
Indicator 2.1.4	Escapement goals address ecosystem needs	95	P															
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species																		
Indicator 2.2.1	Information on biological diversity acquired and used by managers	98	P															
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	74			P			P		P	P	P						

Skeena sockeye salmon fishery is located on the north central portion of the British Columbia Pacific coast and has several large sockeye salmon production lakes that include some that large enhancement spawning channels. A summary of our evaluations for each Principle 2 indicator and criteria is provided in Table 10.2.4. The criteria where the fishery exceeds the 80 Scoring Guidepost are generally considered the highlights (i.e. good news) for the fishery. The highlights associated with the various Principle 2 criteria for Skeena sockeye are summarize sequentially for each group of indicators below:

1. Natural Functional relationships are well maintained in the management of Skeena stocks. The DFO and the major universities in British Columbia have decades of research and myriads of publications on trophic level effects and other ecological processes in the major lakes within this system. These data have been heavy used in the establishment of escapement goals. (Indicators 2.1.1 to 2.1.4.).

2. The acquisition and use of information on biodiversity is quite developed with British Columbia sockeye salmon fisheries including the Skeena fishery. There is relatively little bycatch of other species and much genetic information has been developed to determine biodiversity within sockeye salmon that use this system. This system is ahead of other systems with regard to the use of this information. (Indicator 2.2.1).

3. There are several lakes that have numbers substantially below calculated carrying capacity but have remained low for a relatively long period of time. Anecdotal evidence suggests historically stocks were significantly stronger in these lakes but recent year trends to not suggest these stocks are in any immediate peril. The recent reduction of maximum exploitation rates for marine fisheries to roughly half of what they have been over the last 20 years has been a major step to reduce the overall harvest pressure on weak stocks. However, in the absence of a risk analysis, there is little evidence of recovery plans. In addition, chum salmon are a major concern and the effect of the sockeye salmon fishery on chum salmon recovery is a concern. This issue is addressed in detail in understanding the ratings of the Skeena sockeye salmon fishery to individual MSC Criteria, associated indicators and scoring guideposts. (Indicator 2.3.1).

Skeena Sockeye – Performance Indicators scoring >80

The following sections provide explanations for why these indicators passed all 80 guidepost criteria and identify those criteria that were not met at the 100SG.

Indicator 2.1.2 The management system includes measures to reduce marine ecosystem impacts.

100 Scoring Guidepost

- A risk assessment of bycatch concerns has been conducted as part of developing the management plan.
- The effect of the fishery on the marine ecosystem has been explicitly addressed in the management plan.
- Research has been conducted on marine piscivores that utilize the target species to ensure that commercial harvests do not present significant risks to the populations of these piscivores.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been the subject of an open review by stakeholders.
- This information is presented in documents that are made available to stakeholders.

80 Scoring Guidepost

- The effect of the fishery on the marine ecosystem has been addressed by the management system.
- Where problems are identified, fisheries managers make adjustments to reduce impacts on non-target species.
- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been made known to stakeholders through publicly available information sources.

60 Scoring Guidepost

- The management system does include measures to reduce marine ecosystem impacts to achieve management objectives.
- The management system has a history of responding to bycatch mortality problems and has procedures that are followed to limit bycatch.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004b, p.4-8) and the independent review (Bocking 2005) suggested that a score of 90 was appropriate for this indicator. We generally agreed with these findings, however we found that both scoring elements 1 and 2 were lacking support but sufficient information was available on marine piscivores and that the information was available to the stakeholders. We did agree that a partial score was deserved for determining the balance through an open process that has been achieved between harvests and potential uncertainty of marine ecosystem impacts. We accepted DFO's findings of the other scoring elements at the 80 and 60SG. The Team's score for this indicator was 90.

Indicator 2.1.3 Research efforts are ongoing to identify new problems and define the magnitude of existing problems, and fisheries managers have a process to incorporate this understanding into their management decisions.

100 Scoring Guidepost

- There is detailed knowledge of the relationship between the fishery and the marine ecosystem impacts or ongoing research is attempting to identify if such problems exist.
- The management agency has a proven history of incorporating new research findings into management plans.
- The management agency has a proven history of closing fisheries when bycatch mortality problems arise.
- The management agency has supported the development of more selective fishing practices.

80 Scoring Guidepost

- There is ongoing research of previously identified problems areas to determine if bycatch reduction measures are effective.
- When new problems are identified, the management plans require a new monitoring program be instituted to determine the effectiveness of bycatch reduction measures.
- The management plan allows for between season assessment and institution of new controls on the fishery or stakeholder consultation following the identification of bycatch problems or ecosystem related impacts.
- The management agency has a proven history of successfully arbitrating stakeholder concerns when balance between fish harvests and ecosystem concerns have arisen.

60 Scoring Guidepost

- The management agency collects or plans to collect data on bycatch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about bycatch problems into management actions.
- The management agency responds to data provided on bycatch problems by entities outside of their agency.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004b, p.8-13) suggested that a score of 100 was deserved. Bocking's (2005) independent review indicated that there

was limited support for detailed knowledge of the relationship of the fishery on the marine ecosystem. We generally agreed with these findings, however we found that both scoring elements of the first scoring criteria were lacking at the 100SG and we gave a partial score for the third scoring element because of the response related to the 2006 steelhead issue. We accepted DFO's findings of the other scoring elements at the 100, 80 and 60SG. The Team's score for this indicator was 93.

Indicator 2.1.4 The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

100 Scoring Guidepost

- There is research to determine tradeoffs of fish harvests with ecosystem concerns such as providing for sustainable populations of dependent components of the aquatic ecosystem.
- Results and conclusions from research are made available to stakeholders.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcass on freshwater ecosystem processes and identify any tradeoffs between harvests and freshwater ecosystem concerns.
- 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.

60 Scoring Guidepost

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

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004b, p.13-16) suggested that a score of 100 was deserved while the independent review (Bocking 2005) indicated disagreement with this assessment. Bocking stated 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. He pointed out that current Target Reference Points are based on maximizing yield for fisheries and Limit Reference Points are supposedly set to avoid extinction. He further stated that it is notionally accepted that escapements, at least occasionally, above MSY are required for proper ecosystem function and although DFO supports research in this area, very little is occurring. He further stated that DFO does not have sufficient annual funding to address this research need.

The team generally disagreed with these findings, based on our interpretation of what DFO has provided. The work completed on nutrient requirements and carrying capacity of lakes based on limnology, has been incorporated into assessments of Skeena sockeye escapement potential and DFO's research and experience in the field of nutrient supplementation and other aspects of sockeye salmon freshwater biology are far beyond the understanding of impacts of fisheries on ecology of their habitat for most species in the world. We acknowledge that funding levels have been reduced in this area and full application of the information to address management issues has not occurred. However reduction of maximum harvest rates to 60% where rates above that could be supported by stock recruit analysis, suggests they have actively acted in considering freshwater ecosystem needs. Based on this evaluation, we gave a partial score on scoring element 1 under the 100SG and agreed with DFO on all other criteria at the 100, 80, and 60SG. We accepted DFO's findings of the other scoring elements at the 100, 80 and 60SG. The Team's score for this indicator was 95.

Indicator 2.2.1 The management of the fishery includes provisions for integrating and synthesizing new scientific information on biological diversity at the genetic, species or population level of all species harvested in the fishery and impacts on endangered, threatened, protected or icon species.

100 Scoring Guidepost

- A risk assessment has been conducted, based on current knowledge of direct and incidental mortalities from the fishery, to ensure the fishery does not pose a significant threat to the biodiversity of the target or non-target species.
- Stock composition including enhanced component, is known within Fishery Management Units with the likelihood of harvest of endangered, threatened, protected, or icon species has been estimated.
- Time and area of migrations of weak year classes, sub-stock or population components are known.
- The management system contains provisions to reduce harvests based on biodiversity concerns of affected endangered, threatened, protected or icon species, or weak year classes, of stocks, including the enhanced components, of the targeted species.

80 Scoring Guidepost

- The fishery has been monitored and the stock composition is assessed with a special effort to determine presence of rare, endangered, protected, or icon species.
- The management agency has a history of incorporating new research into management as new research data on impacts of fisheries on biodiversity become available.
- The fisheries management system includes provisions for harvest reduction when biodiversity concerns are identified for target or non-target species.

60 Scoring Guidepost

- Efforts are being made to assess the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.
- The impact of the fishery on endangered, threatened, and protected or icon species is identified and is considered in the management of fisheries.
- There are provisions in the management system to reduce the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004b, p.16-21) suggested that a score of 95 was deserved with partial scores for scoring elements 1 and 2 at the 100SG. The independent review (Bocking 2005) indicated that he agreed with DFO's assessment. We generally agreed with these findings, however we gave a full score for scoring element 2 at the 100 scoring guidepost because we believe DFO has adequate information on stock composition and the likelihood of harvest of species with special status. We accepted DFO's findings of the other scoring elements at the 100, 80 and 60SG. The Team's score for this indicator was 98.

Skeena Sockeye – Performance Indicators scoring <80

Indicator 2.1.1: The management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified.

100 Scoring Guidepost

- A monitoring program exists that provides estimates of bycatch that meet statistical criteria acceptable to external reviewers.
- All historic monitoring data is readily available to stakeholder groups and external reviewers.
- Quantities of gear lost are recorded, and the impacts of lost gear on target and non-target species have been researched and accurate projections of impacts have been completed.

80 Scoring Guidepost

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

60 Scoring Guidepost

- Data on bycatch in the majority of the fisheries are available to determine impacts on non-target species.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2004b, p.1-4) and the independent review (Bocking 2005) suggested that a score of 100 was appropriate for this indicator. However, an independent science review panel (Walters et al. 2008) provided additional analysis that was used by the team to rescore this and all other indicators for Skeena sockeye. Much of the review and information originally provided by DFO was superseded by this document. We agreed specifically with the findings of the ISRP that estimates of DFO of bycatch rates on steelhead have little reliability. The SG60 is passed because there is data on bycatch of steelhead and these data indicated that the Skeena sockeye fisheries represent known high bycatch of steelhead. After a detailed review of all the methods used to estimate catch or exploitation rates for Skeena steelhead stocks, the Skeena ISRP concluded that "The state of affairs today is that we actually have no idea how reliable DFO's estimates of steelhead exploitation rates are." Since there is general scientific agreement that the terminal Skeena sockeye fisheries represent a known area of high bycatch for steelhead, there is an urgent need to improve the procedures used to estimate steelhead bycatch. The condition is necessary because there is a need for an ongoing monitoring program and these types of programs have not been consistently conducted in the past. The Team's score for this indicator was 70 based on the lack of reliability of the steelhead bycatch monitoring program.

Condition 21a – Same as new condition 13a. Certification is conditional until the management agencies implement a scientifically defensible program for estimating steelhead catch in the Skeena sockeye fisheries. To be completed within two years. (**Skeena Condition #2.1a**).

Indicator 2.3.1 Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

100 Scoring Guidepost

- The management plans and escapement goals have been shown to have a high (>80%) probability of achieving a long-term recovery of depleted non-target stocks using risk analysis.

- Historic data have been thoroughly examined to ensure fisheries restoration objectives are based on the likely habitat capacity, rather than on trends that cover only the most recent decades, thus avoiding the "moving baseline" syndrome.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Proposed management strategies have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- The management system supports the collection of data on non-fishing related human activity in the development of recovery plans for non-target stocks.

80 Scoring Guidepost

- The management system includes assessment of plans for the recovery of non-target stocks to levels above established LRPs.
- Objectives for recovery have at least some consideration of historic documents on stock abundance.
- The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.
- The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks

60 Scoring Guidepost

- The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.
- The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.
- The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

The management agencies detail submission for Skeena sockeye (DFO Skeena 2004b, p.16-21) suggested that a score of 95 was deserved with no score for guideposts 1 and that guidepost4 was not relevant. The independent review (Bocking 2005) indicated that he did not agree with DFO's assessment and suggested partial failure at all three of the criteria at the 60 level. Further, at the 80 scoring level, this reviewer saw little evidence of incorporating non-fishing human impacts in the development of recovery plans with recovery plans for Skeena sockeye being primarily driven by stock assessment and fishery management actions, not habitat actions and there are no comprehensive recovery plans. DFO contends that recovery plans are only the subject of COSEWIC listed stocks, and not the subject of depleted stocks. DFO also acknowledged that there are no LRP's for these stocks.

We agreed with much of what Bocking offered, however, the Team found that DFO has a rebuilding strategy for the majority of the stocks and found that based on historical track records, more likely than not, that the stocks that are depleted would recover in the long-term and DFO responds to new data in adjustment of harvest rates and escapement goals.

We generally agreed with Bocking's findings at the 80 scoring level in that there are no LRP's or comprehensive recovery programs for depleted stocks and agreed that depleted stocks (those below an LRP) were covered under this MSC criteria without being listed by COSEWIC. The Skeena sockeye salmon fishery falls short in the area of development of recovery plans for the Damshiquit, Kitwanga, Spawning and Sicintine systems. 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. Guideposts 1, 3, 4 and 5 are all deficient for some of the identified depleted stocks. Although these stocks do not appear to be immediately threatened with extirpation, a recovery strategy associated with a risk analysis is needed. In addition, we received information suggesting chum salmon stocks are depleted in this area and are a significant bycatch of the sockeye salmon fishery. A recovery plan for these non-target stocks and associated risk analysis of any modified harvest strategy should be completed.

The Team found that all of the 60 scoring guideposts were met because DFO has taken measures to prevent the extirpation of non-target stocks. While it is difficult to distinguish between a 50% probability of achieving long-term recovery at the 60 scoring level and a 60% at the 80 scoring level, the Team found that the management system has taken actions to reduced the impact of fisheries on the depleted non-target sockeye and chum stock in recent years. Based on the deficiencies at the 80 scoring level, the Team's score for this indicator was 74.

Condition 21b - Skeena Sockeye Salmon Condition #1. Certification will be conditional until Limit Reference Points or their equivalent have been defined for Skeena sockeye salmon stocks, and recovery plans have been developed and implemented for stocks harvested in Skeena sockeye fisheries that are below their LRP. The proposed recovery plans must provide information regarding the probability of recovery and the timing for recovery. To be completed within one year. (**Skeena Condition 2.1b)**

Condition 22 - Skeena Sockeye Salmon Condition #2. Continued certification of the Skeena sockeye salmon fishery is contingent upon developing and implementing a recovery plan for chum stocks harvested in Skeena sockeye fisheries that are below their LRP. The proposed recovery plan must include procedures for determining 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. To be completed within two years. (**Skeena Condition 2.2)**

Nass Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 2 indicator for Nass sockeye fisheries is provided in Table 10.2.5. The assessment team rescored one Nass Fishery Principle 2 performance indicator in June 2008.

Table 10.2.5 Summary of the evaluations for each Principle 2 criteria and indicator for the Nass sockeye fishery.

Summary for Nass Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
PRINCIPLE 2 - Ecosystem and Non-Target Populations																		
Criterion 2.1 - Maintain natural functional relationships among species																		
Indicator 2.1.1	Impacts on non-target species can be identified	97		P														
Indicator 2.1.2	Provisions to reduce ecosystem impacts	90		P		P												
Indicator 2.1.3	Sufficient research on ecosystem impacts	93			P													
Indicator 2.1.4	Escapement goals address ecosystem needs	95	P															
Criterion 2.2 - Fishery minimizes impacts on endangered, threatened or protected species																		
Indicator 2.2.1	Information on biological diversity acquired and used	95																
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	73								P			P					

The Nass sockeye salmon fishery is the most northern sockeye salmon fishery in British Columbia and is located near the Nass River. A significant portion of the ownership of this fishery and the management has been transferred to the Nisga'a First Nation as the first Native Claims Treaty Settlement in British Columbia. A summary of our evaluations for each Principle 2 indicator and criteria is provided in Table 10.2.5. The criteria where the fishery exceeds the 80% Scoring Guidepost are generally considered the highlights (i.e. good news) for the fishery. The highlights associated with the various Principle 2 criteria for Nass sockeye are summarize sequentially for each group of indicators below:

1. Natural Functional relationships are well maintained in the management of Nass stocks. During the 1990's a relatively large number of studies were conducted on the limnology and productivity of the major sockeye salmon lakes. Compared to most fisheries in the world, including salmon fisheries, the freshwater life history is well understood. The Nisga'a have invested significantly in management of the fisheries and there has been extensive use of local knowledge in development of fisheries plans. A relatively large personal fishery occurs on this stock in addition to both native and non-native commercial fisheries. (Indicators 2.1.1 to 2.1.4.).

2. The acquisition and use of information on biodiversity is quite developed with British Columbia sockeye salmon fisheries including the Nass fishery. There is relatively little bycatch of other species and much genetic information has been developed to determine biodiversity within sockeye salmon that use this system. The genetic information has been used to determine stock of origin in the intensive boundary fisheries with the State of Alaska. Salmon enhancement programs are not operating on the Nass system, other than the fishway into Meziadin Lake which was installed in 1966. This has apparently had substantial benefit to salmon production in addition to being used in management to recover tags and enumerate escapement, with an increases of the Meziadin component of the sockeye population from 40 to 80%. These increases have occurred without apparently providing differential increases in return per spawner rates that could lead to overharvest of systems that were not enhanced. (Indicator 2.2.1).

3. The Nass system is relatively unique in BC sockeye salmon fisheries as there are no data to suggest significant depletion of any of the sockeye salmon stocks. The biggest concern is the depletion of the chum salmon stocks that are harvested coincidental with the sockeye salmon fishery. Provisions are needed to ensure non-target stocks are not over harvested. (Indicator 2.3.1).

Nass Sockeye – Performance Indicators scoring >80

The following sections provide explanations for why these indicators passed all 80SG criteria and identify those criteria that were not met at the 100SG.

Indicator 2.1.1: The management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified.

100 Scoring Guidepost

- A monitoring program exists that provides estimates of bycatch that meet statistical criteria acceptable to external reviewers.
- All historic monitoring data is readily available to stakeholder groups and external reviewers.
- Quantities of gear lost are recorded, and the impacts of lost gear on target and nontarget species have been researched and accurate projections of impacts have been completed.

80 Scoring Guidepost

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

60 Scoring Guidepost

- Data on bycatch in the majority of the fisheries are available to determine impacts on non-target species.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004b, p.1-4) and an independent review by David Levy (Levy 2005) suggested that a score of 100 was appropriate for this indicator. The Team partially agreed with their assessment and found that information provided on the management plan for the prosecution of the marine fisheries provides a high confidence that direct impacts on non-target species are identified. However, as with other fisheries, we did not find bycatch information readily available and gave a partial score on this criteria (DFO Nass 2004b, p.1-4). We did find the third scoring element on gear loss relevant but agree sufficient information was available to assess the lack of impact from any loss. We agreed with the scoring on all other criteria based on the evidence provided for this indicator. The Team's score for this indicator was 97.

Indicator 2.1.2 The management system includes measures to reduce marine ecosystem impacts.

100 Scoring Guidepost

- A risk assessment of bycatch concerns has been conducted as part of developing the management plan.
- The effect of the fishery on the marine ecosystem has been explicitly addressed in the management plan.
- Research has been conducted on marine piscivores that utilize the target species to ensure that commercial harvests do not present significant risks to the populations of these piscivores.

- Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been the subject of an open review by stakeholders.
- This information is presented in documents that are made available to stakeholders.

80 Scoring Guidepost

- The effect of the fishery on the marine ecosystem has been addressed by the management system.
- Where problems are identified, fisheries managers make adjustments to reduce impacts on non-target species.
- •Where conflicts exist between the harvest of fish and ecosystem concerns based on their removal, the balance achieved has been made known to stakeholders through publicly available information sources.

60 Scoring Guidepost

- The management system does include measures to reduce marine ecosystem impacts to achieve management objectives.
- The management system has a history of responding to bycatch mortality problems and has procedures that are followed to limit bycatch.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004b, p.4-8) and an independent review by David Levy (Levy 2005) suggested that a score of 90 was appropriate for this indicator because of the lack of a risk assessment (scoring element 1), and partial scores on scoring elements 2, 3,and 4 (100SG) addressing marine ecosystem impacts and achieving a balance through an open review process. We found that the existing information is sufficient to assess risks to marine piscivore populations that are dependent upon these populations. We agreed with the scoring on all other criteria based on the evidence provided for this indicator. The Team's score for this indicator was 90.

Indicator 2.1.3 Research efforts are ongoing to identify new problems and define the magnitude of existing problems, and fisheries managers have a process to incorporate this understanding into their management decisions.

100 Scoring Guidepost

- There is detailed knowledge of the relationship between the fishery and the marine ecosystem impacts or ongoing research is attempting to identify if such problems exist.
- The management agency has a proven history of incorporating new research findings into management plans.
- The management agency has a proven history of closing fisheries when bycatch mortality problems arise.
- The management agency has supported the development of more selective fishing practices.

80 Scoring Guidepost

- There is ongoing research of previously identified problems areas to determine if bycatch reduction measures are effective.
- When new problems are identified; the management plans require a new monitoring program be instituted to determine the effectiveness of bycatch reduction measures.

- The management plan allows for between season assessment and institution of new controls on the fishery or stakeholder consultation following the identification of bycatch problems or ecosystem related impacts.
- The management agency has a proven history of successfully arbitrating stakeholder concerns when balance between fish harvests and ecosystem concerns have arisen.

60 Scoring Guidepost

- The management agency collects or plans to collect data on bycatch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about bycatch problems into management actions.
- The management agency responds to data provided on bycatch problems by entities outside of their agency.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004b, p.8-13) and an independent review by David Levy (Levy 2005) suggested that a score of 100 was appropriate for this indicator. We found that there was no evidence provided of detailed knowledge of marine ecosystem impacts or ongoing research to determine if such impacts exist. We gave partial value on the third scoring element with demonstrated response in the case of coho but no such response in the case of the declining chum salmon stocks. We agreed with the scoring on all other criteria at all scoring guideposts based on the evidence provided for this indicator. The Team's score for this indicator was 93.

Indicator 2.1.4 The management system supports research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

100 Scoring Guidepost

- There is research to determine tradeoffs of fish harvests with ecosystem concerns such as providing for sustainable populations of dependent components of the aquatic ecosystem.
- Results and conclusions from research are made available to stakeholders.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcass on freshwater ecosystem processes and identify any tradeoffs between harvests and freshwater ecosystem concerns.
- 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.

60 Scoring Guidepost

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

The management agency's detailed submission for Nass sockeye (DFO Nass 2004b, p.13-16) suggested a score of 100 was deserved while an independent review by David Levy (Levy 2005) suggested that a reduced score was deserved for this indicator. The reviewer stated 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. He also stated that this is an important area where focused research is required to determine these relationships so DFO should partially meet the criteria (orange ranking) within the scoring guideposts. We agreed with the reviewer and found that there is limited information to do analysis of tradeoffs. We agreed with the scoring on all other criteria at all scoring guideposts based on the evidence provided for this indicator. The Team's score for this indicator was 95.

Indicator 2.2.1 The management of the fishery includes provisions for integrating and synthesizing new scientific information on biological diversity at the genetic, species or population level of all species harvested in the fishery and impacts on endangered, threatened, protected or icon species.

100 Scoring Guidepost

- A risk assessment has been conducted, based on current knowledge of direct and incidental mortalities from the fishery, to ensure the fishery does not pose a significant threat to the biodiversity of the target or non-target species.
- Stock composition including enhanced component, is known within Fishery Management Units with the likelihood of harvest of endangered, threatened, protected, or icon species has been estimated.
- Time and area of migrations of weak year classes, sub-stock or population components are known.
- The management system contains provisions to reduce harvests based on biodiversity concerns of affected endangered, threatened, protected or icon species, or weak year classes, of stocks, including the enhanced components, of the targeted species.

80 Scoring Guidepost

- The fishery has been monitored and the stock composition is assessed with a special effort to determine presence of rare, endangered, protected, or icon species.
- The management agency has a history of incorporating new research into management as new research data on impacts of fisheries on biodiversity become available.
- The fisheries management system includes provisions for harvest reduction when biodiversity concerns are identified for target or non-target species.

60 Scoring Guidepost

- Efforts are being made to assess the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.
- The impact of the fishery on endangered, threatened, and protected or icon species is identified and is considered in the management of fisheries.
- There are provisions in the management system to reduce the impacts of the fishery on the biodiversity of the endangered, threatened, and protected or icon species.

The management agency's detailed submission for Nass sockeye (DFO Nass 2004b, p.16-21) suggested a score of 95 was deserved and an independent review by David Levy (Levy 2005) agreed with this assessment. We gave no value for the first criteria at the 100SG but gave full credit for knowledge of the stock composition and for the provision of estimating the impact on species of special status. We agreed with the scoring on all other criteria at all scoring guideposts based on the evidence provided for this indicator. The Team's score for this indicator was 95.

Nass Sockeye – Performance Indicators scoring <80

Indicator 2.3.1 Management strategies include provision for restrictions to the fishery to enable recovery of non-target stocks to levels above established LRPs (Limit Reference Points)

100 Scoring Guidepost

- The management plans and escapement goals have been shown to have a high (>80%) probability of achieving a long-term recovery of depleted non-target stocks using risk analysis.
- Historic data have been thoroughly examined to ensure fisheries restoration objectives are based on the likely habitat capacity, rather than on trends that cover only the most recent decades, thus avoiding the "moving baseline" syndrome.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Proposed management strategies have been reviewed and found to be scientifically defensible and appropriate by the Pacific Scientific Advice Review Committee or the appropriate Pacific Salmon Commission technical committee.
- The management system supports the collection of data on non-fishing related human activity in the development of recovery plans for non-target stocks.

80 Scoring Guidepost

- The management system includes assessment of plans for the recovery of non-target stocks to levels above established LRPs.
- Objectives for recovery have at least some consideration of historic documents on stock abundance.
- The management system has a reasonable (>60%) probability of achieving long-term recovery of depleted non-target stocks.
- Monitoring and assessment programs are established to determine with a high degree of confidence and in a timely manner that recovery is occurring.
- Escapement goals will be revised periodically to accommodate new data indicating success or failure of existing recovery plans.
- The management system considers the impact of non-fishing related human activity in the development of recovery plans for non-target stocks

60 Scoring Guidepost

- The management system attempts to prevent extirpation of non-target stocks and does have rebuilding strategies for the majority of the stocks.
- The management system has at least a 50% probability of achieving long-term recovery of depleted non-target stocks.
- The management system has a strategy for periodic revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.

The management agencies detail submission for Nass sockeye (DFO Nass 2004b, p.21-23) suggested a score of 95 was deserved and an independent review by David Levy (Levy 2005) agreed with this

assessment. At the 80 scoring level, the Team disagree with DFO and the reviewer in that the chum salmon stocks that are impacted by this fishery are depleted and there is no recovery plan reducing scores on scoring elements 3, 5, and 6 at the 80 level while we did agree the existing monitoring plan was sufficient to meet scoring elements 1, 2 and 4. As there are no identified depleted sockeye salmon stocks on the Nass, the first two guideposts are not factors and we have no reason to believe that if stocks become depleted in the future, such factors will be considered in concert with the Wild Salmon Policy document. The third guidepost at the 80 level was considered partially met in that the Wild Salmon Policy provides guidance and considerations for depleted sockeye stocks.

We have been provided with ample evidence of major depletion of Nass chum salmon stocks that are intercepted in the marine fisheries for sockeye salmon and may be harvested in the inshore fisheries. There is no obvious process or a recovery plan for these chum stocks that limits the impact of fisheries on their harvest. There needs to be a process in place where any depleted non-target species will require a recovery plan with a reasonable chance of success. Without a risk analysis or other process that identifies the relative risk to the chum salmon (or other non-target stocks) of the existing fishery, the sustainability of these non-target stocks cannot be assured. The last guidepost was considered partially met in that the escapement monitoring and intensive scrutiny of habitat and development that impact the Nass fisheries is likely to occur with the broad based ownership of the fishery by the Nisga'a people.

The Team found that all of the 60 scoring guideposts were met because DFO has taken measures to prevent the extirpation of non-target stocks. While it is difficult to distinguish between a 50% probability of achieving long-term recovery at the 60 scoring level and a 60% at the 80 scoring level, the Team found that the management system has taken actions to reduce the impact of fisheries on the depleted non-target chum stock in recent years. Based on the deficiencies at the 80 scoring level regarding a recovery plan for Nass chum stocks, the Team's score for this indicator was 73.

Condition 23 - Nass Sockeye Salmon Condition #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. To be completed within 2 years. (**Nass Condition 2.1)**

10.3 MSC PRINCIPLE 3

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.

MSC 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.

For the purposes of this section, the management system is defined to mean all public sector entities with responsibility for managing salmon in British Columbia, including Fisheries and Oceans Canada (DFO), the Pacific Salmon Treaty (PST), and Pacific Salmon Commission (PSC), in addition to scientific assessment groups such as Pacific Scientific Advice Review Committee (PSARC) and other governmental entities that provide advice to mangers.

Some indicators under Principle 3 appear to overlap with indicators under Principles 1 and 2, however, Principles 1 and 2 are concerned with the outcomes of a management system respecting the fact that the resources are maintained at the desired levels of abundance, while Principle 3 is concerned with evaluating whether all of the processes for reaching management objectives are in place.

Principle 3 Summary

A comparison of the scores for the Principle 3 indicators that evalute the management system is provided in Table 10.3.1.

Evaluation scores for the four sockeye fisheries were above the 80 scoring guidepost for most of the Principle 3 indicators. The following points provide a summary of our findings:

1. The management systems in place for Skeena and Nass sockeye are consistent with MSC principles and guideposts while those for Fraser and Barkley Sound sockeye require some enhancements for certification.
2. Fraser, Skeena and Barkley Sound fisheries are deficient in their framework for research since no research plans were provided for target or non-target species;
3. The consultation process is similar for each fishery and this process was found to be completely consistent with the evaluation guideposts;
4. The management system includes effective measures to control levels of harvest for each fishery but for Fraser sockeye has fallen short of MSC requirements regarding the restoration schedule for depleted populations;
5. The processes in place to review the management system were similar for the Fraser, Barkley Sound and Skeena sockeye fisheries and only deficient with regard to external reviews and the dispute resolution process. The Nass fisheries include a rigorous internal and external review process as part of the implementation of the Nisga'a Final Agreement;
6. All sockeye fisheries were found to be compliant with international agreements, and domestic laws. Only the Nass sockeye fisheries were found to be incompliance with all legal and most customary rights of First Nation peoples that are impacted by the fishery; and

7. Fishing gear and practices were generally found to be consistent with MSC guideposts, however, there is general agreement that the data on catches and discards of sturgeon in Fraser sockeye fisheries and steelhead in Skeena sockeye fisheries are not adequate.

The bulk of the information provided in the DFO submissions for P3 was similar for each of the sockeye fisheries and there was at least one fishery that scored above the 80SG for each indicator. For the scores above 80, it is more efficient and appropriate to provide our rationale for all fisheries together under each indicator.

Table 10.3.1: Summary of scores for Principle 3 indicators for each fishery.

Summary for sockeye fisheries		Scores				Weights	Weighted Scores			
		Fraser	Barkley	Skeena	Nass	Weighting	Fraser	Barkley	Skeena	Nass
PRINCIPLE 3 - Management and Operational Framework						0.333	87.4	91.3	87.4	97.1
Management Framework										
Criterion 3.1 - Management system consistent with MSC principles and criteria						0.327	86.1	91.1	86.7	97.2
Indicator 3.1.1	Clear and defensible set of objectives	75	100	78	96	0.199				
Indicator 3.1.2	Periodic assessment of biological status	100	100	100	100	0.102				
Indicator 3.1.3	Identify the impact of fishing on the ecosystem	85	95	95	95	0.064				
Indicator 3.1.4	Uses best information and precautionary approach	77	77	77	100	0.104				
Indicator 3.1.5	Responses to new information are timely and adaptive	100	100	100	100	0.098				
Indicator 3.1.6	Responsive to social and economic impact of fishery	90	90	90	95	0.095				
Indicator 3.1.7	Useful and relevant information to decision makers	93	90	75	93	0.192				
Indicator 3.1.8	Socioeconomic incentives for sustainable fishing	77	77	96	100	0.147				
Criterion 3.2 - Framework for research pertinent to management						0.100	78.7	78.7	78.7	95.7
Indicator 3.2.1	Research plan for target and non-target species	73	73	73	96	0.667				
Indicator 3.2.2	Research is timely, available and reviewed	90	90	90	95	0.333				
Criterion 3.3 - Transparency in operations and consultation process						0.041	100.0	100.0	100.0	100.0
Indicator 3.3.1	Open consultations process	100	100	100	100	1.000				
Criterion 3.4 - Measure to control levels of harvest						0.179	87.3	95.8	95.8	98.8
Subcriterion 3.4.1 - Catch and exploitation levels						0.500				
Indicator 3.4.1.1	Firshery control systems including no-take zones	92	100	100	100	0.500				
Indicator 3.4.1.2	Measures to restore depleted fish populations	70	85	85	95	0.500				
Subcriterion 3.4.2 - Ensure that conservation objectives are met.						0.500				
Indicator 3.4.2.1	Compliance provisions (effective enforcement)	90	98	98	100	0.500				
Indicator 3.4.2.2	Monitoring provisions	97	100	100	100	0.500				
Criterion 3. 5 - Regular and timely review of management system						0.152	92.4	92.4	92.4	98.6
Indicator 3.5.1	Internal review	100	100	100	100	0.316				
Indicator 3.5.2	External review	87	87	87	100	0.258				
Indicator 3.5.3	Recommendations from reviews incorporated	95	95	95	100	0.284				
Indicator 3.5.4	Mechanism for resolving disputes	80	80	80	90	0.142				
Criterion 3.6 - Compliance with legal and administrative requirements						0.124	86.9	86.9	86.9	96.3
Indicator 3.6.1	Compliance with international agreements	100	100	100	100	0.250				
Indicator 3.6.2	Compliance with domestic laws and regulations	90	90	90	90	0.375				
Indicator 3.6.3	Observes legal and customary (First Nation) rights	75	75	75	100	0.375				
Fisheries Operational Famework										
Criterion 3.7 - Ecosystem sensitive gear and fishing practices						0.077	89.3	98.4	79.4	91.5
Indicator 3.7.1	Avoid catch and minimize mortality of non-target species	97	100	73	93	0.277				
Indicator 3.7.2	No distructive fishing practices	100	100	100	100	0.139				
Indicator 3.7.3	Minimize operational waste	100	100	100	100	0.128				
Indicator 3.7.4	Cooperation of fishers	70	95	60	80	0.328				
Indicator 3.7.5	Fishing methods minimize impacts on habitat	100	100	100	100	0.128				

Rationale for P3 Indicators Scoring >80

In the following sections, we provide a brief statement related to the DFO submissions ; identify the pages in each submission that are relevant for each indicator; and provide the Team's findings and scoring for each fishery. Wilson (2005) provided his own scoring for most of the P3 indicators for Fraser sockeye. In almost every instance, Wilson's scoring was similar to ours or less critical. The one notable exception was related to the mechanism for resolving disputes (Indicator 3.5.4). The rationale for our scoring of this indicator specifically addresses the concerns raised in the Wilson (2005) review.

For Barkley Sound, Young (2009) provided a summary of the differences between our scoring and that provided in the Nelson (2005) review. Several of the major difference appeared to be related to assumptions regarding the harvest of non-target stocks and the need to separate catch estimates between the two target stocks. Young (2009) identified the need for clear and defensible management objectives (Indicator 3.1.1) as the major issue associated with the P3 evaluation for Barkley Sound. Nelson (2005) concerns regarding the four indicators he scored below the 60SG (3.1.1, 3.1.8, 3.4.1.1, 3.5.4) are specifically addressed in our scoring rationale provided below.

For the Skeena and Nass fisheries, Hill (2007) provided a detailed comparison of the Team's initial scoring with the Sierra Club of Canada's independent reviews for these fisheries (Bocking 2005; Levy 2005). For those indicators where the Team's final scorings were substantively different from these independent reviews, we have referenced these reviews and included an explanation for why our scores differ from their evaluations. For the Skeena sockeye fishery, there were only three P3 indicators (3.5.2, 3.5.3, 3.5.4) where the Team's scoring at the 80SG was substantively different from that provided in the Bocking (2005) independent review. For the Nass sockeye fishery, there was only one P3 indicator (3.4.1.2) where the Team's scoring at the 80SG was substantively different from that provided in the Levy (2005) independent review. Indicator specific details are provided below.

Indicator 3.1.1: The management system has a clear and defensible set of objectives for the harvest and escapement for target species and accounts for the non-target species captured in association with, or as a consequence of, fishing for target species.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 2-4; DFO Barkley Sound 2004c, p. 1-4; DFO Skeena 2004c, p.2-4; DFO Nass 2004c, p. 2-4). According to DFO, all of the fisheries passed all guideposts, except the third guidepost at the 100SG. The Team found that the Fraser and Skeena fisheries did not pass all the guideposts at the 80SG, therefore, the scoring rationale and conditions for these fisheries are provided later (see section on scores below 80). The Barkley Sound sockeye fishery met all the guideposts for this indicator because both LRPs and TRPs are clearly defined for the target stock, harvest controls appear to be effective for achieving management objectives and the management system has provided reliable estimates for all catches, landings and bycatch (DFO Barkley Sound 2004c, p.1-3). Our findings for this indicator were very different from those presented in Nelson (2005) because Nelson contended that separate management objectives need to be defined for two target stocks as well as the stock components within these two sockeye rearing lakes. Nelson also claimed that Henderson Lake sockeye are still caught in significant numbers in the fisheries targeting the Somass sockeye stocks. All the information obtained by the Team suggests that measures have been taken to minimize the harvest of Henderson Lake sockeye and the LRP and TRP objectives defined for Somass sockeye have been effective for managing fisheries targeting the Sproat Lake and Great Central Lake stocks. The Nass sockeye fishery also has many clear management goals, effective management controls and reliable catch estimates (DFO Nass, 2004c, p.2-4) but LRPs and

TRPs still need to be defined for some of the target sockeye stocks. The Team found that the following two guideposts were only partially met for Nass sockeye:

- Harvest rates and escapement goals are precisely set for each target stock unit in the fishery, as qualified by relevant environmental factors.
- Target Reference Points and Limit Reference Points are clearly defined and documented for each target stock unit in the fishery.

The Team's scores for this indicator were 100 for Barkley Sound and 96 for Nass.

Indicator 3.1.2: The management system provides for periodic assessment of the biological status of the target species and the impact of fishing.

The DFO submissions describe annual stock and fisheries assessment processes for each fishery that meet all the guideposts for this indicator (DFO Fraser 2004c, p. 4-9; DFO Barkley Sound 2004c, p. 4; DFO Skeena 2004c, p.4-9; DFO Nass 2004c, p. 5-8). The Team's scores for this indicator were 100 for each fishery.

Indicator 3.1.3: The management system includes a mechanism to identify and manage the impact of fishing on the ecosystem.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 11; DFO Barkley Sound 2004c, p. 6; DFO Skeena 2004c, p.11; DFO Nass 2004c, p. 10). According to DFO, three of the 100SG were not applicable (black font) and one was partially met for each fishery:

- Monitoring systems are in place to detect the impact of fishing on the ecosystem.
- Where potential impacts of fishing on the ecosystem have been identified, the management system has clear and well-defined objectives for evaluating and managing the impact of the fishery on the ecosystem.
- Control mechanisms are used to minimize impacts of fishing on the ecosystem.
- There is sufficient evidence to indicate that when used, control mechanisms are adequate for meeting the management objectives.

The Team was not convinced that any of the guideposts were not applicable, so each was evaluated for each fishery. In general, most salmon fisheries have few if any detectable impacts on the ecosystem. However, concerns have been raised on the Fraser regarding the effect of set gillnet fisheries on endangered sturgeon stocks. For the Fraser, the Team found that third guidepost was met but the others were not. For the other three fisheries, the team found that the middle two guideposts were met and the other two guideposts were partially met. No specific ecosystem concerns have been raised for these other fisheries but monitoring systems in place are not adequate to detect the impacts of the fishery on the ecosystem and evidence of the effectiveness of the control mechanisms is very limited. The Team's scores for this indicator were 85 for Fraser, and 95 for Barkley Sound, Skeena and Nass.

Indicator 3.1.4: When dealing with uncertainty, the management system provides for utilizing the best scientific information available to manage the fishery, while employing a precautionary approach.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 13; DFO Barkley Sound 2004c, p. 8; DFO Skeena 2004c, p.13; DFO Nass 2004c, p. 13). According to DFO, three of the 100SGs were met and one was not applicable (black font) for each fishery:

- The management system provides for the routine assessment of the level of uncertainty in the information collected for management and establishes management controls to address these uncertainties using the best available scientific information and a precautionary approach. .
- The management system implements research efforts to address data gaps.
- For newly developing fisheries for which there is very limited data and information, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system always quantitatively evaluates the effect of implementation uncertainty (the tendency for actual harvest rates or escapements to differ from those intended by the management regulations) on the effectiveness of the proposed management actions.

The Team agreed with DFO's evaluation for the Nass fishery but found that the others fisheries did not pass all the guideposts at the 80SG. The main reason for the Nass passing all applicable guideposts was the quality of the in-season information used to manage Nass sockeye fisheries and the consistent application of this information to achieve the escapement goals for Nass sockeye stocks. The Team's scores for this indicator was 100 for Nass and the other scores are provided later in the report (see section on scores below 80).

Indicator 3.1.5: Management response to new information on the fishery and the fish populations is timely and adaptive.

The DFO submissions describe in-season monitoring systems that provide the information need to manage these fisheries and processes in place to ensure that Management responses are timely and adaptive (DFO Fraser 2004c, p. 14-16; DFO Barkley Sound 2004c, p. 9; DFO Skeena 2004c, p.14-15; DFO Nass 2004c, p. 14-15). The Team's scores for this indicator were 100 for each fishery.

Indicator 3.1.6: The management system provides a process for considering the social and economic impacts of the fishery.

As for several of the P3 Indicators, the DFO submissions for this indicator were virtually identical for each fishery (DFO Fraser 2004c, p. 17-19; DFO Barkley Sound 2004c, p. 10-15; DFO Skeena 2004c, p.16-19; DFO Nass 2004c, p. 16-19). For the most part, the Team agreed with the DFO submissions but found that two of the 100SG were not met for three of the fisheries:

- There is a formal and well-defined process to consider, over the short and long term, the impact of the fishery on coastal communities that are closely tied to the fishery.

- There are no direct subsidies to the fishing industry.

Canada's Employment Insurance (EI) system for fisheries workers represents a direct subsidy to the fishing industry for each of the fisheries. The Nass fishery is the only fishery that met the first of the above two guideposts because of the formal and well-defined processes in place that regularly consider

the impact of the fishery on the Nisga'a communities. The Team's scores for this indicator were 95 for the Nass, and 90 for Fraser, Barkley Sound, and Skeena fisheries.

Indicator 3.1.7: The management system provides decision makers with useful and relevant information and advice for managing the fishery.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 23; DFO Barkley Sound 2004c, p. 16; DFO Skeena 2004c, p.22; DFO Nass 2004c, p. 22). According to DFO, none of the fisheries passed the first guidepost at the 100SG. The team found that the Skeena fishery did not pass some of the 80SG; no fisheries met the first 100SG guidepost and the Barkley Sound fishery only partially met the second 100SG guidepost:

- The management system provides decision makers with a range of alternatives for achieving the objectives of management, including risk assessments for each alternative.

- All management decisions are based on useful and relevant information and advice that is provided through the management system.

The Barkley Sound fishery did not pass the second guidepost because the management system has yet to provide some of the most useful and relevant information for management decisions (e.g. reliable harvest rates estimates for Henderson Lake sockeye).
We did not agree with Nelson (2005) assessment that this fishery failed guideposts at both the 60 and 80SGs. Nelson acknowledged that "fisheries management decisions are made in light of the consequences and risks of each alternative" but he did not equate this to a risk assessment for important management decisions or the consistent application of useful and relevant information. The Team concluded that the information routinely considered in the fisheries management process for Barkley Sound and the other sockeye fisheries is consistent with all 60 and 80SG. The Team's scores for this indicator were 93 for the Fraser and Nass, 90 for Barkley Sound and less than 80 for the Skeena fishery (see explanation below).

Indicator 3.1.8: The management system provides for socioeconomic incentives for sustainable fishing.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 23-27; DFO Barkley Sound 2004c, p. 17-21; DFO Skeena 2004c, p.22-27; DFO Nass 2004c, p. 22-27). According to DFO, none of the fisheries passed the second guidepost at the 100SG and the second guidepost at the 80SG. The team agreed with DFO assessment for the Fraser and Barkley Sound fisheries but found that the Skeena and Nass fishery did pass all guideposts at the 80SG. The Skeena partially met the first two of the five guideposts at the 100SG:

- The management system has formal procedure for providing social and economic incentives to stakeholders in the fishery to develop and utilize sustainable fishing practices, particularly the development of selective fishing gear and practices that lead to improved conservation.
- The management system creates strong incentives for harvesters to not exceed target catches or exploitation rates

The Nass fishery passed both of these guideposts because the Nisga'a Treaty entitlements and Harvest Agreement define a Nisga'a allocation for sockeye that provides a powerful incentive for the Nisga'a to develop and utilize sustainable fishing practices and strong incentives for harvesters to not exceed target catches or exploitation rates. The Team's scores for this indicator were 100 for the Nass, 96 for Skeena and less than 80 for the Fraser and Barkley Sound fisheries (see explanation below).

Indicator 3.2.1: The research plan covers the scope of the fishery, includes all target species, accounts for the non-target species captured in association with, or as a consequence of fishing for target species, and considers the impact of fishing on the ecosystem and socioeconomic factors affected by the management program.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 28-30; DFO Barkley Sound 2004c, p. 22-23; DFO Skeena 2004c, p.27-29; DFO Nass 2004c, p. 27-29). According to DFO, all of the fisheries did not pass the second guidepost at the 100SG and partially passed the fourth guidepost at the 100SG. The Team found that the Fraser, Barkley Sound and Skeena fisheries did not pass most of the guideposts at the 80SG because no clear research plan was provided or identified in the DFO submissions. The Nass fishery passed the 80SG because the Nisga'a Treaty implementation and funding review process requires the development and approval of stock assessment and research plan each year. The Nisga'a research plans for Nass sockeye fisheries were sufficient to meet all the guideposts except the second and fourth at the 100SG, which were partially met:

- The framework for research includes investigations dealing with socioeconomic impacts of the fishery.
- Funding is secure and sufficient to meet long-term research needs.

The research plans for the Nass were not sufficient to pass these guideposts because of the limited attention given to the socioeconomic impacts of the fishery and significant uncertainty regarding funding for essential research programs in recent years. Discussions regarding the amount of funding for core fisheries programs that will be provided by Canada through the Nisga'a Fiscal Finance Agreement (FFA) have been ongoing since 2005. Fortunately, Nisga'a Lisims Government has provided most of the bridge funding required to implement the core research and assessment projects for Nass sockeye fisheries. The Team's scores for this indicator were 96 for the Nass and less than 80 for the Fraser, Barkley Sound and Skeena fisheries (see explanation below).

Indicator 3.2.2: Research results are available in a timely fashion to interested parties, and there is a mechanism for periodic review of the content, scope and results of the research plan.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 31-34; DFO Barkley Sound 2004c, p. 24-26; DFO Skeena 2004c, p.30-33; DFO Nass 2004c, p. 30-33). According to DFO, all of the fisheries did not pass the first guidepost at the 100SG but passed all other guideposts. The team found that the Fraser, Barkley Sound and Skeena fisheries did not pass the first and third guidepost at the 100SG:

- There is a formal and codified arrangement for annual stakeholder review of the content and scope of research plans and results, including matters related to its funding, which is open and transparent.

- The management system regularly incorporates into the research plan recommendations emanating from these reviews.

There have been periodic "stakeholder" reviews of research results for the Fraser, Barkley Sound and Skeena fisheries but in many instances the management system has not incorporated the recommendations from these reviews into research plans. The Nisga'a Joint Fisheries Management Committee (JFMC) and Joint Technical Committee (JTC) provide a formal process for reviewing research plans and the recommendations from the JTC are usually approved and incorporated in to the research plan by the JFMC. However, these committees do not consist of representatives from the commercial and recreational fisheries or NGOs. Consequently, the Nass met the third guidepost but not the first. The Team's scores for this indicator were 95 for the Nass and 90 for the Fraser, Barkley Sound and Skeena fisheries.

Indicator 3.3.1: Provides for a consultative process that is open to all interested and affected stakeholders, which allows for their input on a regular basis into the management process.

The DFO submissions describe an extensive consultation process that is open to all interested and affected stakeholders and allows for their input on a regular basis into the management process (DFO Fraser 2004c, p. 35-38; DFO Barkley Sound 2004c, p. 27-29; DFO Skeena 2004c, p. 33-36; DFO Nass 2004c, p. 33-36). The processes and DFO's submissions were essentially identical for each fishery. The Team's scores for this indicator were 100 for each fishery.

Indicator 3.4.1.1: Utilizes methods to limit or close fisheries in order to achieve harvest and/or escapement goals, including the establishment of closed areas, no-take zones, and closed dates and times when appropriate.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 39-40; DFO Barkley Sound 2004c, p. 30-31; DFO Skeena 2004c, p.36-38; DFO Nass 2004c, p. 36-38). According to DFO, all of the fisheries passed all guideposts. The team found that the Fraser partially met the first guidepost and did not meet the fourth guidepost at the 100SG:

- The management system provides a formal and codified system to achieve harvest and/or escapement goals for target stock units and, as appropriate, non-target species of fish.

- There is no evidence provided by the management system to indicate that, as a result of fishing, target stock units are in serious decline or degradation of the ecosystem is occurring.

There is clear evidence that fishing has contributed to the serious decline of Cultus sockeye, which was one of the target stocks for the Fraser sockeye fishery. Reviewers have also expressed concerns that there is no formal or codified system to achieve escapement goals for all of the Fraser target stocks. In contrast, none of the target stocks for the other sockeye fisheries are in serious decline and the clearly defined LRPs and TRPs have provided a codified system for achieving the escapement goals. Nelson (2005) indicated that the Barkley Sound fishery did not pass either of the guideposts at the 60SG because in his view exploitation rates have been too high and "should be more on line with natural

predation rates". The catch and escapement estimates provided by DFO for Somass River indicated that exploitation rates (ERs) have varied from 8-57% over the past 10 years depending on run size (lower ERs in low abundance years) and these rates are consistent with sustainable ERs for many sockeye populations. The Team's scores for this indicator were 92 for the Fraser and 100 for the Barkley Sound, Skeena and Nass fisheries.

Indicator 3.4.1.2: Provides for restoring depleted target species to specified levels within specified time frames.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 41-42; DFO Barkley Sound 2004c, p. 31-32; DFO Skeena 2004c, p.39-40; DFO Nass 2004c, p. 39-40). According to DFO, all of the fisheries did not pass the guideposts at the 100SG and did not pass the second guidepost at the 80SG. The team found that the Fraser only partially met the two guideposts at the 80SG so is scoring is address later. For Barkley Sound and Skeena, the Team agreed with DFO's assessment that the guideposts at the 100SG were not fully met:

- The management system has a formal and codified mechanism, which is adequate for restoring depleted target stocks to the TRP or equivalent high level of abundance, as qualified by relevant environmental factors.

- The mechanism includes strict guidelines for restoring these depleted populations within a certain time frame are formalized by the management system.

As noted above, none of the target stocks for the Barkley Sound and Skeena sockeye fisheries are in serious decline and the clearly defined LRPs and TRPs have provided a codified system for achieving the escapement goals. While there are no strict guidelines for restoring depleted target stocks within a specified time frame, there is evidence that the measures taken in these two fisheries have recovered the target stocks rapidly, often within one cycle, after short periods when they were close to or below their respective LRPs. For the Nass sockeye fishery, the Team found that the first guidepost at the 100SG was met because the management system has consistently maintained escapements for Nass sockeye above their LRP and usually above their TRP. Levy (2005) indicated that he agreed with the DFO submission that the Nass did not pass the second guidepost at the 80SG. However, he noted that "stock restoration is not a concern for Nass sockeye". For the reasons described above (i.e. no restoration concerns for target stocks), the Team did not agree with DFO's scoring at the 80SG for the Barkley Sound, Skeena and Nass fisheries. The Team's scores for this indicator were 95 for the Nass and 85 for the Barkley Sound and Skeena fisheries.

Indicator 3.4.2.1: The management system includes compliance provisions.

The DFO submissions provide similar evaluations for each of the fisheries (DFO Fraser 2004c, p. 43-44; DFO Barkley Sound 2004c, p. 33-35; DFO Skeena 2004c, p.40-41; DFO Nass 2004c, p. 40-41). According to DFO, all of the fisheries passed the guideposts for this indicator. The team found that the Fraser only partially met the second and third guideposts at the 100SG and did not meet the fourth guidepost at this level:

- Education and enforcement procedures are implemented and applicable rules are consistently applied.

- Enforcement actions are effective in achieving the objectives of management.

- There are no infractions being consistently committed in the fishery.

The primary reason for this scoring was the occurrence of illegal fisheries on the Fraser River to protest decisions regarding First Nation Economic Opportunity fisheries. Protest fisheries are extremely rare or have not occurred in the other sockeye fisheries but concerns have been raised about the effectiveness of enforcement in the Barkley Sound and Skeena fisheries. Therefore, the Team's scores for this indicator were 100 for the Nass and 98 for the Barkley Sound and Skeena fisheries and 90 for the Fraser fishery.

Indicator 3.4.2.2. The management system includes monitoring provisions.

The DFO submissions suggest that the management system met all the guideposts for this indicator (DFO Fraser 2004c, p. 42-44; DFO Barkley Sound 2004c, p. 35-38; DFO Skeena 2004c, p. 42-44; DFO Nass 2004c, p. 42-44). The Team agreed with the DFO submission for all fisheries except the Fraser, where the second guidepost at the 100SG was only partially met:

- Monitoring is comprehensive, and includes all relevant components of the fishery

The have been several reviews of the Fraser sockeye fishery that have identified concerns regarding the catch monitoring systems. Therefore, the Team's scores for this indicator were 97 for the Fraser fishery and 100 for the Barkley Sound, Skeena and Nass fisheries.

Indicator 3.5.1: There is an effective and timely system for internal review of the management system.

The DFO submissions describe internal review procedures that are generally effective and timely (DFO Fraser 2004c, p. 47; DFO Barkley Sound 2004c, p. 39; DFO Skeena 2004c, p. 44-45; DFO Nass 2004c, p. 44-45). The Team agreed with DFO's assertion that all guideposts were met and each fishery received a score of 100 for this indicator.

Indicator 3.5.2: There is an effective and timely system for external review of the management system.

The DFO submissions describe external review processes for each fishery but most of these processes don't include independent experts in fisheries management systems (DFO Fraser 2004c, p. 49-50; DFO Barkley Sound 2004c, p. 40-41; DFO Skeena 2004c, p. 46-47; DFO Nass 2004c, p. 46-47). The DFO's evaluations were the same for the Fraser, Barkley Sound and Nass fisheries: two guideposts were not met, the first at the 100SG and the second at the 80SG. For the Skeena, DFO suggested that the first guidepost at the 100SG was the only guidepost not met. The Team did not agree with DFO's assessment and found that the Nass fishery passed all guideposts and the other three fisheries passed the guideposts at the 80SG but did not pass the first two guideposts at the 100SG:

- The management system provides for one or more independent experts to review at least bi-annually all of the important components of management performance.

- The format and standards of the review are established with input from outside the management system.

The Nass sockeye fishery is subjected to annual review by the Nisga'a JFMC, JTC and Trustees for the Lisims Fisheries Conservation Trust. The performance of fisheries managers with regard to the escapement goals for each salmon species is one of the primary purposes for these reviews and individuals outside the management system have helped to define the format and standard for these annual reviews. None of the other sockeye fisheries have these types of annual review processes. However, each of the other sockeye fisheries has been subject to external review processes at least once in the past 5 years. Bocking (2005) indicated that the Skeena should fail the first guidepost at the 80SG because there had not been an independent review of the management performance for this fishery in the 5 years prior to 2005. In 2008, an extensive independent review was conducted by four widely respected fisheries scientists (Walters et al. 2008). Consequently, the Team's scores for this indicator were 100 for the Nass and 87 for the Fraser, Barkley Sound and Skeena fisheries.

Indicator 3.5.3: There is a mechanism for incorporating into the management system recommendations resulting from the review process.

The DFO submissions provide the rationale for why they believe they have met all the guideposts for this indicator (DFO Fraser 2004c, p. 50-51; DFO Barkley Sound 2004c, p. 42-43; DFO Skeena 2004c, p. 47-48; DFO Nass 2004c, p. 47-48). The Team found that the management systems described met most of the guideposts but only partially met the first guidepost at the 100SG for the Fraser, Barkley Sound and Skeena fisheries:

- The recommendations from internal and external reviews are always acted upon and, where appropriate, incorporated into the management system.

While many of the recommendations from internal and external reviews have been acted upon, there are clear examples in the past 5-7 years where recommendations from reviews of the Fraser, Barkley Sound and Skeena fisheries have not been acted upon. In contrast, the JFMC and JTC process for the Nass fishery has ensured that all recommendations from the Nass sockeye reviews are acted upon. Bocking (2005) indicated that the general lack of external reviews for the Skeena fishery was sufficient for this fishery to partially fail each of the guideposts for this indicator. The 2008 independent review (Walters et al. 2008) definitely qualifies as an external review and DFO is currently in the process of acting upon several of the recommendations from this review. The Team's scores for this indicator were 100 for the Nass and 95 for the Fraser, Barkley Sound and Skeena fisheries.

Indicator 3.5.4: There is an appropriate mechanism for resolving disputes.

The DFO submissions indicated that none of the fisheries passed the guideposts at the 100SG (DFO Fraser 2004c, p. 51-53; DFO Barkley Sound 2004c, p. 43-44; DFO Skeena 2004c, p. 48-51; DFO Nass 2004c, p. 48-51). The Team agreed with DFO's assessment for the Fraser, Barkley Sound and Skeena fisheries that all of the 100SG were not met:

- The management system has a formal and codified mechanisms for resolution of disputes arising as a result of the fishery.
- Affected parties routinely use the dispute resolution mechanism.

- The dispute resolution mechanism is unbiased and fair respecting all disputing parties.

For the Nass fishery, the Team found that the formal dispute resolution mechanism defined in the Nisga'a Treaty met the 100SG for the Nisga'a portion of the fishery and thus partially met these guideposts for the whole Nass sockeye fishery. Bocking (2005) and Wilson (2005) contended that the following statement, included in the submissions for each fishery, should be sufficient for DFO to fail all of the guideposts at the 80 and 100SG:

> *"The information presented establishes that there is a dispute resolution mechanism in place—Ministerial decision—but that it is not likely to be viewed as acceptable by stakeholders or dispute resolution experts."*

Nelson (2005) contended that the DFO advisory and consultation process does not have an official dispute resolution mechanism. The Team's view is that the existing process meets the 80SG because there is a process for resolving significant disputes, the process is available for use by affected parties and there is no evidence that it discriminates against any disputing party. For those disputes that can not be resolved through the various steps in the dispute resolution process, there needs to be someone with the authority to make the decision. Since the Minister usually consults with his/her regional and legal advisors before making these types of decision, it is likely that these decisions will not be discriminatory. The Team's scores for this indicator were 90 for the Nass and 80 for the Fraser, Barkley Sound and Skeena fisheries.

Fraser Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 3 indicator and criteria is provided in Table 10.3.2. The assessment team did not rescore any Fraser River Principle 3 performance indicator in June 2008.

The following points describe the Principle 3 highlights for Fraser sockeye:

1. most components of the management systems in place for Fraser sockeye are consistent with MSC principles and criteria;
2. the consultation process was found to be completely consistent with our evaluation criteria;
3. the management system includes effective measures to control levels of harvest for each fisheries;
4. the management system includes an extensive internal review process for assessing management actions, fisheries recommendations and resolving disputes;
5. Fraser sockeye fisheries were found to be compliant with international agreements, and domestic laws. and
6. fishing gear and practices were generally found to be consistent with MSC criteria.

Table 10.3.2: Summary of the evaluations for each Principle 3 criteria and indicator for the Fraser sockeye fishery.

Summary for Fraser Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	75	P	P	P		P	P			P							
Indicator 3.1.2	Periodic assessment of biological status	100																
Indicator 3.1.3	Identify the impact of fishing on the ecosystem	85																
Indicator 3.1.4	Uses best information and precautionary approach	77				P			P									
Indicator 3.1.5	Responses to new information are timely and adaptive	100																
Indicator 3.1.6	Responsive to social and economic impact of fishery	90																
Indicator 3.1.7	Useful and relevant information to decision makers	93																
Indicator 3.1.8	Socioeconomic incentives for sustainable fishing	77	P	P					P									
Criterion 3.2 - Framework for research pertinent to management																		
Indicator 3.2.1	Research plan for target and non-target species	73																
Indicator 3.2.2	Research is timely, available and reviewed	90																
Criterion 3.3 - Transparency in operations and consultation process																		
Indicator 3.3.1	Open consultations process	100																
Criterion 3.4 - Measure to control levels of harvest																		
Subcriterion 3.4.1 - Catch and exploitation levels																		
Indicator 3.4.1.1	Firshery control systems including no-take zones	92	P															
Indicator 3.4.1.2	Measures to restore depleted fish populations	70						P	P									
Subcriterion 3.4.2 - Ensure that conservation objectives are met.																		
Indicator 3.4.2.1	Compliance provisions (effective enforcement)	90		P	P													
Indicator 3.4.2.2	Monitoring provisions	97		P														
Criterion 3. 5 - Regular and timely review of management system																		
Indicator 3.5.1	Internal review	100																
Indicator 3.5.2	External review	87																
Indicator 3.5.3	Recommendations from reviews incorporated	95	P															
Indicator 3.5.4	Mechanism for resolving disputes	80																
Criterion 3.6 - Compliance with legal and administrative requirements																		
Indicator 3.6.1	Compliance with international agreements	100																
Indicator 3.6.2	Compliance with domestic laws and regulations	90	P															
Indicator 3.6.3	Observes legal and customary (First Nation) rights	75						P										
Fisheries Operational Famework																		
Criterion 3.7 - Ecosystem sensitive gear and fishing practices																		
Indicator 3.7.1	Avoid catch and minimize mortality of non-target species	97		P														
Indicator 3.7.2	No distructive fishing practices	100																
Indicator 3.7.3	Minimize operational waste	100																
Indicator 3.7.4	Cooperation of fishers	70		P				P										
Indicator 3.7.5	Fishing methods minimize impacts on habitat	100																

Fraser Sockeye – Performance Indicators scoring <80

MSC Criterion 3.1

The management system has a strategy for management that clearly defines long-term objectives for managing the impact of fishing on target species, non-target species and the ecosystem; the objectives are consistent with a well- managed fishery and MSC principles and criteria; and the management strategy includes provision for the effective implementation of measures to attain these objectives.

The objective regarding this criterion dealing with Management Systems is to compare the Fisheries and Oceans Canada management system for British Columbia salmon, as detailed in the Integrated Fisheries Management Plan for British Columbia Salmon, and elsewhere, with the standards for a well-managed fishery as defined in the MSC Principles and Criteria for Sustainable Fishing. Particularly important is whether the management system has clearly defined objectives and goals that incorporate currently evolving standards for responsible fisheries management with respect to conservation of the species, regard for the ecosystem to which they belong, transparency of the management process and recognition of the impact of the fishery on social, cultural and economic issues.

Throughout this section the term "impact on the ecosystem" is taken to mean the degree to which fishing alters the ecosystem relative to its non-fished state.

Indicator 3.1.1: The management system has a clear and defensible set of objectives for the harvest and escapement for target species and accounts for the non-target species captured in association with, or as a consequence of, fishing for target species.

100 Scoring Guidepost

- Management objectives are clearly defined for all of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are precisely set for each target stock unit in the fishery, as qualified by relevant environmental factors.
- Target Reference Points and Limit Reference Points are clearly defined and documented for each target stock unit in the fishery.
- Harvest controls are effective with respect to the attainment of management objectives for each target stock unit in the fishery.
- The management system provides estimates for all catches, landings and bycatch.

80 Scoring Guidepost

- Management objectives are clearly defined for most of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are set for target stocks or target species in the fishery, as qualified by relevant environmental factors.
- Harvest controls are precise and effective for major target stocks or target species in the fishery.
- The management system provides estimates for all major catches, landings, and bycatch.

60 Scoring Guidepost

- Management objectives are clearly defined and consistent with MSC criteria for a well-managed fishery for the majority of target stocks.
- Harvest controls are effective for the majority of the fisheries on target stocks.
- The management system provides for the estimation of catch, landing, and bycatch for the majority of the fisheries.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.4) suggested that a score of 98 was appropriate for this indicator. Wilson (2005) indicated that one of the 80 scoring guidepost was not met because "within the Fraser and outside of the Fraser there are persistent concerns regarding the quality of catch monitoring in First Nations food social and ceremonial fisheries". In addition to these concerns regarding catch monitoring, the Team has concerns regarding the results from the ongoing processes to define the conservation units and management objectives for Fraser sockeye stocks under the Fraser River Sockeye Spawning Initiative and the WSP. These processes need to be completed before we can assess whether these objectives are consistent with MSC criteria. On a separate issue, there are significant concerns regarding the data on the bycatch and mortality of sturgeon in Fraser River sockeye fisheries. The Team's score was 75.

Condition 24 - Certification will be conditional until a clear set of management objectives has been defined and found to be consistent with MSC criteria and measures are taken to reduce the bycatch of sturgeon and improve the monitoring systems used to estimates sturgeon bycatch. Both of these tasks should be completed within two years. (**Fraser Condition #3.1**).

Indicator 3.1.4: When dealing with uncertainty, the management system provides for utilizing the best scientific information available to manage the fishery, while employing a precautionary approach.

100 Scoring Guidepost

- The management system provides for the routine assessment of the level of uncertainty in the information collected for management and establishes management controls to address these uncertainties using the best available scientific information and a precautionary approach.
- The management system implements research efforts to address data gaps.
- For newly developing fisheries for which there is very limited data and information, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system always quantitatively evaluates the effect of implementation uncertainty (the tendency for actual harvest rates or escapements to differ from those intended by the management regulations) on the effectiveness of the proposed management actions.

80 Scoring Guidepost

- The management system provides for some assessment of the level of uncertainty in the information collected for management and establishes management controls which take into account these uncertainties, using the best available scientific information and a precautionary approach.
- In situations when precautionary measures are necessary to manage the fishery, the management system calls for increasing research efforts in order to fill data and information gaps.
- In most cases where there are newly developing fisheries, the management system implements controls on the development of the fishery that are precautionary in nature.

- The management system considers the effect of implementation uncertainty on the effectiveness of most of the proposed management actions.

60 Scoring Guidepost

- The management system for the majority of newly developing fisheries is consistent with a precautionary approach.
- The management system considers the effect of implementation uncertainty on the effectiveness of the majority of the proposed management actions.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.13) suggested that a score of 100 was appropriate for this indicator. Wilson (2005) indicated that one of the 80 scoring guidepost was not met because "DFO does not always manage in a precautionary manner, or use the best scientific advice". The Team agreed that DFO has not always managed in a precautionary manner and has not shown a clear commitment to define and implement action plans for two sockeye stocks (Cultus and Sakinaw) where precautionary measures are necessary to manage Fraser sockeye fisheries. The Team's score was 77.

Condition 25 - Certification will be conditional until the management agency provides a clear commitment to implement recovery action plans for Cultus and Sakinaw sockeye, within one year (**Fraser Condition #3.2**).

Indicator 3.1.8: The management system provides for socioeconomic incentives for sustainable fishing.

100 Scoring Guidepost

- The management system has formal procedure for providing social and economic incentives to stakeholders in the fishery to develop and utilize sustainable fishing practices, particularly the development of selective fishing gear and practices that lead to improved conservation.
- The management system creates strong incentives for harvesters to not exceed target catches or exploitation rates.
- The stakeholders in the fishery regularly avail themselves of the opportunity to utilize these incentives.
- Evidence provided by the management system demonstrates that such incentives have contributed to improved conservation.
- The management system continually attempts to understand the impact of their decisions on social and economic factors affecting the stakeholders in the fishery and regularly takes action to mitigate the impacts on stakeholders.

80 Scoring Guidepost

- 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
- The management system includes a program to create incentives for harvesters to not exceed target catches or exploitation rates.
- Evidence demonstrates that the stakeholders in the fishery have used such incentives.

- The management system attempts to understand the impact of their management decisions on social and economic factors affecting the major stakeholders in the fishery and takes action to lessen the major impacts on stakeholders.

60 Scoring Guidepost

- The management system provides for the use of social or economic incentives to ensure sustainable fishing.
- The management system attempts to understand the impact of its decisions on social and economic factors affecting the stakeholders in the fishery and is responsive to requests to reduce these impacts.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.20) suggested that a score of 97 was appropriate for this indicator. Wilson (2005) agreed with DFO's assessment that all scoring guideposts were met except one at the 100SG. The Team found that the second guidepost at the 80SG was only partially met because DFO has not implemented management approaches, such as defined allocations, that create incentives for harvesters to not exceed target catches. First Nation treaties provide an avenue for defining salmon allocations and penalizing those that exceed these limits by reducing their harvest opportunities in future years. The Team's score was 77.

Condition 26 - Certification will be conditional until the management agency provides a clear evidence that measures are being implemented to encourage harvesters not to exceed catch targets or exploitation rate limits, within two years. (**Fraser Condition #3.3**).

MSC Criterion 3.2

The management system provides for a framework for research, the results of which are pertinent to achieving the objectives of management.

Under this criterion we are interested in evaluating whether there is a research component to the management system that is sufficiently broad in scope to include all target species and other components of the ecosystem that may be impacted by fishing, and which provides for the acquisition of information and data to support scientifically- sound management actions, and whether the research is timely, open to review by peers and stakeholders in general, and is adequately funded.

Indicator 3.2.1: The research plan covers the scope of the fishery, includes all target species, accounts for the non-target species captured in association with, or as a consequence of fishing for target species, and considers the impact of fishing on the ecosystem and socioeconomic factors affected by the management program.

100 Scoring Guidepost

- The management system incorporates a research component that considers relevant data and information needs for formulating management strategies for all target species, and also information leading to an understanding of the dynamics of the ecosystem including data on the catch, landings and discards of non-target species.
- The framework for research includes investigations dealing with socioeconomic impacts of the fishery.
- The research plan responds in a timely fashion to unexpected changes in the fishery.

- Funding is secure and sufficient to meet long-term research needs.
- There is significant continuing progress in understanding the impact of the fishery on target and non-target species, and the ecosystem in general.
- Research results form the basis for formulating management strategies and decisions.
- Research is regularly published in peer review journals and/or is reviewed by PSARC or the PSC.

80 Scoring Guidepost

- 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.
- The research plan addresses concerns related to the impact of the fishery on the ecosystem.
- The research plan addresses socioeconomic issues that result from the implementation of management.
- The research plan is responsive to changes in the fishery.
- Funding is adequate to support short-term research needs.
- There is progress in understanding the impact of the fishery on target and non-target species.
- Research results are utilized in forming management strategies.
- Research is reviewed by PSARC or PSC, or other appropriate and technically qualified entities.

60 Scoring Guidepost

- Research provides for the collection of catch statistical and biological data for the target species.
- There has been useful research on the impact of fishing on target and non-target species taken in the fishery, and on the ecosystem in general.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.30) suggested that a score of 95 was appropriate for this indicator. Wilson (2005) indicated that one of the 80 scoring guidepost was not met because "DFO's assessment of non Fraser non-target stocks harvested primarily in Fraser sockeye fisheries (inside sockeye) is inadequate by DFO's own admission." The Team found that three of the 80 scoring guideposts were not met because the lack of any research plan for Fraser sockeye makes it difficult to assess whether the plan addresses concerns related to the impact of the fishery on the ecosystem, socioeconomic issues that result from the implementation of management plans, or if the research plan is responsive to changes in the fishery. The Team's score was 73.

Condition 27 - Certification will be conditional until the management agency provides a research plan that addresses identified concerns related to the impact of the fishery on the ecosystem, with emphasis on non-target stocks, and takes into consideration socioeconomic factors and anticipated changes to fisheries, within two years. (Fraser Condition #3.4).

MSC Criterion 3.4

The management system implements measures to control levels of exploitation in the fishery.

Sub-Criterion 3.4.1: The management system has provisions for controlling levels of exploitation to achieve the escapement and/or harvest rate goals for target stocks, and for the

setting of harvest limits for non-target species, when there is information indicating such limits are necessary.

Under this sub-criterion the issue of whether the management system provides for mechanisms such as closed areas, no take zones, and closed dates and times for placing controls on fisheries to ensure that objectives related to exploitation levels and escapement are achieved is evaluated.

Indicator 3.4.1.2: Provides for restoring depleted target species to specified levels within specified time frames.

100 Scoring Guidepost

- The management system has a formal and codified mechanism, which is adequate for restoring depleted target stocks to the TRP or equivalent high level of abundance, as qualified by relevant environmental factors.
- The mechanism includes strict guidelines for restoring these depleted populations within a certain time frame are formalized by the management system.

80 Scoring Guidepost

- The management system includes measures, which are adequate to restore depleted populations of target stock to the TRP or equivalent high level of abundance as qualified by relevant environmental factors.
- A time schedule for restoration, which considers environmental variability, is determined by the management system.

60 Scoring Guidepost

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

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.42) suggested that a score of 70 was appropriate for this indicator. Wilson (2005) indicated that the 80 scoring guideposts were only partially met because "the status of individual target stocks or CUs are not assessed now, and may not be assessed under the new Wild Salmon Policy". The lack of TRP or equivalent for the depleted Cultus sockeye stock and the lack of a time schedule for recovery suggests that the two 80 guideposts have not been fully met. The recovery plan needs credibility by providing clear restoration guidelines, time frames, and a strategy for incremental changes to management and incremental increases in funding when the time schedule for achieving the TRP is not met. The Team's score was 70.

Condition 28 - Certification will be conditional until the management agency provides TRP's for the Cultus sockeye salmon stock, a clear indication of the commitment to implement the Cultus Sockeye Recovery Plan, and an assessment of the probability of recovery and the timing for recovery for Cultus sockeye, within one year. (**Fraser Condition #3.5**).

MSC Criterion 3.6

Indicator 3.6.1: The fishery is not operated in a unilateral manner in contravention to international agreements.

The DFO submissions are similar for all fisheries and there is no evidence that any of the sockeye fisheries have contravened any international agreements (DFO Fraser 2004c, p. 54-55; DFO Barkley Sound 2004c, p. 45-46; DFO Skeena 2004c, p. 51-53; DFO Nass 2004c, p. 51-53). The Team's scores for this indicator were 100 for each fishery.

Indicator 3.6.2: The fishery is carried out in a manner consistent with all relevant domestic laws and regulations relevant to the fishery.

The DFO submissions were similar for all fisheries and they contended that the sockeye fisheries have been conducted in a manner consistent with all relevant domestic laws and regulations. (DFO Fraser 2004c, p. 55-57; DFO Barkley Sound 2004c, p. 46-47; DFO Skeena 2004c, p. 53-54; DFO Nass 2004c, p. 53-54). The Team has been made aware of instances where each of the sockeye fisheries have not been in full compliance with domestic laws and regulations. Therefore, the one guidepost at the 100SG was only partially met:

- The management system conducts annual assessments of the fisheries compliance with relevant domestic laws and regulations, and these assessments have confirmed full compliance with these laws and regulations.

The Team's scores for this indicator were 90 for each fishery.

Indicator 3.6.3: The management system provides for the observation of legal and customary rights of First Nation peoples.

The DFO submissions were essentially identical for all fisheries and suggested that all guideposts were met for each fishery (DFO Fraser 2004c, p. 57-59; DFO Barkley Sound 2004c, p. 47-49; DFO Skeena 2004c, p. 54-55; DFO Nass 2004c, p. 54-55). The Team found that the Fraser, Barkley Sound and Skeena fisheries did not pass one of the guideposts at the 80SG because of concerns expressed by First Nation representatives regarding their access to sockeye for food, social and ceremonial purposes (see section on scores below 80). It was surprising that the submission for the Nass did not make any reference to the Nisga'a Treaty (a comprehensive land claims treaty which included fishing rights for salmon) which has been in effect since 11 May 2000. The Team found that the successful negotiation and implementation of the Nisga'a Treaty was sound evidence that all guideposts have been met and thus the score for this indicator was 100 for the Nass fishery.

100 Scoring Guidepost

- The management system is in compliance with all major legal and customary rights of First Nation peoples that are impacted by the fishery.
- The management system includes processes for consultation with First Nations peoples on the impact of the commercial fishery on their food, social and ceremonial fisheries.

80 Scoring Guidepost

- 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.
- The management system includes processes for providing information to First Nations peoples on the major impacts of the commercial fishery on their food, social and ceremonial fisheries.

60 Scoring Guidepost

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

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.58) suggested that a score of 100 was appropriate for this indicator. This submission indicates that DFO believes it has met its First Nations obligations to protect and manage for food, social, and ceremonial harvest by First Nations. However, in consultation with First Nations and conservations groups, the assessment team was provided with information indicating that several of the First Nations that harvest Fraser sockeye expressed clear concerns that the management system for Fraser sockeye has not adequately addressed their legal priority rights for FSC fisheries (Wilson 2005) and "is not a transparent process, thus it does not comply with Principle 3 criteria" (see Vol 2: Appendix 4 - Letter from Secwepemc Fisheries Commission dated August 3, 2005). Similar views were expressed by representatives of the BCAFC and Cowichan Tribes. A letter from Chief Kelly of the Soowahlie Band of the Sto:lo First Nation to Minister Thibault of Fisheries and Oceans clearly stated disagreements with the management approach for protection for Cultus and Sakinaw sockeye. The Team's score was 75.

Condition 29 – 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, within three years. (**Fraser Condition #3.6**).

MSC Guidepost 3.7

Fishing operations make use of gear and fishing practices that limit ecosystem impacts.

The DFO submissions for all indicators under MSC Guidepost 3.7 were essentially identical for all fisheries and suggested that all guideposts were met for each fishery (DFO Fraser 2004c, p. 58-67; DFO Barkley Sound 2004c, p. 49-57; DFO Skeena 2004c, p. 56-64; DFO Nass 2004c, p. 56-64). For three of these indicator (3.7.2, 3.7.3 and 3.7.5), the Team agreed with the DFO that the management system has met all the guideposts associated with prohibiting destructive fishing practices, minimizing operational waste and minimizing the impact of fishing methods on habitat. None of the independent reviews identified substantive concerns regarding these indicators (Bocking 2005; Levy 2005; Nelson 2005). Therefore, the Team's scores for Indicators 3.7.2, 3.7.3 and 3.7.5 are 100 for each fishery. The Team's findings regarding the remaining two indicators are provided below.

Indicator 3.7.1: Utilization of gear and fishing practices that minimize both the catch of non-target species, and the mortality of this catch.

The Team found that the Barkley Sound fishery met all the guideposts for this indicator because no issues have been identified regarding the harvests of non-target stocks or species for this fishery. In contrast, the Skeena fishery failed to pass two guideposts at the 80SG because of concerns regarding the catch of non-target species, especially steelhead, and the resistance to implementing more selective fishing techniques (see section on scores below 80). While the management systems for the Fraser and Nass can demonstrate effective use of some selective fishing methods to reduce the catches of non-target species, on going concerns related to steelhead and sturgeon caught in Fraser sockeye fisheries and steelhead and chum caught in Nass sockeye fisheries resulted in partial scores for two guideposts at the 100SG:

- Taking into consideration natural variability in population abundance and the possibility of declining abundance resulting from heavy exploitation, the management system can demonstrate the effective use of these methods by fishers by the existence of downward trends in the catches of non-target species.

- The management system creates incentives to decrease the catch of non-target species (e.g. by providing more fishing time for vessels achieving certain standards for reducing such catches).

The Nass fishery received partial scores for both of these guideposts, resulting in a score of 93 for this indicator. The Fraser fishery received partial scores for the first of the above two guideposts and full socre for the first and third scoring element under the 100SG, resulting in a score of 97 for this indicator

Indicator 3.7.4: The management system solicits the cooperation of the fishing industry and other relevant stakeholders in the collection of data on the catch and discard of non-target species and undersized individuals of target species.

The Team found that all fisheries failed to meet some of the guideposts for this indicator. The Fraser and Skeena fisheries failed to pass the single guidepost at the 80SG because the number of harvesters that comply with requests for data on the catches and discards of non-target species is not sufficient to derive reliable estimates of the total catches and discards for these fisheries (see section on scores below 80). After reviewing the findings of the Skeena ISRP (Walters et al. 2008), the Team concluded that concerns related to the Skeena sockeye fisheries were also relevant for a portion of the Nass sockeye fishery and therefore, the Nass fishery did not pass the two guideposts at the 100SG:

- The majority of fish harvesters and processors are in compliance with management requests for the collection of data on catches and discards of non-target species and undersized individuals of target species.

- Continued improvement in the quality and quantity of catch and discard data is evident.

The Team found that the Barkley Sound fishery met most of the guideposts for this indicator because no issues regarding harvester or processor compliance have been identified for this fishery. The second guidepost at the 100SG was only partially met because the Team was not provided any evidence of improvements in the quality and quantity of catch and discard data. The Team's scores for this indicator were 95 for the Barkley Sound fishery and 80 for the Nass fishery.

100 Scoring Guidepost

- The majority of fish harvesters and processors are in compliance with management requests for the collection of data on catches and discards of non-target species and undersized individuals of target species.
- Continued improvement in the quality and quantity of catch and discard data is evident.

80 Scoring Guidepost

- 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.

60 Scoring Guidepost

- 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.

The management agency's detailed submission for Fraser sockeye (DFO Fraser 2003c, p.42) suggested that a score of 70 was appropriate for this indicator. Wilson (2005) agreed with the DFO assessment for this indicator. However, the Team found that reliable estimates for sturgeon and steelhead bycatch are not available from all harvesters for sockeye fisheries in the lower Fraser River. The Team's opinion is that the catch reporting is sufficient to manage the majority of non-target species harvested. While it is important that the catch reporting be improved for Fraser sturgeon and steelhead caught in Fraser sockeye fisheries, these species do not represent the majority of the non-target species harvested in Fraser sockeye fisheries. The Team's score was 70.

Condition 30 – Same as Condition 17. Certification will be conditional until the management agency provides reasonable estimates of the harvest of white sturgeon and steelhead, by May 2012. (**Fraser Condition #3.7**).

Barkley Sound Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 3 indicator and criteria is provided in Table 10.3.3. The assessment team did not rescore any Barkley Sound Principle 3 performance indicators in June 2008.

The following points describe the Principle 3 highlights for Barkley Sound sockeye:

1. most components of the management systems in place for Barkley Sound sockeye are consistent with MSC principles and criteria;
2. the consultation process was found to be completely consistent with our evaluation criteria;
3. the management system includes effective measures to control levels of harvest for each fisheries;
4. the management system includes an extensive internal review process for assessing management actions, fisheries recommendations and resolving disputes;

5. Barkley Sound sockeye fisheries were found to be compliant with international agreements, and domestic laws; and
6. fishing gear and practices were generally found to be consistent with MSC criteria.

Table 10.3.3: Summary of the evaluations for each Principle 3 criteria and indicator for the Barkley Sound sockeye fishery.

Summary for Barkley Sound Sockeye July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	100																
Indicator 3.1.2	Periodic assessment of biological status	100																
Indicator 3.1.3	Identify the impact of fishing on the ecosystem	95	P			P												
Indicator 3.1.4	Uses best information and precautionary approach	77		P	na	P			P	na				na				
Indicator 3.1.5	Responses to new information are timely and adaptive	100																
Indicator 3.1.6	Responsive to social and economic impact of fishery	90																
Indicator 3.1.7	Useful and relevant information to decision makers	90		P														
Indicator 3.1.8	Socioeconomic incentives for sustainable fishing	77	P	P					P									
Criterion 3.2 - Framework for research pertinent to management																		
Indicator 3.2.1	Research plan for target and non-target species	73																
Indicator 3.2.2	Research is timely, available and reviewed	90																
Criterion 3.3 - Transparency in operations and consultation process																		
Indicator 3.3.1	Open consultations process	100																
Criterion 3.4 - Measure to control levels of harvest																		
Subcriterion 3.4.1 - Catch and exploitation levels																		
Indicator 3.4.1.1	Firshery control systems including no-take zones	100																
Indicator 3.4.1.2	Measures to restore depleted fish populations	85		P														
Subcriterion 3.4.2 - Ensure that conservation objectives are met.																		
Indicator 3.4.2.1	Compliance provisions (effective enforcement)	98			P													
Indicator 3.4.2.2	Monitoring provisions	100																
Criterion 3. 5 - Regular and timely review of management system																		
Indicator 3.5.1	Internal review	100																
Indicator 3.5.2	External review	87																
Indicator 3.5.3	Recommendations from reviews incorporated	95	P															
Indicator 3.5.4	Mechanism for resolving disputes	80																
Criterion 3.6 - Compliance with legal and administrative requirements																		
Indicator 3.6.1	Compliance with international agreements	100																
Indicator 3.6.2	Compliance with domestic laws and regulations	90	P															
Indicator 3.6.3	Observes legal and customary (First Nation) rights	75						P										
Fisheries Operational Famework																		
Criterion 3.7 - Ecosystem sensitive gear and fishing practices																		
Indicator 3.7.1	Avoid catch and minimize mortality of non-target species	100																
Indicator 3.7.2	No distructive fishing practices	100																
Indicator 3.7.3	Minimize operational waste	100																
Indicator 3.7.4	Cooperation of fishers	95		P														
Indicator 3.7.5	Fishing methods minimize impacts on habitat	100																

Barkley Sound Sockeye – Performance Indicators scoring <80

Indicator 3.1.4: When dealing with uncertainty, the management system provides for utilizing the best scientific information available to manage the fishery, while employing a precautionary approach.

100 Scoring Guidepost

- The management system provides for the routine assessment of the level of uncertainty in the information collected for management and establishes management controls to address these uncertainties using the best available scientific information and a precautionary approach.
- The management system implements research efforts to address data gaps.
- For newly developing fisheries for which there is very limited data and information, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system always quantitatively evaluates the effect of implementation uncertainty (the tendency for actual harvest rates or escapements to differ from those intended by the management regulations) on the effectiveness of the proposed management actions.

80 Scoring Guidepost

- The management system provides for some assessment of the level of uncertainty in the information collected for management and establishes management controls which take into account these uncertainties, using the best available scientific information and a precautionary approach.
- In situations when precautionary measures are necessary to manage the fishery, the management system calls for increasing research efforts in order to fill data and information gaps.
- In most cases where there are newly developing fisheries, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system considers the effect of implementation uncertainty on the effectiveness of most of the proposed management actions.

60 Scoring Guidepost

- The management system for the majority of newly developing fisheries is consistent with a precautionary approach.
- The management system considers the effect of implementation uncertainty on the effectiveness of the majority of the proposed management actions.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003c, p.8) suggested that a score of 100 was appropriate for this indicator. Nelson (2005) agreed with the DFO scoring for this indicator. However, the Team found that the management agency has not shown a clear commitment to define and implement action plans and increase research efforts to fill data gaps for the depleted Henderson Lake sockeye stock. The Team's score was 77.

Condition 31 – Same as Condition 20. (**Barkley Sound Condition #3.1**).

Indicator 3.1.8: The management system provides for socioeconomic incentives for sustainable fishing.

100 Scoring Guidepost

- The management system has formal procedure for providing social and economic incentives to stakeholders in the fishery to develop and utilize sustainable fishing practices, particularly the development of selective fishing gear and practices that lead to improved conservation.
- The management system creates strong incentives for harvesters to not exceed target catches or exploitation rates.
- The stakeholders in the fishery regularly avail themselves of the opportunity to utilize these incentives.
- Evidence provided by the management system demonstrates that such incentives have contributed to improved conservation.
- The management system continually attempts to understand the impact of their decisions on social and economic factors affecting the stakeholders in the fishery and regularly takes action to mitigate the impacts on stakeholders.

80 Scoring Guidepost

- 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.
- The management system includes a program to create incentives for harvesters to not exceed target catches or exploitation rates.
- Evidence demonstrates that the stakeholders in the fishery have used such incentives.
- The management system attempts to understand the impact of their management decisions on social and economic factors affecting the major stakeholders in the fishery and takes action to lessen the major impacts on stakeholders.

60 Scoring Guidepost

- The management system provides for the use of social or economic incentives to ensure sustainable fishing.
- The management system attempts to understand the impact of its decisions on social and economic factors affecting the stakeholders in the fishery and is responsive to requests to reduce these impacts.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003c, p.21) suggested that a score of 97 was appropriate for this indicator. Nelson (2005) suggested that two of the 80 scoring guideposts were not met because "it does not appear as there are incentives developed (penalties exist) to encourage compliance". The Team found that the lack of any defined allocations for Barkley Sound sockeye makes it virtually impossible to discourage harvesters from exceeding catch targets or exploitation rate limits. As indicated for Fraser sockeye, First Nation treaties provide an avenue for defining salmon allocations and penalizing those that exceed these limits by reducing their harvest opportunities in future years. The Team's score was 77.

Condition 32 - Certification will be conditional until the management agency provides clear evidence that measures are being implemented to encourage harvesters not to exceed catch targets or exploitation rate limits, within two years. (**Barkley Sound Condition #3.2**).

Indicator 3.2.1: The research plan covers the scope of the fishery, includes all target species, accounts for the non-target species captured in association with, or as a

consequence of fishing for target species, and considers the impact of fishing on the ecosystem and socioeconomic factors affected by the management program.

100 Scoring Guidepost

- The management system incorporates a research component that considers relevant data and information needs for formulating management strategies for all target species, and also information leading to an understanding of the dynamics of the ecosystem including data on the catch, landings and discards of non-target species.
- The framework for research includes investigations dealing with socioeconomic impacts of the fishery.
- The research plan responds in a timely fashion to unexpected changes in the fishery.
- Funding is secure and sufficient to meet long-term research needs.
- There is significant continuing progress in understanding the impact of the fishery on target and non-target species, and the ecosystem in general.
- Research results form the basis for formulating management strategies and decisions.
- Research is regularly published in peer review journals and/or is reviewed by PSARC or the PSC.

80 Scoring Guidepost

- 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.
- The research plan addresses concerns related to the impact of the fishery on the ecosystem.
- The research plan addresses socioeconomic issues that result from the implementation of management.
- The research plan is responsive to changes in the fishery.
- Funding is adequate to support short-term research needs.
- There is progress in understanding the impact of the fishery on target and non-target species.
- Research results are utilized in forming management strategies.
- Research is reviewed by PSARC or PSC, or other appropriate and technically qualified entities.

60 Scoring Guidepost

- Research provides for the collection of catch statistical and biological data for the target species.
- There has been useful research on the impact of fishing on target and non-target species taken in the fishery, and on the ecosystem in general.

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003c, p.23) suggested that a score of 95 was appropriate for this indicator. Nelson (2005) suggested that three of the 80 scoring guideposts were not met because of deficiencies in the research related to fishery impacts on marine mammals and understanding Henderson Lake sockeye. The Team found that the lack of any research plan for Barkley Sound sockeye makes it difficult to assess whether the plan addresses concerns related to the impact of the fishery on the ecosystem, socioeconomic issues that result from the implementation of management plans, or if the research plan is responsive to changes in the fishery. The Team's score was 73.

Condition 33 - Certification will be conditional until the management agency provides a research plan that addresses identified concerns related to the impact of the fishery on the ecosystem, with emphasis on non-target stocks, and takes into consideration socioeconomic factors and anticipated changes to fisheries. These tasks should be completed in three years (**Barkley Sound Sockeye Condition #3.3**).

Indicator 3.6.3: The management system provides for the observation of legal and customary rights of First Nation peoples.

100 Scoring Guidepost

- The management system is in compliance with all major legal and customary rights of First Nation peoples that are impacted by the fishery.
- The management system includes processes for consultation with First Nations peoples on the impact of the commercial fishery on their food, social and ceremonial fisheries.

80 Scoring Guidepost

- 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.
- The management system includes processes for providing information to First Nations peoples on the major impacts of the commercial fishery on their food, social and ceremonial fisheries.

60 Scoring Guidepost

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

The management agency's detailed submission for Barkley Sound sockeye (DFO Barkley Sound 2003c, p.48-49) suggested that a score of 100 was appropriate for this indicator. The submissions by the client indicate that DFO believes it has met its First Nations obligations to protect and manage for food, social, and ceremonial harvest by First Nations. However, in consultation with First Nations and conservations groups, the Team was provided with information suggesting that several of the First Nations that harvest Barkley Sound sockeye would not agree the management system is in compliance with all the legal and most of the customary rights of First Nation peoples that are impacted by the Barkley Sound sockeye fishery. Nelson (2005) did not score this indicator. The Team found that the first guidepost at the 80SG was not met and thus the Team's score was 75.

Condition 34 – Same as Condition 29. (**Barkley Sound Condition #3.4**).

Skeena Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 3 indicator and criteria is provided in Table 10.3.4. The assessment team rescored seven Skeena River Principle 3 performance indicators in June 2008.

The following points describe the Principle 3 highlights for Skeena sockeye:

1. the management systems in place for Skeena sockeye are consistent with MSC principles and criteria;
2. the consultation process was found to be completely consistent with our evaluation criteria;
3. the management system includes effective measures to control levels of harvest for each fishery;
4. the management system includes an internal review process for assessing management actions, fisheries recommendations and resolving disputes;
5. Skeena sockeye fisheries were found to be compliant with international agreements, and domestic laws. and
6. fishing gear and practices were found to be consistent with MSC criteria.

Table 10.3.4: Summary of the evaluations for each Principle 3 criteria and indicator for the Skeena sockeye fishery.

Summary for Skeena Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
			1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	78		P							P							
Indicator 3.1.2	Periodic assessment of biological status	100																
Indicator 3.1.3	Identify the impact of fishing on the ecosystem	95	P			P												
Indicator 3.1.4	Uses best information and precautionary approach	77		P	na	P			P	na				na				
Indicator 3.1.5	Responses to new information are timely and adaptive	100																
Indicator 3.1.6	Responsive to social and economic impact of fishery	90																
Indicator 3.1.7	Useful and relevant information to decision makers	75	P						P									
Indicator 3.1.8	Socioeconomic incentives for sustainable fishing	96	P	P														
Criterion 3.2 - Framework for research pertinent to management																		
Indicator 3.2.1	Research plan for target and non-target species	73						P				P						
Indicator 3.2.2	Research is timely, available and reviewed	90																
Criterion 3.3 - Transparency in operations and consultation process																		
Indicator 3.3.1	Open consultations process	100																
Criterion 3.4 - Measure to control levels of harvest																		
Subcriterion 3.4.1 - Catch and exploitation levels																		
Indicator 3.4.1.1	Firshery control systems including no-take zones	100																
Indicator 3.4.1.2	Measures to restore depleted fish populations	85		P														
Subcriterion 3.4.2 - Ensure that conservation objectives are met.																		
Indicator 3.4.2.1	Compliance provisions (effective enforcement)	98				P												
Indicator 3.4.2.2	Monitoring provisions	100																
Criterion 3. 5 - Regular and timely review of management system																		
Indicator 3.5.1	Internal review	100																
Indicator 3.5.2	External review	87																
Indicator 3.5.3	Recommendations from reviews incorporated	95	P															
Indicator 3.5.4	Mechanism for resolving disputes	80																
Criterion 3.6 - Compliance with legal and administrative requirements																		
Indicator 3.6.1	Compliance with international agreements	100																
Indicator 3.6.2	Compliance with domestic laws and regulations	90	P															
Indicator 3.6.3	Observes legal and customary (First Nation) rights	75						P										
Fisheries Operational Famework																		
Criterion 3.7 - Ecosystem sensitive gear and fishing practices																		
Indicator 3.7.1	Avoid catch and minimize mortality of non-target species	73		P	P				P	P								
Indicator 3.7.2	No distructive fishing practices	100																
Indicator 3.7.3	Minimize operational waste	100																
Indicator 3.7.4	Cooperation of fishers	60																
Indicator 3.7.5	Fishing methods minimize impacts on habitat	100																

Skeena Sockeye – Performance Indicators scoring <80

Indicator 3.1.1: The management system has a clear and defensible set of objectives for the harvest and escapement for target species and accounts for the non-target species captured in association with, or as a consequence of, fishing for target species.

100 Scoring Guidepost

- Management objectives are clearly defined for all of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are precisely set for each target stock unit in the fishery, as qualified by relevant environmental factors.
- Target Reference Points and Limit Reference Points are clearly defined and documented for each target stock unit in the fishery.
- Harvest controls are effective with respect to the attainment of management objectives for each target stock unit in the fishery.
- The management system provides estimates for all catches, landings and bycatch.

80 Scoring Guidepost

- Management objectives are clearly defined for most of the target stocks and are consistent with the MSC criteria for a well-managed fishery.
- Harvest rates and escapement goals are set for target stocks or target species in the fishery, as qualified by relevant environmental factors.
- Harvest controls are precise and effective for major target stocks or target species in the fishery.
- The management system provides estimates for all major catches, landings, and bycatch.

60 Scoring Guidepost

- Management objectives are clearly defined and consistent with MSC criteria for a well-managed fishery for the majority of target stocks.
- Harvest controls are effective for the majority of the fisheries on target stocks.
- The management system provides for the estimation of catch, landing, and bycatch for the majority of the fisheries.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.4) suggested that a score of 98 was appropriate for this indicator. Bocking (2005) suggested that the two of the 80SG were not met because environment factors have not been considered when setting harvest rates and escapement goals for the target stocks and harvest controls are not precise. The Team found that the information provided by DFO was sufficient to pass the first three guideposts at the 80SG but not the fourth guidepost. After a detail review of all the methods used to estimate catch or exploitation rates for Skeena steelhead stocks, the Skeena ISRP concluded that "The state of affairs today is that we actually have no idea how reliable DFO's estimates of steelhead exploitation rates are." Since there is general scientific agreement that the terminal Skeena sockeye fisheries represent a known area of high bycatch for steelhead, there is an urgent need to improve the procedures used to estimate steelhead bycatch. The Team's score was 78.

Condition 35a – Same as new condition 13a. Certification is conditional until the management agencies implement a scientifically defensible program for estimating steelhead catch in the Skeena sockeye fisheries, within two years (**Skeena Condition #3.1a**).

Indicator 3.1.4: When dealing with uncertainty, the management system provides for utilizing the best scientific information available to manage the fishery, while employing a precautionary approach.

100 Scoring Guidepost

- The management system provides for the routine assessment of the level of uncertainty in the information collected for management and establishes management controls to address these uncertainties using the best available scientific information and a precautionary approach.
- The management system implements research efforts to address data gaps.
- For newly developing fisheries for which there is very limited data and information, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system always quantitatively evaluates the effect of implementation uncertainty (the tendency for actual harvest rates or escapements to differ from those intended by the management regulations) on the effectiveness of the proposed management actions.

80 Scoring Guidepost

- The management system provides for some assessment of the level of uncertainty in the information collected for management and establishes management controls which take into account these uncertainties, using the best available scientific information and a precautionary approach.
- In situations when precautionary measures are necessary to manage the fishery, the management system calls for increasing research efforts in order to fill data and information gaps.
- In most cases where there are newly developing fisheries, the management system implements controls on the development of the fishery that are precautionary in nature.
- The management system considers the effect of implementation uncertainty on the effectiveness of most of the proposed management actions.

60 Scoring Guidepost

- The management system for the majority of newly developing fisheries is consistent with a precautionary approach.
- The management system considers the effect of implementation uncertainty on the effectiveness of the majority of the proposed management actions.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.13) suggested that a score of 100 was appropriate for this indicator. Bocking (2005) concurred with the DFO scoring for this indicator. The Team found that the level of uncertainty associated with steelhead catch, escapement and stock status should have been sufficient for the management system to recognize that precautionary measures were necessary to manage the Skeena sockeye fishery and call for increasing efforts to fill information gaps. However, it took significant pressure and funding from outside the management system to initiate just a review of the fishery and information gaps and at the time of the rescoring there had not been a clear commitment from the management agencies to implement the recommendations of the ISRP regarding improved assessments of steelhead catch, escapement and stock status. The Team's score was 77.

Condition 35b – Similar to new condition 13a. Certification is conditional until the management agencies implement a scientifically defensible program for estimating steelhead catch in the Skeena sockeye fisheries and escapement and stock status for Skeena steelhead stocks, to be completed within two years. (**Skeena Condition #3.1b**).

Indicator 3.1.7: The management system provides decision makers with useful and relevant information and advice for managing the fishery.

100 Scoring Guidepost

- The management system provides decision makers with a range of alternatives for achieving the objectives of management, including risk assessments for each alternative.
- All management decisions are based on useful and relevant information and advice that is provided through the management system.
- The management system, whenever possible, provides information to decision makers within a time frame that permits management controls to be determined before they need to be taken.

80 Scoring Guidepost

- The management system provides managers with a range of alternatives for management.
- 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.

60 Scoring Guidepost

- The majority of management decisions rely on data, useful and relevant information, or advice provided through the management system.
- Risk assessments are considered in formulating important management decisions.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.22) suggested that a score of 93 was appropriate for this indicator. Bocking (2005) suggested that the second guidepost at the 60SG was not met because he "could not find any documentation that risk assessments are considered in formulating management decisions". The Team found that the pre-season and in-season analysis of fishing alternative was effectively a basic risk assessment and therefore the fishery passed the 60SG. However, there were clear examples of decisions in 2006 that were not consistent with the information provided. Managers new that there were selective fishing methods that could be used to reduce the impact of the sockeye fishery on steelhead but the management system chose not to require fishers to use these more selective fishing methods and the requirement for functional revival boxes on all gillnet vessels to increase the post-release survival of non-target species was not adequately enforced. The Team's score was 75.

Condition 35c – Certification is conditional until the management agencies and the terminal gillnet fisheries demonstrate their commitment to implement selective fishing and handling techniques that have been shown to increase the post-release survival of non-target species, within one year (**Skeena Condition #3.1c**).

Indicator 3.2.1: The research plan covers the scope of the fishery, includes all target species, accounts for the non-target species captured in association with, or as a consequence of fishing for target species, and considers the impact of fishing on the ecosystem and socioeconomic factors affected by the management program.

100 Scoring Guidepost

- The management system incorporates a research component that considers relevant data and information needs for formulating management strategies for all target species, and also information

leading to an understanding of the dynamics of the ecosystem including data on the catch, landings and discards of non-target species.
- The framework for research includes investigations dealing with socioeconomic impacts of the fishery.
- The research plan responds in a timely fashion to unexpected changes in the fishery.
- Funding is secure and sufficient to meet long-term research needs.
- There is significant continuing progress in understanding the impact of the fishery on target and non-target species, and the ecosystem in general.
- Research results form the basis for formulating management strategies and decisions.
- Research is regularly published in peer review journals and/or is reviewed by PSARC or the PSC.

80 Scoring Guidepost

- 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.
- The research plan addresses concerns related to the impact of the fishery on the ecosystem.
- The research plan addresses socioeconomic issues that result from the implementation of management.
- The research plan is responsive to changes in the fishery.
- Funding is adequate to support short-term research needs.
- There is progress in understanding the impact of the fishery on target and non-target species.
- Research results are utilized in forming management strategies.
- Research is reviewed by PSARC or PSC, or other appropriate and technically qualified entities.

60 Scoring Guidepost

- Research provides for the collection of catch statistical and biological data for the target species.
- There has been useful research on the impact of fishing on target and non-target species taken in the fishery, and on the ecosystem in general.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.29-30) suggested that a score of 95 was appropriate for this indicator. Bocking (2005) suggested that the three of the 80SG were not met because the research plan does not adequately address the impact of the fishery on the ecosystem and socio-economic issues and funding levels are not adequate. The Team's agreed with Mr. Bocking's assessment and found, in addition, that the lack of any research plan for Skeena sockeye fisheries makes it impossible to assess whether the plan addresses concerns related to the impact of the fishery on the ecosystem, socioeconomic issues that result from the implementation of management plans, or if the research plan is responsive to changes in the fishery. The Core Stock Assessment Review for North and Central Coast salmon stocks and the ISRP process identify many of the key elements that should be included in a research plan for Skeena sockeye fisheries. The Team's score was 73.

Condition 35d - Certification will be conditional until the management agency provides a research plan that addresses identified concerns related to the impact of the fishery on the ecosystem, with emphasis on non-target stocks (e.g. Skeena summer-run steelhead), and takes into consideration socioeconomic

factors and anticipated changes to fisheries. This task should be completed by May 2012 (**Skeena Condition #3.1d**).

Indicator 3.6.3: The management system provides for the observation of legal and customary rights of First Nation peoples.

100 Scoring Guidepost

- The management system is in compliance with all major legal and customary rights of First Nation peoples that are impacted by the fishery.
- The management system includes processes for consultation with First Nations peoples on the impact of the commercial fishery on their food, social and ceremonial fisheries.

80 Scoring Guidepost

- 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.
- The management system includes processes for providing information to First Nations peoples on the major impacts of the commercial fishery on their food, social and ceremonial fisheries.

60 Scoring Guidepost

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

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.55) suggested that a score of 100 was appropriate for this indicator. Bocking (2005) suggested that the first guidepost at the 100SG was not met. The submissions by the client indicate that DFO believes it has met its First Nations obligations to protect and manage for food, social, and ceremonial harvest by First Nations. However, in consultation with First Nations and conservations groups, the Team was provided with information suggesting that several of the First Nations that harvest Skeena River sockeye would not agree the management system is in compliance with all the legal and most of the customary rights of First Nation peoples that are impacted by the Skeena River sockeye fishery. The Team's score was 75.

Condition 36a – Same as Condition 29. (**Skeena Condition #3.2a**).

Indicator 3.7.1: Utilization of gear and fishing practices that minimize both the catch of non-target species, and the mortality of this catch.

100 Scoring Guidepost

- There are requirements in the management system to reduce the capture of non-target species, which include:
    - Controlling the use of gear types and fishing practices that result in significant catches of non-target species or undersized individuals of target species, and/or

  - Implementing closed seasons and no-fishing zones during times and in areas where the probability of making significant catches of non-target species or undersized individuals of target species is high, and
  - Holding education programs for the fishing industry and other relevant stakeholders to make them aware of the benefits of using fishing techniques and gear that minimize the catch of non-target species or undersized individuals of target species.
- Taking into consideration natural variability in population abundance and the possibility of declining abundance resulting from heavy exploitation, the management system can demonstrate the effective use of these methods by fishers by the existence of downward trends in the catches of non-target species.
- The management system creates incentives to decrease the catch of non-target species (e.g. by providing more fishing time for vessels achieving certain standards for reducing such catches).

80 Scoring Guidepost

- Through educational programs for members of the fishing industry and other relevant stakeholders, the management system discourages the use of gear types and fishing practices that result in high catches of non-target species or undersized individuals of target species, and encourages them to avoid fishing in areas identified to have high concentrations of non-target species or undersized individuals of target species.
- 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.
- Fishers generally conduct their fishing activity in a manner that is consistent with the goal of reducing the catch of non-target species or undersized individuals of target species.

60 Scoring Guidepost

- 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.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.57-58) suggested that a score of 100 was appropriate for this indicator. Bocking (2005) suggested that the second guidepost at the 80SG was not met because he does not believe that "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". The Team agreed with Mr. Bocking and found that the uncertainties related to the capture and discard rates for non-target species in Skeena sockeye fisheries make it virtually impossible to determine trends in these rates. The continuing resistance to the use of short nets and short sets or tangle tooth nets in the Skeena sockeye gillnet fishery is strong evidence that this fishery is not conducted in a manner that is consistent with the goal of reducing the catch of non-target species. The Team's score was 73.

Condition 36b – Certification will be conditional until there is a clear commitment from the management agency and fishers to identify and implement selective fishing techniques that are consistent with the goal of reducing the catch of non-target species, especially steelhead. These tasks should be completed within two years (**Skeena Condition #3.2b**).

Indicator 3.7.4: The management system solicits the cooperation of the fishing industry and other relevant stakeholders in the collection of data on the catch and discard of non-target species and undersized individuals of target species.

100 Scoring Guidepost

- The majority of fish harvesters and processors are in compliance with management requests for the collection of data on catches and discards of non-target species and undersized individuals of target species.
- Continued improvement in the quality and quantity of catch and discard data is evident.

80 Scoring Guidepost

- 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.

60 Scoring Guidepost

- 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.

The management agency's detailed submission for Skeena sockeye (DFO Skeena 2003c, p.62-63) suggested that a score of 100 was appropriate for this indicator. Bocking (2005) suggested that the 80SG guidepost was only partially met because "there is insufficient monitoring to show continued improvement in the quality and quantity of catch and discard data, at least for steelhead and chum". The Team found that while some harvesters have complied with requests for data on catch and discards of non-target species, it is clear that the number of complying fishers is not sufficient to provide reliable estimates of total catches and discards for steelhead. The Team's score was 60 for this indicator.

Condition 36c – Certification will be conditional until there is a clear commitment from the fishers participating in Skeena sockeye fisheries to provide sufficient information for managers to derive reliable estimates of the catch and discards of steelhead and other non-target species, within two years (**Skeena Condition #3.2c**).

Nass Sockeye – Criterion Summaries

A summary of our evaluations for each Principle 3 indicator and criteria is provided in Table 10.3.5. The assessment team rescored two Principle 3 performance indicator in June 2008.

The following points describe the Principle 3 highlights for Nass sockeye:

1. the management systems in place for Nass sockeye are consistent with MSC principles and criteria;
2. the consultation process was found to be completely consistent with our evaluation criteria;
3. the management system includes effective measures to control levels of harvest for each fisheries;

4. the management system includes an internal and external review process for assessing management actions, fisheries recommendations and resolving disputes;
5. Nass sockeye fisheries were found to be compliant with international agreements, domestic laws and observe the legal and customary rights of First Nations; and
6. fishing gear and practices were found to be consistent with MSC criteria.

Table 10.3.5: Summary of the evaluations for each Principle 3 criteria and indicator for the Nass sockeye fishery.

Summary for Nass Sockeye (July 2009)			Criteria @ 100					Criteria @ 80						Criteria @ 60				
		Score	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5
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	96		P	P													
Indicator 3.1.2	Periodic assessment of biological status	100																
Indicator 3.1.3	Identify the impact of fishing on the ecosystem	95	P			P												
Indicator 3.1.4	Uses best information and precautionary approach	100			na					na				na				
Indicator 3.1.5	Responses to new information are timely and adaptive	100																
Indicator 3.1.6	Responsive to social and economic impact of fishery	95																
Indicator 3.1.7	Useful and relevant information to decision makers	93																
Indicator 3.1.8	Socioeconomic incentives for sustainable fishing	100																
Criterion 3.2 - Framework for research pertinent to management																		
Indicator 3.2.1	Research plan for target and non-target species	96		P		P												
Indicator 3.2.2	Research is timely, available and reviewed	95																
Criterion 3.3 - Transparency in operations and consultation process																		
Indicator 3.3.1	Open consultations process	100																
Criterion 3.4 - Measure to control levels of harvest																		
Subcriterion 3.4.1 - Catch and exploitation levels																		
Indicator 3.4.1.1	Firshery control systems including no-take zones	100																
Indicator 3.4.1.2	Measures to restore depleted fish populations	95		P														
Subcriterion 3.4.2 - Ensure that conservation objectives are met.																		
Indicator 3.4.2.1	Compliance provisions (effective enforcement)	100																
Indicator 3.4.2.2	Monitoring provisions	100																
Criterion 3. 5 - Regular and timely review of management system																		
Indicator 3.5.1	Internal review	100																
Indicator 3.5.2	External review	100																
Indicator 3.5.3	Recommendations from reviews incorporated	100																
Indicator 3.5.4	Mechanism for resolving disputes	90	P	P	P													
Criterion 3.6 - Compliance with legal and administrative requirements																		
Indicator 3.6.1	Compliance with international agreements	100																
Indicator 3.6.2	Compliance with domestic laws and regulations	90	P															
Indicator 3.6.3	Observes legal and customary (First Nation) rights	100																
Fisheries Operational Famework																		
Criterion 3.7 - Ecosystem sensitive gear and fishing practices																		
Indicator 3.7.1	Avoid catch and minimize mortality of non-target species	93		P	P													
Indicator 3.7.2	No distructive fishing practices	100																
Indicator 3.7.3	Minimize operational waste	100																
Indicator 3.7.4	Cooperation of fishers	80																
Indicator 3.7.5	Fishing methods minimize impacts on habitat	100																

11.0 Tracking, Tracing Fish and Fish Products

MSC Chain of Custody requirements were only checked as far as the landing of fish on board legally licensed fishing vessels and found to be compliant with MSC requirements. Further chain of custody assessments were not conducted for any of the fish moving from boat deck into the processing segment of the fishery either onboard or at shoreside processors. It is highly recommended that any Chain of Custody certificates issued for product originating from this fishery also examine fish ticket data as part of ensuring that the fish products displaying the MSC logo are properly verified.

11.1 Target Eligibility Date

As required by MSC Policy Advisory 4, TAVEL Certification and the BC Sockeye certification clients have agreed that the eligibility date for this certification is January 17, 2009, (six months prior to the July 17, 2009 date of publication of the Public Draft report). All client companies wishing to sell certified product must have a valid Chain of Custody certification prior to the back dating of product eligibility and labeling of product as MSC certified.

12.0 Peer Review, Public Comment, and Objections

A list of potential peer reviews was negotiated with the client, the government, and stakeholders. The list of agreed peer reviewers was posted for comment as required by the MSC. Two peer reviews, Dr. Greg Ruggerone and Mr. Ray Beamesderfer, were chosen based on MSC experience requirements.

The public comment period for the Public Draft Report was conducted from July 17 to August 24, 2009. Stakeholder comments were received from a variety of ENGO groups, First Nation organizations, recreational fishing organizations and individuals. The comments and responses can be found in Volume 2 of this report.

Upon publication of this Final Certification Report, stakeholders will have 15 days to review the decision and to lodge an official objection regarding the outcome. Information on lodging an official objection can be attained from the MSC website (www.msc.org) or by contacting a regional MSC office.

13.0 Certification Recommendations

The overall performance of the four BC Sockeye Salmon fisheries is identified in Tables 10.1.1, 10.2.1 and 10.3.1 above. It is the assessment Team's consensus judgment that the management of the BC sockeye fisheries complies with the MSC's requirements for achieving certification for all 4 units of certification as the following performance criteria have been met:

1. Each MSC Principle has an aggregated, weighted score higher than the required score of 80.
2. No individual performance indicator had a score below 60.
3. The client has agreed to improve the fishery management performance for all performance indicators which had scores below 80 and above 60.

4. TAVEL Certification has received and accepted a Corrective Action Plan (see Vol 2: Appendix 6).

TAVEL Certification recommends that each unit of certification be issued a fishery certificate pending proof of a contractual agreement between the applicant and an accredited certification body that assures the applicant will continue to comply with all specified conditions, all required surveillance audits, and all other responsibilities under the MSC program.

The following table displays the scores achieved by the four candidate fisheries.

Table 13.1 Four candidate fisheries scores and number of conditions issued

	Fraser		Barkley Sound		Skeena		Nass	
MSC Principle	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**	**Fishery Scores**	**Number of Conditions Issued**
Principle 1	83.4	8	86.1	4	82.2	5	91.6	2
Principle 2	82.3	2	88.9	1	85.3	2	88.8	1
Principle 3	87.4	7	91.3	4	87.4	7	97.1	0

A 15 day objection period will now be conducted as required by the MSC Fisheries Certification Methodology. During this period, stakeholders who have participated in the fishery assessment can submit an ojection in relation to the certification recommendation contained herein.

14.0 Requirements for Continued Certification

The client, BCSMC, must agree in written contract with an accredited MSC certification body to meet the specific conditions as described in Section 8 of this report (within the agreed timelines identified in the DFO Corrective Action Plan in Vol 2: Appendix 6).

The client must agree in written contract to be financially and technically responsible for surveillance visits by an MSC accredited certification body, which would occur at a minimum of once a year, or more often at the discretion of the certification body (based on the applicant's action plan or by previous findings by the certification body from annual surveillance audits or other sources of information).

The contract must be in place prior to certification being awarded. Surveillance audits will be comprised in general of (1) checking on compliance with the agreed action plan for meeting pre-specified 'Conditions', and (2) sets of selected questions that allow the certifier to determine whether the fishery is being maintained at a level of performance similar to or better than the performance recognized during the initial assessment.

15.0 MSC Logo Licensing Responsibilities

As the "applicant" (BCSMC) for certification of the BC sockeye fisheries, BCSMC is the only entity that has the right to apply for a license to use the MSC logo. It is also the case that BCSMC has the right to approve the use of the logo for others associated with the fishery at its discretion.

16.0 Conclusion

The TAVEL Certification Assessment team concludes that all aspects of the MSC Fisheries Certification Methodology procedures were followed, that the four BC sockeye fisheries meet the requirements of the MSC Principles and Criteria as a well managed and sustainable fishery.

17.0 References

Alexander, R., K.K. English, D. Peacock, and G. Oliver. 2009. Assessment of the Canadian and Alaskan Sockeye Stocks harvested in the northern boundary fisheries using run reconstruction techniques, 2004-07. Draft report for Pacific Salmon Comm. Northern Boundary Technical Committee.

Bocking, R. C. 2005. Review of MSC certification evaluation of Skeena sockeye stocks. Prepared for the Sierra Club of Canada, BC Chapter. 19 p.

Bocking. R.C., M.R. Link, B. Baxter, B. Nass and L. Jantz. 2002. Meziadin Lake biological escapement goal and considerations for increasing yield of sockeye salmon. Canadian Science Advisory Secretariat, Research Document 2002/124. 55p.

Bradford, M., and C. Wood. 2004. A review of biological principles and methods involved in setting minimum population sizes and recovery objectives for the September 2004 drafts of the Cultus and Sakinaw Lake sockeye salmon and Interior Fraser coho salmon recovery plans. DFO Can. Sci. Advis. Sec. Res. Doc. 2004/128.

Cass, A. 2002. Pre-Season Run Forecast for Fraser River Sockeye and Pink Salmon in 2003. CSAS, DFO Research Document 2002/116.

Cox-Rogers, S., J.M.B. Hume, and K.S. Shortreed. 2004. Stock status and lake-based production relationships for wild Skeena River sockeye salmon. Fisheries and Oceans Canada CSAS Research Document 2004/10.

DFO Barkley Sound. 2004a. Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Barkley Sound Sockeye. Fisheries and Oceans Canada. 37p.

DFO Barkley Sound. 2004b. Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Barkley Sound Sockeye. Fisheries and Oceans Canada. 19p.

DFO Barkley Sound. 2004c. Response to Marine Stewardship Council Indicators for Principle 3 – Fisheries Management System, Pacific Wild Salmon Fishery, Barkley Sound Sockeye. Fisheries and Oceans Canada. 57p.

DFO Fraser. 2004a. Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Fraser River Sockeye. Fisheries and Oceans Canada. 36p.

DFO Fraser. 2004b. Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Fraser River Sockeye. Fisheries and Oceans Canada. 26p.

DFO Fraser. 2004c. Response to Marine Stewardship Council Indicators for Principle 3 – Fisheries Management System, Pacific Wild Salmon Fishery, Fraser River Sockeye. Fisheries and Oceans Canada. 67p.

DFO Nass. 2004a. Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Nass River Sockeye. Fisheries and Oceans Canada. 25p.

DFO Nass. 2004b. Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Nass River Sockeye. Fisheries and Oceans Canada. 23p.

DFO Nass. 2004c. Response to Marine Stewardship Council Indicators for Principle 3 – Fisheries Management System, Pacific Wild Salmon Fishery, Nass River Sockeye. Fisheries and Oceans Canada. 64p.

DFO Skeena. 2004a. Response to Marine Stewardship Council Indicators for Principle 1 – Stock Assessment and Stock Status, Pacific Wild Salmon Fishery, Skeena River Sockeye. Fisheries and Oceans Canada. 27p.

DFO Skeena. 2004b. Response to Marine Stewardship Council Indicators for Principle 2 – Ecosystem Impacts, Pacific Wild Salmon Fishery, Skeena River Sockeye. Fisheries and Oceans Canada. 24p.

DFO Skeena. 2004c. Response to Marine Stewardship Council Indicators for Principle 3 – Fisheries Management System, Pacific Wild Salmon Fishery, Skeena River Sockeye. Fisheries and Oceans Canada. 64p.

DFO, 2009. Fraser Sockeye Escapement Strategy 2009. Model Overview and Summary of 2009 Planning Simulations. Prepared by Fisheries and Oceans, Canada. June 12, 2009. 29 p.

Dobson, D and C. Wood. 2004. Status Review of “Inside” Sockeye Stocks – those adjacent to the Strait of Georgia, North-Eastern Vancouver Island and the Southern Mainland. In DFO, 2004. Proceedings of the PSARC Salmon Subcommittee Meeting, December 6-7, 2004. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2004-036. 17 p.

English, K.K., W.J. Gazey and J.A. Taylor. 1984. Part C. The 1983 North Coast Salmon Tagging Project. In: Gazey, W.J. and D.A. Birdsall (eds.). Design and execution of a stock interception study. Unpubl. Rep. by LGL Limited for Fisheries and Oceans Canada. 115 p.

English, K.K., W. J. Gazey, D. Peacock, and G. Oliver. 2004. Assessment of the Canadian and Alaskan Sockeye Stocks harvested in the northern boundary fisheries using run reconstruction techniques, 1982-2001. Pacific Salmon Comm. Tech. Rep. No. 13:93 p.

English, K.K., R. Alexander, D. Peacock, and G. Oliver. 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 Comm. Northern Boundary Technical Committee. 59 p.

English, K.K., D. Peacock and B. Spilsted. 2006. North and central coast core stock assessment program for salmon. Prepared by LGL Limited for the Pacific Salmon Foundation and Fisheries and Oceans Canada. 78 pp.

Gable J. and S. Cox-Rogers. 1993. Stock Identification of Fraser River Sockeye Salmon: Methodology and Management Application. Pacific Salmon Commission, Technical Report No. 5.

Gazey, W.J. and K.K. English. 2000. Assessment of sockeye and pink salmon stocks in the northern boundary area using run reconstruction techniques, 1982-95. Can. Tech. Rep. Fish. Aquat. Sci. No. 2320. 132 p.

Hill, A. 2007. Critical Review of the Marine Stewardship Council Draft Assessment of Skeena and Nass River Sockeye Fisheries, prepared by Aaron Hill for Watershed Watch Salmon Society, November 2007. 49 p.

Hill, A. 2009a. Key Deficiencies in the MSC Re-Assessments of Skeena and Nass Commercial Sockeye Fisheries, prepared by Aaron Hill, Watershed Watch Salmon Society, August 2009. 5 p. (Hill 2009a)

Hill, A. 2009b. Comments on the DFO Action Plan for Conditional MSC Certification of Skeena River Sockeye Salmon, prepared by Aaron Hill, for Skeena Wild Conservation Trust and Watershed Watch Salmon Society, January 2009. 10 p.

Holtby, L.B., and K.A. Ciruna. 2007. Conservation units for Pacific salmon under the Wild Salmon Policy. Canadian Science Advisory Secretariat, Research Document 2007/070.

Johnston, N.T., E.A. Parkinson, A.F. Tautz, and B.R. Ward. 2002. A conceptual framework for the management of steelhead, Oncorhynchus mykiss. Province of BC, Fisheries Branch, Fisheries Project Report No. RD101. 21 pp.

Lakelse Lake Sockeye Recovery Plan. 2005. Recovering Lakelse Lake Sockeye Salmon – Lakelse Lake Sockeye Recovery Plan prepared by Lakelse Watershed Society, Kitselas First Nation, Terrace Salmonid Enhancement Society, BC Ministry of Water, Land and Air Protection, BC Timber Sales, and Fisheries and Oceans Canada. 18 p.

Lapointe, M. 2008. Pacific Salmon Commission's Response to IUCN's Status Assessment of Fraser Sockeye. Prepared for the Pacific Salmon Commission. 9 p.

Levy, D. 2005. Independent review of Nass River sockeye fishery performance measures. Prepared for the Sierra Club of Canada, BC Chapter. 51 p.

May, B., D. Leadbitter, M. Sutton and M. Weber. 2003. The Marine Stewardship Council (MSC). In. Phillips *et al.* (Eds). Eco-labelling in Fisheries: What is it all about? Pp 14 – 33. Oxford: Blackwell Science. 2003.

Nelson J.R. 2005. Marine Stewardship Council evaluation of the Barkley Sound sockeye fishery. Assessment of the Department of Fisheries and Ocean's response to the Marine Stewardship Council's principles of sustainable fishing. Prepared for the Sierra Club of Canada, BC Chapter. 48 p.

Shortreed, K.S., J.M.B. Hume, and C.C. Wood. 1997. Recommended escapements to secondary sockeye nursery lakes in the Skeena River system. PSARC Working Paper S97-9:48 p.

Skeena Wild Conservation Trust, 2009a. Testing Whether the Draft Public Report and DFO's Action Plan Meets MSC's Principles and Criteria for Sustainability in Regards to the Skeena River Sockeye Fishery. Submitted by Skeena Wild Conservation Trust. 19p.

Skeena Wild Conservation Trust, 2009b. MSC Certification of British Columbia Sockeye Fisheries – Core Issues and Recommendations for the Skeena Unit of Certification. Submitted by Skeena Wild Conservation Trust August 2009. 4 p.

Smith, J.L. and K.H. Morgan, 2005. An Assessment of Seabird Bycatch in Longline and Net Fisheries in British Columbia. Technical Report Series No. 401. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia

Walters, C.J., Lichatowich, J.A., Peterman, R.M. and Reynolds, J.D. 2008. Report of the Skeena Independent Science Review Panel. A report to the Canadian Department of Fisheries and Oceans and the British Columbia Ministry of the Environment. May 15, 2008, 144 p.

Wilson, K. 2005. Independent assessment of British Columbia Salmon Fisheries for Fraser sockeye, Barkley Sound sockeye and Skeena River sockeye. Prepared for the Sierra Club of Canada, BC Chapter. 20 p.

Wilson, K. 2009. Some thoughts on the MSC certification of Fraser sockeye fisheries and the proposed action plan to meet Conditions. Prepared for Watershed Watch Salmon Society. January 2009. 3p.

Wood, C. 1999. Provisional Limit Reference Points for Skeena Sockeye in 1999. Memorandum to R. Kadowaki, Stock Assessment Division, Science Branch, Fisheries and Oceans Canada, Nanaimo, 14 April 1999. 14 p.

Woodey, J.C. 1987. In-season management of Fraser River sockeye (Oncorhynchus nerka): meeting multiple objectives, p. 367-374. In H.D. Smith, L. Margolis, and C.C. Wood [eds] Sock-eye Salmon (Oncorhynchus nerka) Population Biology and Future Management. Can. Spec. Publ. Fish. Aquat. Sci. 96.

Young, J. 2009. Review of the Marine Stewardship Council Draft Assessment of the Barkley Sound Sockeye Fisheries. Prepared by Jeffery Young, David Suzuki Foundation. August 2009. 8 p.

Young, J. and Wilson, K. 2009. Review of the July 2009 Marine Stewardship Council draft assessment of British Columbia Fraser River sockeye salmon fisheries. Prepared by Jeffery Young, David Suzuki Foundation, and Ken Wilson, Watershed Watch Conservation Society. August 2009. 10 p.