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

TABLE OF CONTENTS

INTRODUCTION

The BC Salmon Marketing Council has applied for certification of the BC wild salmon fishery by the Marine Stewardship Council.

In June 2003, the Marine Stewardship Council published its MSC Evaluation Criteria for the BC Salmon Fisheries (which included Units of Certification, Performance Indicators and Scoring Guideposts) describing in detail how the certification process will be conducted[1]. The Marine Stewardship Council has defined 47 Indicators under three Principles.

This document, prepared with staff from Fisheries and Oceans Canada's Coastal BC North Region, is the BCSMC's technical submission on the Principle 2 indicators for Skeena River sockeye. Principle 2 indicators address the impact of the fishery on the marine environment including non-target fish species, marine mammals and seabirds.

The Scoring Guideposts as identified by the MSC have been colour coded to indicate the level of agreement with the statements.

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 Skeena River sockeye fishery.

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.

DFO Response

Current Situation

Fishery monitoring programs including non-target species are described in the 2003/04 Pacific Region Integrated Fisheries Management Plan: Salmon – Northern BC.[2]

---

[1] Marine Stewardship Council. 2003. MSC Evaluation of BC Salmon Fisheries: Units of Certification, Performance Indicators and Scoring Guideposts.

[2] IFMP 2003/04, Section 3.1, pages 13-16, and Section 3.5, pages 16-17.

http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/MPLANS/plans03/salmon/northcoast/html/SalmonNC.htm

Fishery monitoring programs for target and non-target species are obligatory in all fisheries, including Skeena River sockeye marine net fisheries.

Mandatory logbooks, frequent phone-in, and sales slip programs are in place for all commercial fisheries; these include data on other species of fish and seabirds, retained or released, must be recorded. (See sample logbook in 2003/04 IFMP[3]). All fishery notices remind fishermen to report sightings of sea turtles.[4]

Use of the logbook is a condition of license. Fishers can be charged if they fail to comply with correct use of the logbook. There are provisions for self-reporting and observer-reporting. Data are entered into a regional database. A variety of reports derived from these data can be accessed at the following web site.

http://www-sci.pac.dfo-mpo.gc.ca/sa/Commercial/default_e.htm

DFO's plans for fishery monitoring and catch reporting are detailed in its Discussion Paper *Pacific Region Fishery Monitoring and Reporting Framework.*

http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/fisheriesmgmt/reportingframework/monitoringpaper_e.pdf

Log-book, frequent phone-ins and sales slips are mandatory for all commercial salmon fisheries. These would include details for non-target species.[5] Conditions of license (sample attached) describe the details.[6]

Data requirements for "discards, releases, by-catch and other fishery interactions" include observers (intermittent), log books, hails, and harvester surveys.[7]

Weekly aggregate Skeena river sockeye harvest rate goals are set pre-season, and in-season monitoring, using the Skeena Fishery Model, ensures that overall exploitation rates on non-target wild Skeena sockeye stocks are within acceptable limits and that conservation goals are met.

Skeena coho and steelhead exploitation is estimated in-season using the Skeena Fishery Model, with the overall objective of meeting strict conservation goals.[8] Fishing plans are

---

[3] IFMP 2003, Appendix 3.

[4] Fishery Notice. Page 2.

[5] IFMP 2003, Sections 7.2 and 7.3, page 57.

[6] See Conditions of Licence, Section 6.

[7] Fishery Monitoring & Reporting Framework. Table, page 12, Item 2 .

designed to keep exploitation rates on stocks of concern within the limits described in the conservation objectives of the IFMP.[9] If stock levels drop below acceptable levels, specific conservation objectives are developed for newly identified stocks of concern.[10]

The Tyee Test Fishery, operated within the tidal portion of the Skeena River since 1956, provides relative indices of abundance in-season for all species migrating past approach-water fisheries and into the Skeena River. This information is used to monitor relative strength of returns for each species and provides another management trigger for regulating fisheries according to run strength. Seine and gillnet gear is attached to or attended by the vessel, constantly worked, and therefore rarely lost. For this reason, lost salmon gear is not a significant problem. Accordingly, no monitoring systems or impact assessments of lost gear are carried out for salmon fisheries.

Historic monitoring data are available at the following web site.

http://www-sci.pac.dfo-mpo.gc.ca/sa/Commercial/HistoricStats_e.htm

Scoring Summary

The information presented establishes that the intent of Indicator 2.1.1 has been met.

The 60 Scoring Guidepost has been met.

Both 80 Scoring Guideposts have been achieved.

One of the 100 Scoring Guideposts is not applicable; the remaining two have been met.

Future Changes

DFO is undertaking a comprehensive, detailed review of fishery monitoring and catch reporting programs in consultation with harvesters from all sectors to identify deficiencies and discuss improvements to better meet the needs of the resource, the public and stakeholders.

http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/fisheriesmgmt/reportingframework/default_e.htm

---

[8] Cox-Rogers, Steve, 1994. Description of a Daily Simulation Model For the Area 4 (Skeena) Commercial Gillnet Fishery. Canadian Manuscript Report of Fisheries and Aquatic Sciences, No. 2256.

[9] IFMP 2002, Section 3.1, page 21.

[10] IFMP 2003, Section 3.1, pages 13-15.

100 Scoring Guidepost

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

60 Scoring Guidepost

- Data on by-catch of the majority of the stocks are available to determine that 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 by-catch of non-salmon species and the removal of large numbers of the target salmon species.

DFO Response

Current Situation

By-Catch of Non-Salmon Species

Conflict between harvest of target species and ecosystem concerns (non-salmon by-catch) is minimal in Skeena River sockeye fisheries because there is very little interaction between Skeena River sockeye and non-salmon species in fisheries that harvest Skeena River sockeye. As established in our response to Indicator 2.1.1 above, harvesters are required to report by-catch of non-salmon species as a condition of license. Those data are used to determine whether further fishery management actions are required to provide additional protection to non-target species.[11]

[11] IFMP 2003, Section 7.3, page 57.

Specific conservation objectives are identified for stocks of concern if their abundance drops below acceptable levels.[12] For example, an objective for the 2003 fishing season was to reduce exploitation rates in the established mixed stock tidal fishery by 23% from the 1980-1999 average to ensure that Skeena River wild sockeye stocks of concern do not continue to decline. Similarly, when Upper Skeena coho stocks declined severely in 1997, a complete net closure to coho possession/retention was initiated in1998 to minimize coho mortality; that closure has remained in place to date in Areas 4 and 5.

The fishing plan calls for directed harvests of target stocks to be constrained when there are conservation concerns for species, stocks or stock aggregates encountered during directed fisheries. Fishing plans are designed to keep exploitation rates on stocks of concern within the limits described in the Conservation Objectives.[13] For example, the exploitation rate designed to protect wild non-Babine Skeena sockeye and upper Skeena Coho precludes fisheries on more abundant enhanced Babine sockeye stocks.[14]

Marine piscivore research indicates that utilization of the target stock by harbour seals is low[15]. Research is ongoing into the composition of Stellar Sea Lion[16] and Killer Whale[17] diets but sockeye contributions are thought to be low. Accordingly, current levels of commercial harvests are not thought to present any risks to these populations.

Removals of Target Salmon Species

The primary objective of all fisheries is conservation.[18] This objective includes determining target exploitation rates and acceptable harvesting methods for stocks of concern.

Regular monitoring of fisheries, stock assessment, the use of gear modifications and selective fishing methods, timing closures, strategic enhancement and habitat restoration ensure that healthy stock levels are maintained.[19] Examples of the precautionary approach, risk averse management and sustainability follow:

---

[12] IFMP 2003, Section 3.1, pages 13-15.

[13] IFMP 2003, Section 3.1, page 13.

[14] IFMP 2003, section 3.1.2, page 13-14.

[15] Olesiuk, Peter F., Annual prey consumption by harbour seals (Phoca vitulina) in the Strait of Georgia, British Columbia.

[16] Olesiuk, Peter F., Pers Comm

[17] Ford, John, Pers Comm

[18] IFMP 2003, Section 3.1, page 13.

[19] IFMP 2003, Section 3.1, page 13; Section 4.8, pages 32-33.

- In accordance with the precautionary approach, weekly Skeena sockeye harvest rates were reduced to levels that allowed for limited exploitation of weaker wild non-Babine sockeye stocks (eg, Nanika and Kitwanga River stocks) while still allowing for the harvest of abundant enhanced Babine stocks (ie, Fulton and Pinkut River).
- The use of selective fishing methods (reduced net length and set time) upon the arrival of upper Skeena coho stocks reduced exploitation of these stocks while allowing for the continued exploitation of passing abundant enhanced Babine sockeye and Skeena pink stocks.
- In 2003, weekly harvest rate targets were set to minimize exploitation of non-target stocks. This reflects a risk averse stance taken to ensure sustainability.

Examples and discussion of fishery monitoring and catch reporting, stock assessment and selective fishing follow:

- Monitoring of harvests of target stocks is addressed in Indicator 1.1.2.1.
- Monitoring of spawning escapements for target stock units is addressed in Indicator 1.1.2.2.
- Catch monitoring, stock assessment and their use in deriving productivity estimates and management guidelines for target stocks are described in indicator 1.1.2.4.
- Selective fishing is discussed in Indicator 3.7.1.

All Skeena River sockeye stocks groups remain within acceptable limits.

Comprehensive decision guidelines were introduced as a feature of salmon management plans in 2002. They provide a summary of the rationale behind management decisions and describe DFO's intended responses to in-season information and conditions as they become available.[20]

Weekly Harvest Rate Ceilings are established pre-season allowing managers to set fishing schedules accordingly.

Decision guidelines provide for low impact fisheries to fish before fisheries having a higher impact. This is particularly so at low run sizes.[21]

In recent years, the fleet has adopted a range of fisheries management strategies aimed at reducing impacts on non-target stocks while allowing harvest of more abundant stocks (eg, Fulton and Pinkut River sockeye).

Where conflicts exist between the harvest of fish and ecosystem concerns (defined as "the by-catch of non-salmon species and the removal of large numbers of the target salmon species") based on their removal, the balance achieved has been the subject of an open review by stakeholders. The process used to achieve this is to include management options in draft IFMPs that are available for review by stakeholders and the public. For example, harvest

[20] IFMP 2003, Section , pages 18-50.

[21] IFMP 2003, Section 3.1, page 13.

plan options to protect the Kitwanga and Nanika/Morice River sockeye stocks were incorporated into the draft 2003 IFMP.[22]

Scoring Summary

DFO takes a variety of measures to ensure that removals of target stocks and species are sustainable and that removals of non-salmon species are kept to a minimum.

The two 60 Scoring Guideposts have been met.

All three 80 Scoring Guideposts are in effect.

One of the five 100 Scoring Guideposts has been met, one has not been met and the other three have been partially met.

Future Changes

Fisheries and Oceans Canada will be developing a risk assessment framework for assessing Skeena River sockeye.

100 Scoring Guidepost

- A risk assessment of by-catch 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.

[22] IFMP 2003, section 4.8, pages 32-33

- 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 by-catch problems and has procedures that are followed to limit by-catch.

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.

DFO Response

Current Situation

Research Program

Research on BC salmon stocks is conducted by Science Branch. Research is focused on achieving a better understanding of salmon habitat and the impact of natural and man-made events on returning stock abundance for the upcoming year.

The Pacific Scientific Advice Review Committee (PSARC) is the Pacific Regional body responsible for review and evaluation of all scientific information on the status of living aquatic resources, their ecosystem, and on biological aspects of stock management.

PSARC advises the Resource Management Executive Committee (RMEC) of Fisheries and Oceans Canada and other bodies on stock and habitat status and potential biological consequences of fisheries management actions and natural events.

PSARC issues Stock Status Reports (SSRs) and Habitat Status Reports (HSRs). These reports are public documents that summarize, in lay terms, scientific information and fisheries information on major commercially-harvested species and their aquatic habitats.

Additional information and PSARC reports are available at:

Research Documents

In addition to ongoing research activities in the areas of freshwater and marine habitat and stock assessment, specific areas of focus for 2003 included investigations into concerns with stock status and lake-based production relationships for wild Skeena River sockeye salmon.[23]

Post-release mortality rates have been monitored and assessed to ensure that they are appropriately reflected in fishing plans.

DFO continues to investigate modifications in gear to increase selectivity and reduce impacts on fish and fish habitat.[24]

A full summary of the selective fishery program including its research program can be found in the Selective (Salmon) Fishing Final Report.

http://www-comm.pac.dfo-mpo.gc.ca/publications/SFFinalReport_e.pdf

These documents reflect a sequential and evolving response to by-catch concerns as new issues are identified.

Established Management Process

The key management process by which "research conclusions can quickly be transparently incorporated into future management activities associated with prosecuting the fishery" is the department's annual post-season review.

Post-season review processes and references are described in Indicator 3.3.1. These include a review of compliance with IFMP by-catch objectives that are incorporated into subsequent IFMPs.

Availability of research results and review of research plans are described in Indicator 3.2.2.

Post-season reviews (by each country) are included in the Pacific Salmon Commission's Annual Report.

http://www.psc.org/Pubs/PUBFORM.HTM

---

[23] Cox-Rogers, S., J.M.B. Hume and K.S. Shortreed. 2003. Stock status and lake-based production relationships of wild Skeena River sockeye stocks. PSARC working paper S2003-09, DFO, Nanaimo. 62p (In press).

[24] IFMP 2003, Sections 7.8.1 and 7.8.2.

Work continues on assessing the status of wild Skeena River sockeye stocks with the final goal being the determination of productive capacities for each of the sockeye rearing lakes in the Skeena watershed. This will allow for more effective fisheries management in the future.

Non-salmon species are recorded during catch monitoring. Eco-system related conservation objectives for non-salmon species may be identified in the IFMP. For example, the IFMP identifies that interim restricted fishing areas to protect inshore rockfish will apply to all salmon gear.[25] The department has also responded by changing fishing times and areas to minimize by-catch of other species.

DFO has demonstrated a willingness to conserve stocks of conservation concern by closing fisheries in which there will be significant by-catch. In 1998, for example, in response to serious conservation concerns for Skeena and Thompson coho, DFO closed all marine coho fisheries and closed or reduced a number of other fisheries of significant by-catch concern for Skeena and Thompson stock complexes. Evidence of DFO's willingness to close fisheries as new by-catch problems arise and to incorporate new research findings into management plans is provided by the following examples.

MINISTERS ANNOUNCE CANADA'S COHO RECOVERY PLAN AND $400 MILLION FOR PACIFIC SALMON FISHERY - June 19, 1998

"Severe restrictions will be imposed on fishing activity in many areas, and selective, conservation-based fishing techniques are being introduced to conserve coho and other stocks at risk."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/1998/nr9849_e.htm

---

DETAILS OF THE 1998 SALMON SEASON CATCH - March 12, 1999

"Commercial fisheries that targeted coho were eliminated as part of the coho conservation program. In areas and times where stocks of concern were not prevalent commercial fisheries proceeded, but fishermen were subject to strict coho conservation measures, including non-retention in all areas of the coast, mandatory brailing for seines, short set times for gillnets, barbless hooks for trollers, and time and area closures."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/bckgrnd/1999/bg990311d_e.htm

---

1999 SALMON MANAGEMENT PLAN: STAYING THE COURSE FOR SALMON CONSERVATION - June 18, 1999

"The plan continues domestic measures implemented in 1998 to protect threatened coho salmon stocks...", "An objective of zero fishing mortality for Canadian fisheries on Thompson and upper Skeena coho stocks, as in 1998."

---

[25] IFMP 2003, Section 3.1.7, page 15-16. See also Appendix 4.

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/1999/nr9960_e.htm

---

CANADA'S COHO RECOVERY PLAN - Backgrounder - June 19, 1998

"The most immediate measure being implemented is the announcement today of a Salmon Management Plan which avoids harvest-related mortalities of coho by restricting all fisheries that impact threatened coho stocks."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/bckgrnd/1998/recov_e.htm

---

BACKGROUNDER - May 24, 2000 - Salmon Update

"As in previous years, there are no opportunities for any commercial gear type to retain coho."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/bckgrnd/2000/bg0017_e.htm

---

Salmon Update - May 24, 2000

"This year, Fisheries and Oceans Canada will again maintain a zero mortality objective for Thompson coho"

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2000/nr0051_e.htm

---

Salmon Update - July 5, 2000

"There will be no commercial fisheries directed on coho stocks in northern BC"

"A key management objective for salmon fisheries in 2000 is to maintain zero fishing mortality on upper Skeena and Thompson River coho stocks..."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2000/nr0072_e.htm

---

WEST COAST VANCOUVER ISLAND CHINOOK AND SOUTHERN BC COHO - May 4, 2001 - Salmon Update

"No targeted coho opportunities will be provided to commercial harvesters in 2001. All fisheries will have stringent measures applied to limit by-catch of coho and chinook."

http://www-comm.pac.dfo-mpo.gc.ca/pages/release/p-releas/2001/nr045_e.htm

---

To conserve coho in Skeena sockeye fisheries in particular, the department implemented closures and reductions in fishery times and areas, gear modifications attached as licence conditions, modifications in fishing practices, and mandatory revival tanks. These modifications are described in the IFMP.

Skeena commercial fisheries continue to be managed to exploitation rate targets on upper Skeena coho (IFMP) and will be managed with regard to by-catch of Nanika/Morice and Kitwanga sockeye. Conservation objectives for these stocks are identified in the IFMP.

The IFMP does not explicitly require new monitoring programs to be implemented when new problems are encountered. New monitoring programs are, however, very much part of the process of developing management plans. The objective of a management plan is to identify the approach to be taken to prosecuting a fishery. Monitoring programs are part of that approach and are specified in Conditions of Licence[26] (but not explicitly in the IFMP). Recent examples of new monitoring programs implemented when new problems were encountered include the following:

- Fishing behaviour was monitored during the "short set/short net" fishery to ensure compliance.
- To better monitor exploitation of upper Skeena coho during net and recreational fisheries, studies were conducted to quantify specific mortality rates associated with each gear type under specific scenarios.
- For Kitwanga Lake sockeye, DNA and scale analysis to determine stock group and age composition, along with construction and operation of a fish counting fence to accurately monitor salmon escapements and production.

Scoring Summary

DFO has an entire branch—Science Branch—dedicated to research including assessment and evaluation of historic and new data to identify future problems. The annual post-season review is the primary vehicle by which such research is incorporated into the management of the fishery.

All three of the 60 Scoring Guideposts have been met.

All four 80 Scoring Guideposts are in effect.

All 100 Scoring Guideposts are in place.

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.

[26] Conditions Of 2003/2004 Salmon Area C Licence, part 1, sections 6, 7 8 and 9 (there are no page numbers in Conditions of Licence).

- The management agency has a proven history of closing fisheries when by-catch 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 by-catch reduction measures are effective.
- When new problems are identified, the management plans require a new monitoring program be instituted to determine the effectiveness of by-catch 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 by-catch problems or ecosystem related impacts.
- The management agency has a proven history of closing fisheries when by-catch problems or 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 by-catch problems or ecosystem concerns.
- There are procedures established to incorporate any knowledge obtained about by-catch problems into management actions.
- The management agency responds to data provided on by-catch 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 nutrient requirements and piscivore food requirements, are incorporated into the management system.

DFO Response

Current Situation

Analysis in support of freshwater ecosystems includes analysis of:

- lake trophic status,
- limiting factors,
- productivity and productive capacity,
- nutrient monitoring and numbers,
- distribution,
- behaviour and diet in Skeena sockeye nursery lakes.

Results of productivity studies are utilized to develop productivity models that are incorporated into the establishment of escapement goals.

A number of studies have been published.[27] Additional information can be found by searching for "Hume" and/or "Shortreed" at the following web site.

http://www-sci.pac.dfo-mpo.gc.ca/mehsd/publ/pubs2001-2005_e.htm

Fisheries and Oceans Canada has conducted studies on the impacts of salmon carcasses on stream productivity and nutrient budgets. These consider the impact of salmon-derived nutrients on the terrestrial eco-system, including icon species such as bears, and the role that

[27] Shortreed, K.S., J.M.B. Hume, K.F. Morton and Sue MacLellan. 1998. Trophic status and rearing capacity of smaller sockeye nursery lakes in the Skeena River system. Can. Tech. Rep.. Fish. Aquat. Sci. 2240: 78 p.

Shortreed, K.S. and K.F. Morton. 2000. An assessment of the limnological status and productive capacity of Babine Lake, 25 years after the inception of the Babine Lake Development Project. Can. Tech. Rep. Fish. Aquat. Sci. 2316: 52p.

Shortreed, K.S., J.M.B. Hume, and J.G. Stockner. 2000. Using photosynthetic rates to estimate the juvenile sockeye rearing capacity of British Columbia lakes. pp. 505-521 in E.E. Knudsen, C.R. Steward, D.D. MacDonald, J.E. Williams, and D.W. Reiser (ed.) Sustainable Fisheries Management: Pacific Salmon. CRC Press, Boca Raton, Fla.

Shortreed, K.S., K..F. Morton, K. Malange and J.M.B. Hume. 2001. Factors limiting juvenile sockeye production and enhancement potential for selected BC nursery Lakes. Can. Sc. Advisory Secretariat Res. Doc. 2001/098

icon species play in the transfer of nutrients to the terrestrial ecosystem[28]. Further studies are in progress that track salmon nutrients into higher trophic levels[29].

One Canadian paper on Skeena River sockeye biomass and nutrient levels is in preparation.[30] The results of this research will be made available to stakeholders once it is completed. Articles have been written in other jurisdictions (eg, Alaska). Proceedings of a symposium on this subject, held in Eugene Oregon in 2001, are available.[31]

Escapement targets for Skeena sockeye stocks are based on a long history of spawner-recruitment relationships. Freshwater factors are inherently, but not explicitly, incorporated into the establishment of escapement targets. DFO's response to Indicator 3.1.1 describes processes and references for setting escapement goals.

Scoring Summary

The material presented in this section establishes that the management system does indeed support research efforts to understand the adequacy of existing escapement goals for meeting freshwater ecosystem needs.

The single 60 Scoring Guidepost is true.

Both 80 Scoring Guideposts are in effect.

Both 100 scoring guideposts are true.

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.

---

[28]Johnston, N.T., E.A. MacIsaac, P.J. Tschaplinski, and K.J. Hall (in prep). Effects of the abundance of spawning sockeye salmon (Oncorhynchus nerka) on nutrients and epilithic algal biomass in forested streams in north-central British Columbia. Electronic copy available but not to be distributed.

[29] MacIsaac, Erland. Fisheries and Oceans Canada. Pers comm.

[30] Cox-Rogers, S., J.M.B. Hume and K.S. Shortreed. 2003. Stock status and lake-based production relationships for wild Skeena River sockeye salmon. PSARC working paper S2003-09, DFO, Nanaimo. 62p. In preparation. Electronic copy is available for review. Please do not distribute.

[31] Ken Shortreed, Fisheries and Oceans Canada, pers comm.

80 Scoring Guidepost

- Ongoing research is supported to determine the impacts of carcasses on freshwater ecosystem processes and to identify 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.

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.

DFO Response

Current Situation

The Department interprets threatened and endangered species to include those so identified by COSEWIC or listed in Schedule 1 of the Species at Risk Act (SARA).

www.speciesatrisk.gc.ca

The Skeena River currently has no stocks listed by COSEWIC.

http://www.cosewic.gc.ca/htmlDocuments/CDN_SPECIES_AT_RISK_Nov2002_e.htm

The remainder of this section is structured according to the main elements indicated in Marine Stewardship Council's "Intent" Statement following the Indicator statement.

Adequate Protection of Significant Components of the Target Species to Provide for a Reasonable Expectation of Sustainability of these Components and their Contribution to the Genetic Diversity of the Target Population

DFO currently manages Skeena River sockeye in six timing groups—Early non-Babine, Pinkut, Fulton, Late non-Babine, Early Babine Tributaries and Babine River.[32] For each of the timing groups, escapement strategies are developed to protect stocks of low abundance. In addition, an exploitation rate ceiling is set for stocks of concern to ensure they are maintained and thus to ensure that biodiversity is maintained.

Each target stock (run timing group) consists of component stocks that rear in different lakes and spawn in different locations. Target weekly harvest rate ceilings are set pre-season and then adjusted in-season based on returning abundance according to a schedule agreed to pre-season.[33] But stock composition including the enhanced component is known and the likelihood of harvest of endangered species has been estimated. For example, impacts on upper Skeena coho have been evaluated given a range of conditions and a range of fisheries including sockeye fisheries.

A Wild Salmon Policy is under development. This Wild Salmon Policy will describe the future framework for identifying conservation units, for all species of salmon, that will be used for both assessment and management purposes. A draft policy paper was publicly released in 2000 that outlined many elements of this new approach and this is presently being reviewed and revised. The draft policy will be the subject of consultation in the fall of 2004.[34]" Work is underway, under the auspices of the Wild Salmon Policy to establish benchmark reference points for all conservation units of Skeena River sockeye.

Decision guidelines regarding the conduct of all Skeena sockeye fisheries are included in the IFMP.[35] They take into account environmental conditions, exploitation targets for endangered stocks and expected stock status.

Sources of uncertainty and information available on target stocks/species are described in the response to Indicator 3.1.4

The response to Indicator 3.1.5 describes the department's responses to changing information.

---

[32] IFMP 2003, section 4.8.4, Table 2, page 36.

[33] See, for example, IFMP 2003, Table 2, page 36 that shows harvest rates on the six run timing groups at different abundance levels.

[34] IFMP 2003, section 2.2, fifth paragraph, page 9.

[35] IFMP 2003, Section 4.1, pages 18-21 and Section 4.8, pages 32-38.

Direct Mortality of Non-Target Species in the Prosecuted Fisheries

Protection for stocks of concern is based on historical timing and migration data because current stock abundances are too low for reliable estimates from test fisheries. Test fishing and racial analyses are used to identify stock composition (including listed stocks) within management units; presence, timing and area of migration; and age composition of threatened stocks. The ability to identify stocks of concern is constrained by their small numbers relative to target stocks.

Specific conservation objectives for listed stocks are included in the Decision Guidelines section of the IFMP.[36] These are explicitly incorporated into fishing plans.

The Selective Fisheries Program (1998-2001) began the widespread exploration of selective gear and methods.

http://www-comm.pac.dfo-mpo.gc.ca/pages/selective/default_e.htm

The continued development of selective fishing techniques has taken on more importance as a result of heightened conservation concerns on identified stocks as well as a stronger focus on protection of small stocks. Seines have to fish selectively, sorting catch and releasing coho and chinook salmon as well as steelhead.

The region's selective fishing policy

http://www-comm.pac.dfo-mpo.gc.ca/publications/selectivep_e.pdf

outlines the expectations and responsibilities of harvesters to continue to implement and develop new selective techniques and practices. An emphasis has also been placed on the need for continued learning, training and education.

Annually, there is provision for TAC to be put aside for selective fishing experiments. Through that provision, Fisheries and Oceans Canada is experimenting with selective fishing gears and methods. As these methods are proved, DFO has moved to incorporate them into fisheries. Examples include new and potentially promising selective fishing initiatives that have been proposed that are not ready to be implemented without testing.

Fisheries and Oceans Canada will continue to work with harvesters to incorporate new selective gear and fishing practices into annual fishing plans.

Selective fishing gear and methods are currently widely used and required in all fisheries. Selective fishing is addressed in Indicator 3.1.8. All gears—gillnet, seine and troll—are required to use revival tanks of prescribed design.[37]

---

[36] IFMP 2003, Section 3.1, pages 13-17.

[37] Conditions Of 2003/2004 Salmon Area C Licence, part 1, section 3, sub-section 8 (there are no page numbers in Conditions of Licence).

- **Gillnets.** Main selective fishing technique is avoidance. In addition, selective fishing through minimising mortality of non-target species is used in Skeena approach waters to minimise mortality of upper Skeena coho. This is achieved by regulation and enforcement of half-length nets and reduced set soak time[38].
- **Trolls**. Use barbless hooks to facilitate release of non-target species.
- **Seines.** Brailing and sorting of catch are mandatory.

Adequate Protection of Icon Species from Direct or Indirect Impacts of Fisheries

Fisheries and Oceans Canada has conducted studies on the impacts of salmon carcasses on stream productivity and nutrient budgets. These consider the impact of salmon-derived nutrients on the terrestrial eco-system, including icon species such as bears, and the role that icon species play in the transfer of nutrients to the terrestrial ecosystem[39]. Further studies are in progress that track salmon nutrients into higher trophic levels[40].

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.

There is little enhancement done to Skeena River sockeye stocks. There are two spawning channel facilities—Fulton River and Pinkut Creek.

There has been minimal marking of enhanced sockeye largely because there is no mark sampling program for sockeye in the commercial fishery. Marking programs are not adequate to derive the proportion of enhanced sockeye in fisheries or escapement but an estimate of the proportion of enhanced fish can be made by comparing the number of fish escaping past the Tyee Test Fishery to the number swimming past the Babine Fence and by determining escapements to Pinkut and Fulton enhancement facilities. Using those methods:

- The proportion of enhanced fish in the escapement to Skeena is likely over 65% in many years because of poor natural spawning, incubation and rearing conditions.
- The proportion of enhanced fish in the escapement to the Babine Lake system is higher.

In the Skeena, for the most part enhanced stocks are a significant contributor to some of the stock timing groups.

Morice/Nanika sockeye are managed as part of the Early non-Babine run group that co-migrates with the more abundant Pinkut Creek (enhanced) stock. Kitwanga sockeye are

---

[38] IFMP 2003, Section 7.9, page 59.

[39]Johnston, N.T., E.A. MacIsaac, P.J. Tschaplinski, and K.J. Hall (in prep). Effects of the abundance of spawning sockeye salmon (Oncorhynchus nerka) on nutrients and epilithic algal biomass in forested streams in north-central British Columbia. Electronic copy available but not to be distributed.

[40] MacIsaac, Erland. Fisheries and Oceans Canada. Pers comm.

managed as part of a Late non-Babine run group that co-migrates with the much larger and more productive Fulton River (enhanced) stock. The Department's management policy established fishery objectives and escapement targets for the dominant stocks in the group (either Pinkut or Fulton), resulting in exploitation rates on less productive stocks being too high.[41]

For Morice/Nanika, exploitation rates have exceeded 65% except in the early 1960s and the 1990s. Morice/Nanika management is driven by Pinkut sockeye, an enhanced stock. The management regime has been modified in recent years to address conservation concerns. For 2003, the exploitation rate was 26.4% in the commercial fishery; the total exploitation rate was 36.1%. In 2002, the commercial exploitation rate was 38.3% and the total exploitation rate was 46.4%. the decline in exploitation rates from 2002 to 2003 was the results of a conservation-based fishing plan, with conservation measures (eg, fishery restrictions) to protect all stocks.[42]

Harvests on enhanced Babine stocks take place in mixed-stock fisheries and in terminal areas that have minimal impacts on other stocks. Enhanced Babine stocks are harvested in the approach areas and in the lower Skeena River. These are mixed-stock areas where fisheries have the potential to impact upon weaker co-migrating sockeye stocks like Morice/Nanika and Kitwanga Rivers. Careful management of this enhanced stock is required to ensure that any impacts upon co-migrating stocks are minimized. Babine Lake stock is also harvested at the facility as an ESSR.[43]

Scoring Summary

The material presented under this Indicator responds to target stocks, non-target species, icon species and interactions between enhanced and wild salmon stocks.

All three of the 60 Scoring Guideposts have been met.

All three of the 80 Scoring Guideposts are in effect.

Two of the four 100 Scoring Guideposts are in place. The remaining two 100 scoring guideposts have partially been met.

---

[41] Wood, C.C. 2001. Managing biodiversity in Pacific Salmon: the evolution of the Skeena River sockeye salmon fishery in British Columbia. A report to the international workshop Blue Millennium: Managing Fisheries for Biodiversity, June 25-26, 2001. Victoria, Canada.

[42] Cox-Rogers, S. 2003 Skeena Sockeye, Coho, and Steelhead Post-Season Review. P.5, second paragraph.

[43] This fishery occurs when salmon stocks return to a system after passing through the various fisheries and are at a level in excess of the capacity of the spawning grounds or enhancement facility to receive them.

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 component, 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 selective fishing 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.

Indicator 2.3.1

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

DFO Response

Current Situation

Non-Listed Stocks of Concern

Monitoring programs are in place for both target and non-target species.[44]

Management actions designed to protect and rebuild stocks of concern (ie, stocks that are expected to return below target levels) to sustainable levels will continue to be implemented. The objective of implementing specific conservation measures is to reduce the impact of harvest and increase the level of escapement to the stock of concern.[45]

The inadvertent harvest of different species of concern is referred to as by-catch. The inadvertent harvest of stocks of concern within the same species (eg, Morice/Nanika sockeye when harvesting Pinkut sockeye) is referred to as incidental harvest. Both by-catch and incidental harvest are factored into the calculation of exploitation rates on various stocks. Fishing plans are thereby designed to keep exploitation rates on stocks of concern within limits described under "Conservation Objectives."[46]

LRPs have not been defined for non-target salmon stocks, whether by-catch or incidental catch. To protect those stocks, exploitation rates on target stocks are constrained to be low.

For upper Skeena coho, extremely conservative Canadian exploitation rates (eg, 15% or less) provide a very high probability that the stock will achieve long term recovery.[47]

COSEWIC-listed Stocks/SARA

Under SARA, Recovery Plans are required for species listed in Schedule 1. There are no Skeena salmon stocks listed by COSEWIC.

Scoring Summary

It should be clear from the information presented that DFO takes a variety of measures to ensure that removals of target stocks and species are sustainable and that removals of non-salmon species are kept to a minimum.

All three 60 Scoring Guideposts have been met.

---

[44] IFMP 2003, Section 2.2, last paragraph, page 10, last two sentences.

[45] IFMP 2003, Section 3.1, pages 13-16.

[46] IFMP 2003, Section 3.1.2, pages 13-14.

[47] IFMP 2003, section 3.1.3, page 14.

All six 80 Scoring Guideposts are in effect.

Three of five 100 Scoring Guideposts are in place. One has been determined to not be applicable.

Future Changes

Work is underway under the auspices of the Wild Salmon Policy to establish Limit Reference Points of abundance as performance benchmarks for all Skeena River sockeye conservation units. A precautionary approach is being used to establish these Limit Reference Points and to identify levels of abundance where there are increasing conservation concerns.

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 Stock Assessment 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 periodically revisiting escapement goals to respond to new data on recovery success or failure for the majority of the stocks.