Response to Marine Stewardship Council

Indicators for Principle 2 – Ecosystem Impacts

Pacific Wild Salmon Fishery

Nass Sockeye

Fisheries and Oceans Canada

Pacific Region

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TABLE OF CONTENTS

Introduction

The BC Wild Salmon Fishery has applied to the Marine Stewardship Council for certification of its fisheries.

In June 2003, the Marine Stewardship Council published their 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 defined 47 Indicators under three Principles.

This document, prepared with staff from Fisheries and Oceans Canada, Coastal BC North Region, is the BCSMC's technical submission on the indicators for Nass River sockeye for Principle 2. This principle examines the impact of the fishery on the marine environment. It examines the effect fishing has on immediate marine environment including other non-target fish species, marine mammals and seabirds.

The Scoring Guideposts as identified by 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 Nass 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.

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

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*, available at the following web site.

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 Nass River sockeye marine net fisheries.

Mandatory logbooks, frequent phone-in, and sales slip programs are in place for all commercial fisheries where data on other species (EG, fish, seabirds) retained or released, must be recorded. (See sample logbook in 2003/04 IFMP[2]). In addition, all fishery notices remind fishermen to report sightings of sea turtles.[3]

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 reports include details for non-target species.[4] Conditions of license (sample included) describe the details.[5]

Data requirements for "discards, releases, by-catch and other fishery interactions" include observers (intermittent), log books, hails, and harvester surveys.[6]

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[2] IFMP 2003, Appendix 3.

[3] Fishery Notice. Page 2.

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

[5] See Conditions of Licence, Section 6.

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

Annual aggregate Nass River sockeye escapement goals are set pre-season, and in-season monitoring, using the Nass Fishwheels Assessment Project, ensures escapements of sockeye stocks are within acceptable limits and conservation goal are met. This method allows for an even distribution of harvest throughout the annual sockeye migration. In addition, Nass coho, chinook and steelhead escapements are estimated in-season using this method, with the overall objective of meeting strict conservation goals.[7] Fishing plans are thereby designed to keep exploitation rates on Nass River salmon stocks at acceptable levels. If stock levels drop below acceptable limits, conservation objectives are developed for newly identified stocks of concern.[8] Currently, no stocks of concern have been identified in the Nass River drainage.

The Nass Fishwheel Project, operated in the Nass River since 1992, gives in-season escapement estimates for all species migrating past the project area and into the mid- and upper-Nass River.[9] This information is used to monitor strength of returns for sockeye, chinook, coho and steelhead and provides another management trigger for regulating fisheries according to run strength.

Seine and gillnet gear is attached to or attended by the vessel and constantly being worked. As a consequence, gear is rarely lost. Accordingly, no monitoring systems or impact assessments 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.

Two of three 100 Scoring Guideposts have been met and the remaining guidepost is not applicable to the salmon fishery.

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[7] Link, M.R., K.K. English and R.C. Bocking. 1996. The 1992 Fishwheel Project on the Nass River and an Evaluation of Fishwheels as an In-season Management and Stock Assessment Tool for the Nass River. Can. Manuscr. Rep. Fish. Aquat. Sci. 2372: x + 82 p.

[9] Link M.R. 1995. The value of an improvement in the precision and accuracy of information used to manage a sockeye salmon (Oncorhynchus nerka) fishery: the Nass River gillnet and fishwheel test fishery programs. Rep. No. 164. Master's thesis, School of Resource and Environmental Management, Simon Fraser University, Burnaby, BC

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

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 potential 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

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

The conflict between harvest of target species and ecosystem concerns (non-salmon by-catch) is minimal in Nass River sockeye fisheries because there is very little interaction between Nass River sockeye and non-salmon species in fisheries that harvest Nass 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.

The data are used to determine whether further fishery management actions are required to provide added protection to non-target species.[9]

Conservation objectives are identified for stocks of concern if stock levels drop below acceptable levels.[10] For example, when Upper Skeena coho stocks declined severely in 1997, a portion of Area 3 was permanently closed to the net fleet to reduce impacts to the stock. In addition, a complete net closure to coho possession/retention initiated in 1998 to minimize coho mortality has remained in place to date. 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.[11]

Research has been conducted into marine piscivores indicating that utilization of the target stock is low for harbour seals.[12] Research into the composition of Stellar Sea Lion and Killer Whale diets is ongoing: sockeye contributions are thought to be low. Accordingly, current levels of commercial harvests are not thought to present any risks to these populations.

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

[#] IFMP 2002, Section 3.1.2, page 13.

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

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

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

Removals of Target Salmon Species

The primary objective of all fisheries is conservation.[13] This objective includes determining target exploitation rates and acceptable harvesting methods for stocks of concern.

Managing for conservation also means incorporating a precautionary approach. Fisheries management is risk averse and precautionary. Regular monitoring of fisheries, stock assessment, the use of gear modifications and selective fishing methods, specific timing and area closures, strategic enhancement and habitat restoration ensure that healthy stock levels are maintained.[14] An example of the precautionary approach, risk averse management and sustainability follows: In accordance with the precautionary approach, areas within the approach waters of the Nass River where, historically, the incidental catch of Upper Skeena coho was high, are permanently closed to commercial fishing. In addition, the approach waters of the Khutzemateen and Kwinamass Rivers are permanently closed to commercial and recreational fishing to protect weak chinook stocks. The gillnet fleet fishing season is terminated earlier then in previous years to protect weaker chum stocks.

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 is described in indicator 1.1.2.4.
- Selective fishing is discussed in Indicator 3.7.1.

All Nass 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.[15]

Target annual aggregate escapements are established pre-season, allowing managers to set fishing schedules accordingly.

Decision guidelines provide for low impact fisheries at low run sizes. In addition, management of aggregate sockeye stocks is conducted in a risk-averse manner to insure that the total exploitation rate on individual stocks does not exceed conservation goals.[16]

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

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

[15] IFMP 2003, Section 4, pages 18-50.

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

In recent years, the fleet has adopted a range of fisheries management strategies aimed at reducing impacts on non-target stocks while still allowing for the harvest of more abundant stocks (eg, Meziadin Lake 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") attributable to their removal, the balance achieved has been the subject of an open review by stakeholders. The process used to conduct this review is to include management options in draft IFMPs that are available for review by stakeholders and the public. For example, the harvest plan options to protect Upper Skeena coho stocks have been incorporated into the IFMP since 1998.[17]

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 Nass 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.

[17] IFMP 2003, section 4.8.2, page 33.

- 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 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 manmade events and 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 ecosystems, 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:

www.pac.dfo-mpo.gc.ca/sci/english/psarc

In addition to ongoing research concerning freshwater and marine habitat and stock assessment, research topics in 2003 included investigations into concerns with stock status and lake-based production relationships for wild Skeena River sockeye salmon and selected Nass River sockeye salmon.[18]

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.[19]

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 the results of which are incorporated into subsequent IFMPs.

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[18] 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).

[19] IFMP 2003, Sections 7.8.1 and 7.8.2.

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

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

Non-salmon species are recorded during catch monitoring and 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 in-shore rockfish will apply to all salmon gear.[20] 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, 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 in the face of new by-catch problems 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/preleas/1998/nr9849_e.htm

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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,

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

[20b] IFMP 2003, Section 3.1.6, page 15.

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

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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."

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

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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

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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

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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

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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

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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

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To conserve coho in Nass sockeye and pink fisheries, the department implemented closures and reductions of 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. [20b]

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 in prosecuting a fishery. Monitoring programs are part of that approach and are specified in Conditions of Licence[21] (but not explicitly in the IFMP). Recent examples of new monitoring programs implemented when new problems were encountered include:

- To better monitor exploitation of upper Skeena coho during net and recreational fisheries, studies were conducted to quantify mortality rates associated with each gear type.
- For the protection of non-Nass Area 3 chinook, non-retention of chinook by the seine fleet and area closures in Khutzemateen River and Kwinimass River approach waters for the gillnet and recreational fleets were implemented. Extensive escapement estimation studies were conducted to monitor the success of these management actions.
- For Nass River sockeye, DNA and scale analysis was conducted to determine stock group and age composition. Fishwheels were operated in the lower Nass system and fish counting facilities were introduced at the Meziadin River, Zolzap Creek and Damdochax River 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.

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[21] 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).

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.
- 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 the main Nass 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.[22]

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[22] Cooper, K.L., M.R.S. Johannes, and K.D. Hyatt. 1994a. Limnology of Salmonid nursery lakes of the Nass River system (1991-1993) under study by the interim measures fisheries program. Can. Data. Rep. Fish. Aquat. Sci. 29 p.

Cooper, K.L., M.R.S. Johannes, and K.D. Hyatt. 1994b. Zooplankton community structure (1991-1993) of Salmonid nursery lakes of the Nass River system under study by the interim measures fisheries program. Can. Data. Rep. Fish. Aquat. Sci. 33 p.

Johannes, M.R.S., and K.D. Hyatt. 1994. DFO-Nisga'a interim measures program status report on assessment of sockeye salmon carrying capacity of Meziadin Lake. Report SRe 11-94. Recriut. Assess. Sec., Pac. Bio. Sta. Nanaimo, BC

Johannes, M.R.S., K.D. Hyatt, and D.K. McCreight. 1994. DFO-Nisga'a interim measure program status report on assessmentof sockeye salmon smolts from the Nass River system. Report SRe 19-94. Recriut. Assess. Sec., Pac. Bio. Sta. Nanaimo, BC

Johannes, M.R.S., K.D. Hyatt, D.P. Rankin, and D.K. McCreight. 1995. Hydroacoustic/trawl survey estimates of limnetic fish population abundance in Salmonid nursery lakes of the Nass River system. Can. Data. Rep. Fish. Aquat. Sci. 75 p.

Murdoch, S.P., M.R.S. Johannes, D.K. McCreight, K.D. Hyatt, and D.P. Rankin. 1993. Physical parameters of Nass Salmonid nursery lake under study by the interim measures fisheries program. Dept. Fish. Ocean. Res. Br. Can. Tech. Rep. Fish. Aquat. Sci. No. 2192. 113 p.

Rankin, D.P. and K.D. Hyatt. 2002. Juvenile sockeye salmon and limnetic zooplankton data summary from 1991-1993 surveys of Fred Wright and Meziadin Lakes. Report to file: JSIDS – SSRe 04-2001. Stock Assessment Division, Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, BC V9T 6N7

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 icon species play in the transfer of nutrients to the terrestrial ecosystem.[23] Further studies are in progress that track salmon nutrients into higher trophic levels.[24]

One Canadian paper for Nass River sockeye is in preparation.[25] 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.[26]

Escapement targets for Nass sockeye stocks are based on a long history of spawner-recruitment relationships. Freshwater factors are thus 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.[22, 25]

Outcomes include:

- Provision of post-season reviews of sockeye migration and spawning success as it relates to environmental conditions.
- Development of models to predict mortality during migration that have been used to adjust fishery allocations and achieve spawner escapement targets.
- Preliminary understanding of the life-cycle and development rates of *Parvicapsula sp*.

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

[23] N.T. Johnston, 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.

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

[25] Bocking, R.C., M.R. Link, B. Baxter, B. Nass and L. Jantz. 2003. Meziadin Lake biological escapement goal and considerations for increasing yield of sockeye (*oncorhynchus nerka*). PSARC Working Paper. 19 pp.

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

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.

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 Nass 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 Nass River sockeye as one main group as there is no know distinction in run timing between each separate stock. A target annual escapement is set for the entire stock and management staff attempt to keep weekly harvest rates within specified limits to ensure that biodiversity is maintained.

Each target stock (run timing group) consists of component stocks that rear in different lakes or rivers 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.[27]

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 to be used for assessment and management purposes. A draft policy paper released in 2000 outlined many elements of this new approach. It is presently being reviewed and revised. The draft policy will be the subject of consultation in the fall of 2004.[28] Work is underway, under the auspices of the Wild Salmon Policy, to establish benchmark reference points for all conservation units of Nass River sockeye.

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

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

Decision guidelines regarding the conduct of all Nass sockeye fisheries are included in the IFMP.[29] 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.

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/hampered by their small numbers relative to target stocks.

Specific conservation objectives for listed stocks are included in the Decision Guidelines in the IFMP.[30] 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 for identified stocks as well as a stronger focus on protection of small stocks. Seines must 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 have become operational, DFO has moved to incorporate them

[29] IFMP 2003, Section 4.1, pages 18-21 and Section 4.5, pages 28-32.

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

into fisheries, especially where new and potentially promising selective fishing initiatives may be 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.[31]

- **Gillnets.** Main selective fishing technique is avoidance. In addition, selective fishing through minimising mortality of non-target species is used in Nass approach waters to minimise mortality of upper Skeena and Nass coho, Nass chum and steelhead and non-Nass chinook stocks. This is achieved by regulation and enforcement of time and area closures and gear restrictions to the gillnet fleet[32].
- **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 studies 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.[33] Further studies are in progress that track salmon nutrients into higher trophic levels.[34]

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

[32] IFMP 2003, Section 7.8, pages 58-59.

[33] N.T. Johnston, 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.

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

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 no enhancement of Nass River sockeye stocks.

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. In each case, we described the department's policies and programs and provided examples of recent initiatives.

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.

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 target and non-target species.[35]

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 conservation measures is to reduce the impact of harvest and increase the level of escapement of the stock of concern.[36]

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 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" (Section 3.1 of IFMP 2003).[37]

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.

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

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

[37] IFMP 2003, Section3.1.2, pages 13-14.

COSEWIC-listed Stocks/SARA

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

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.

All three 60 Scoring Guideposts have been met.

All six 80 Scoring Guideposts are in effect.

Three of five 100 Scoring Guideposts are in place and one has not been met. 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 Nass River sockeye conservation units. A precautionary approach will be used in establishing these Limit Reference Points and identifying 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.