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MSC SUSTAINABLE FISHERIES CERTIFICATION

On-Site Surveillance Visit - Report for British Columbia salmon

1st Surveillance

December 2018

Certificate Code	F-ACO-0116
Prepared For:	**Canadian Pacific Sustainable Fisheries Society**
Prepared By:	Lloyd's Register
Authors:	**Rob Blyth-Skyrme, Greg Ruggerone, Jim Seeb & Al Cass**

Assessment Data Sheet

Fishery name	British Columbia Salmon	
Species and Stock	1) North and Central Coast sockeye salmon (*Oncorhynchus nerka*), pink salmon (*Oncorhynchus gorbuscha*) and chum salmon (*Oncorhynchus keta*). 2) Inner Southern including Fraser River sockeye salmon, pink salmon and chum salmon. 3) West Coast Vancouver Island sockeye salmon and chum salmon	
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1 Introduction

1.1 Scope of Surveillance

This report outlines the findings of the 1st Annual Surveillance of the British Columbia Salmon Fishery. The scope of the certified fishery and therefore of this surveillance is specified in the Units of Certification set out below.

This Year 1 Audit of the fishery covers the 2017 fishery season, and science and management information as available to the Audit Team at the site visit.

UoC 1 – North and Central Coast

Species:	Sockeye salmon (*Oncorhyncus nerka*), Pink salmon (*Oncorhyncus gorbuscha)*, Chum salmon (*Oncorhyncus keta*)
Geographical Area:	Canadian Pacific EEZ and British Columbia Coastal Waters
Method of Capture:	Seine, gillnet, troll, beach seine, fish wheels, weirs and dipnets
Stock:	North and Central Coast, British Columbia
Management System:	Fisheries and Oceans Canada (DFO)
Client Group:	Members of the Canadian Pacific Sustainable Fisheries Society
Other Eligible Fishers:	None

UoC 2 – Inner Southern including Fraser River

Species:	Sockeye salmon (*Oncorhyncus nerka*), Pink salmon (*Oncorhyncus gorbuscha)*, Chum salmon (*Oncorhyncus keta*)
Geographical Area:	Canadian Pacific EEZ and British Columbia Coastal Waters
Method of Capture:	Seine, gillnet, troll, beach seine, fish wheels, weirs and dipnets
Stock:	Inner Southern, including Fraser River
Management System:	Fisheries and Oceans Canada (DFO)
Client Group:	Members of the Canadian Pacific Sustainable Fisheries Society
Other Eligible Fishers:	None

UoC 3 – West Coast Vancouver Island (WCVI)

Species:	Sockeye salmon (*Oncorhyncus nerka*), Chum salmon (*Oncorhyncus keta*)
Geographical Area:	Canadian Pacific EEZ and British Columbia Coastal Waters
Method of Capture:	Seine, gillnet, troll, beach seine, fish wheels, weirs and dipnets
Stock:	West Coast Vancouver Island
Management System:	Fisheries and Oceans Canada (DFO)
Client Group:	Members of the Canadian Pacific Sustainable Fisheries Society
Other Eligible Fishers:	none

1.2 Aims of the Surveillance

The purpose of the annual Surveillance Report is fourfold:

1. To establish and report on whether or not there have been any material changes to the circumstances and practices affecting the original complying assessment of the fishery;

2. To monitor the progress made to improve those practices that have been scored as below "good practice" (a score of 80 or above) but above "minimum acceptable practice" (a score of 60 or above) – as captured in any "conditions" raised and described in the Public Report and in the corresponding Action Plan drawn up by the client;

3. To monitor any actions taken in response to any (non-binding) "recommendations" made in the Public Report;

4. To re-score any Performance Indicators (PIs) where practice or circumstances have materially changed during the intervening year, focusing on those PIs that form the basis of any "conditions" raised.

Please note: The primary focus of this surveillance audit is assess changes made in the previous year. For a complete picture, this report should be read in conjunction with the Public Certification Report for this fishery assessment which can be found here: https://fisheries.msc.org/en/fisheries/british-columbia-salmon/@@assessments.

1.3 Certificate Holder Details

The MSC certificate holder for the BC Salmon Fishery is as follows:

Canadian Pacific Sustainable Fisheries Society
1100-1200 West 73 AvenueVancouver, BC
V6P 6G5
Canada

2 Surveillance Process

2.1 Findings of the original assessment

The BC Salmon Fishery was recertified on the 28th April 2017 (Blyth-Skyrme *et al*. 2017). At certification, a number of conditions were raised by the Assessment Team; maintenance of the fishery's MSC certificate is contingent on the BC Salmon Fishery moving to comply with these conditions within the time-scales set at the time the certificate was issued.

In addition, six recommendations were made during the full assessment, and two further recommendations were set during an expedited audit in September 2018 (Blyth-Skyrme *et al*. 2018). Whilst not obligatory, the client is encouraged to act upon all recommendations within the spirit of the certification.

2.2 Surveillance Activity

Surveillance team details

This Year 1 surveillance audit was carried out by Rob Blyth-Skyrme, Greg Ruggerone, Al Cass and Jim Seeb. The Team Leader was Rob Blyth-Skyrme. This is the same team that conducted the recent full reassessment of the fishery (Blyth-Skyrme *et al*. 2017).

Dr. Rob Blyth-Skyrme has broad fisheries and environmental science, management and policy knowledge, having gained more than 20 years of postgraduate experience in a variety of roles. In particular, he led the marine fisheries and aquaculture work of Natural England, the UK Government's statutory advisor on nature conservation in England, and held the post of Deputy Chief Fishery Officer for the Eastern Sea Fisheries Joint Committee, where he co-managed the activities of a staff of 16 Fishery Enforcement, Research and Environment Officers. Since 2009 he has led and participated in MSC assessments of a wide variety of fisheries, including the Alaska Salmon Fishery and the BC Salmon Fishery. Rob has passed all the MSC training requirements and has no Conflict of Interest in relation to this fishery. A full CV is available upon request.

Dr. Greg Ruggerone has investigated population dynamics, ecology, and management of Pacific salmon in Alaska and the Pacific Northwest since 1979. Most of his research involves factors that affect growth, age, and survival of salmon in freshwater and marine habitats. He has also forecasted the salmon abundance, evaluated and developed biologically-based spawning escapement goals, and evaluated salmon management for sustainability. For the past 14 years, Dr. Ruggerone has evaluated management of salmon fisheries in Alaska, British Columbia, California, and Russia for sustainability using Marine Stewardship Council (MSC) criteria (Principles 1, 2, and 3). He also helped develop earlier MSC criteria for evaluating the sustainability of salmon fisheries. He is past Chair of the Columbia River Independent Scientific Advisory Board and past Chair of the Columbia River Independent Scientific Review Panel. Greg has passed MSC training and has no Conflict of Interest in relation to this fishery. A full CV is available upon request.

Al Cass is a retired fisheries biologist with a 35-year career with Fisheries and Oceans Canada (DFO). His area of expertise is stock assessment, population dynamics and management. While at DFO his work was diverse in nature but had a primary focus on Pacific salmon and the impacts of fishery exploitation. He has lead stock assessment and research programmes on salmon in British Columbia, and has collaborated extensively with colleagues in DFO, academia and other non-government organizations. Most recently, Al participated as the lead DFO scientist in the development of modelling approaches for assessing alternative harvest control rules including management reference points for Fraser River sockeye salmon. He has published over 30 scientific papers in the primary literature as well as numerous reports and research documents. Al also headed the DFO science peer-review process from 2002 to 2009. Before retirement, Al was the science representative on the DFO Team assigned to the Commission of Inquiry into the Decline of Sockeye salmon in the Fraser River. Al has passed MSC training and has no Conflict of Interest in relation to this fishery. A full CV is available upon request.

Professor Jim Seeb is a Research Professor at the School of Aquatic and Fishery Sciences at University of Washington. He was a principal in the Gordon and Betty Moore sponsored International Program for Study of Salmon Ecological Genetics. In his current research he uses DNA polymorphisms in Pacific salmon for study of the interaction of life history, ecology and genetics. He formerly was a senior scientist with the ADF&G where he was steward of the State's Genetics Policy and worked to interpret that and other policies to minimize the risks of hatchery/wild stock interactions. Jim has passed MSC training and has no Conflict of Interest in relation to this fishery. A full CV is available upon request.

Date & Location of surveillance audit

The Year 1 annual surveillance audit was undertaken in Vancouver, BC, during the week commencing 15th October 2018. All team members were on-site during this week.

Stakeholder consultation & meetings

Meetings were undertaken with the representatives of the client, Fisheries and Oceans Canada (DFO) and the Marine Conservation Caucus, as in the following table (Table 1).

Table 1: Meetings held during the site visit, Vancouver.

Name	Affiliation	Date & Subjects Discussed
Rob Blyth-Skyrme	Lloyd's Register	15th October 2018 (Client opening) • Audit scope and schedule • Fishery performance in 2017 • Updates to fishery background • Client update • Progress against conditions
Al Cass	Lloyd's Register	
Greg Ruggerone	Lloyd's Register	
Jim Seeb	Lloyd's Register	
Christina Burridge	BC Seafood Alliance	
Phil Young	BC Seafood Alliance	
Paul Ryall	BC Seafood Alliance	
Rob Blyth-Skyrme	Lloyd's Register	17th October 2018 (DFO) • Audit scope and schedule • Fishery performance in 2017 • Updates to fishery background • Progress against conditions
Al Cass	Lloyd's Register	
Greg Ruggerone	Lloyd's Register	
Jim Seeb	Lloyd's Register	
Christina Burridge	BC Seafood Alliance	
Phil Young	BC Seafood Alliance	
Paul Ryall	BC Seafood Alliance	
Jeff Grout	DFO	
Matt Mortimer	DFO	
Marla Maxwell	DFO	
Ashley Dobko	DFO	
Katie Beach	DFO (by phone)	
Carolyn Churchland	DFO (by phone)	
Diana Dobson	DFO (by phone)	
Jennifer Sandher	DFO (by phone)	
Megan Acheson	MSC (observer)	
Rob Blyth-Skyrme	Lloyd's Register	18th October 2018 (Marine Conservation Caucus) • Audit scope and schedule • Fishery performance in 2017 • Changes to fishery background • MCC research and information update • MCC concerns about conditions
Al Cass	Lloyd's Register	
Greg Ruggerone	Lloyd's Register	
Jim Seeb	Lloyd's Register	
Greg Taylor	MCC	
Andy Rosenberger	MCC (by phone)	
Megan Acheson	MSC (observer)	
Kurtis Hayne	MSC (observer)	
Rob Blyth-Skyrme	Lloyd's Register	18th October 2018 (Client closing) • Audit closing and initial findings • Timetable for report • Team observations
Al Cass	Lloyd's Register	
Greg Ruggerone	Lloyd's Register	
Jim Seeb	Lloyd's Register	
Christina Burridge	BC Seafood Alliance	
Phil Young	BC Seafood Alliance	

What was inspected

This audit concentrated on assessing whether and/or how the client has been addressing the conditions raised in the original assessment (Blyth-Skyrme *et al*. 2017). This was done by review of information provided to the Assessment Team by the client in written form (as summarised against each Condition in Section 5 of this report – see the sections entitled "Client Update on Progress [Year 1]"), and in meetings held during the site visit (see Table 1, above).

In addition, the BC Salmon Fishery's performance in 2017 with respect to catch and escapement was reviewed.

Stakeholder Consultation

A total of 69 stakeholder organisations and individuals having relevant interest in the assessment were identified and invited to participate in this surveillance audit, including all those contacted during the original reassessment process. The interest of others not appearing on this list was solicited through the postings on the MSC website (https://fisheries.msc.org/en/fisheries/british-columbia-salmon/@@assessments).

Only the Marine Conservation Caucus (MCC) chose to meet with the Assessment Team and provide a stakeholder submission (see Appendix 2. Stakeholder submissions).

The Assessment Team notes that the MCC participated in this audit as well as the reassessment of the fishery in 2015/16. We consider stakeholder input to be an extremely important part of the MSC assessment and audit process. Efforts were made by the MCC this year to focus its commentary on specific issues, which was helpful, but we strongly encourage the MCC to further refine its input to future audits by tendering just one or two concisely written, well-referenced submissions.

3 Surveillance Standards

MSC Standards, Requirements and Guidance used

This surveillance audit was carried out according to the MSC Fisheries Certification Requirements v2.0 (MSC 2014).

Confirmation that destructive fishing practices or controversial unilateral exemptions have not been introduced

No indication was given or suggested during the surveillance audit to suggest that either of these practices is in evidence for this fishery

4 Updated Fishery Background

4.1 The 2017 BC Salmon Fishery

There are three Units of Certification (UoCs) in the BC Salmon Fishery, all of which cover non-First Nation commercial salmon fisheries, First Nations Excess Salmon to Spawning Requirement (ESSR) fisheries and First Nations Economic Opportunity (EO) fisheries. UoC 1 includes those fisheries targeting sockeye salmon, pink salmon and chum salmon in the North and Central Coast (North and Central Coast) of BC, UoC 2 includes those fisheries targeting sockeye salmon, pink salmon and chum salmon in the Inner Southern including Fraser River area of BC, while UoC 3 includes those fisheries targeting only sockeye salmon and chum salmon in West Coast Vancouver Island (WCVI).

Commercial fishing fleets are designated by area and gear type according to the Pacific Fisheries Management Area (PFMA) Regulations, as follows (see Figures 1-8):

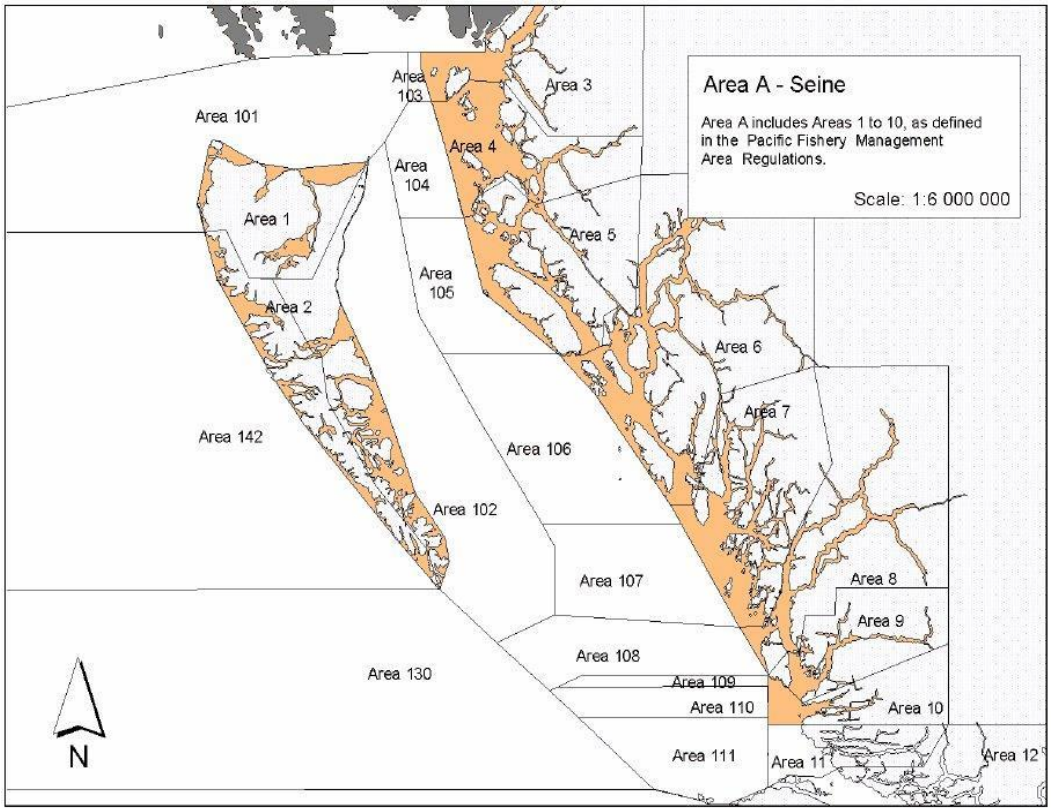


Figure 1: BC Salmon Fishery management area A – seine

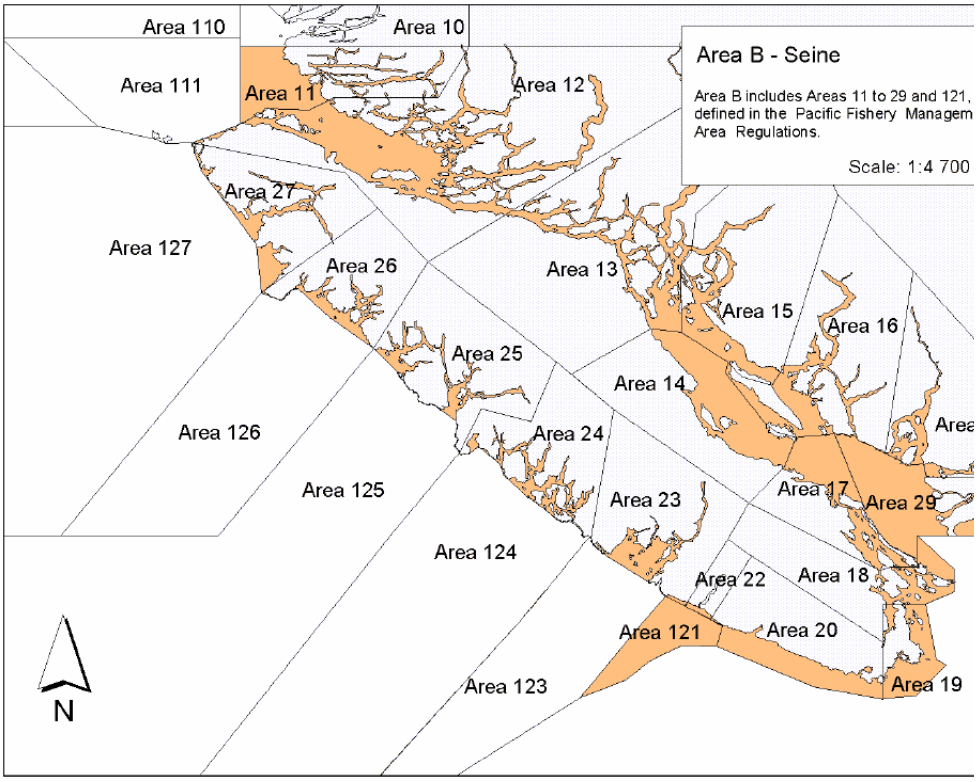


Figure 2: BC Salmon Fishery management area B – seine

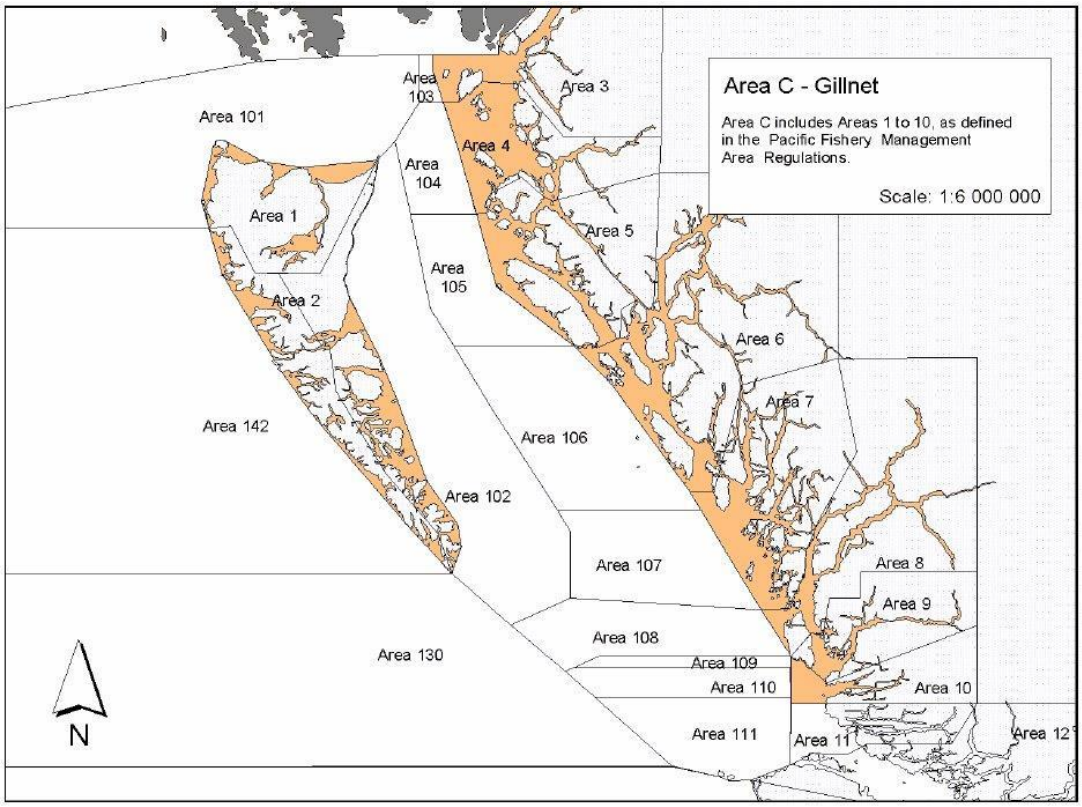


Figure 3: BC Salmon Fishery management area C – gillnet

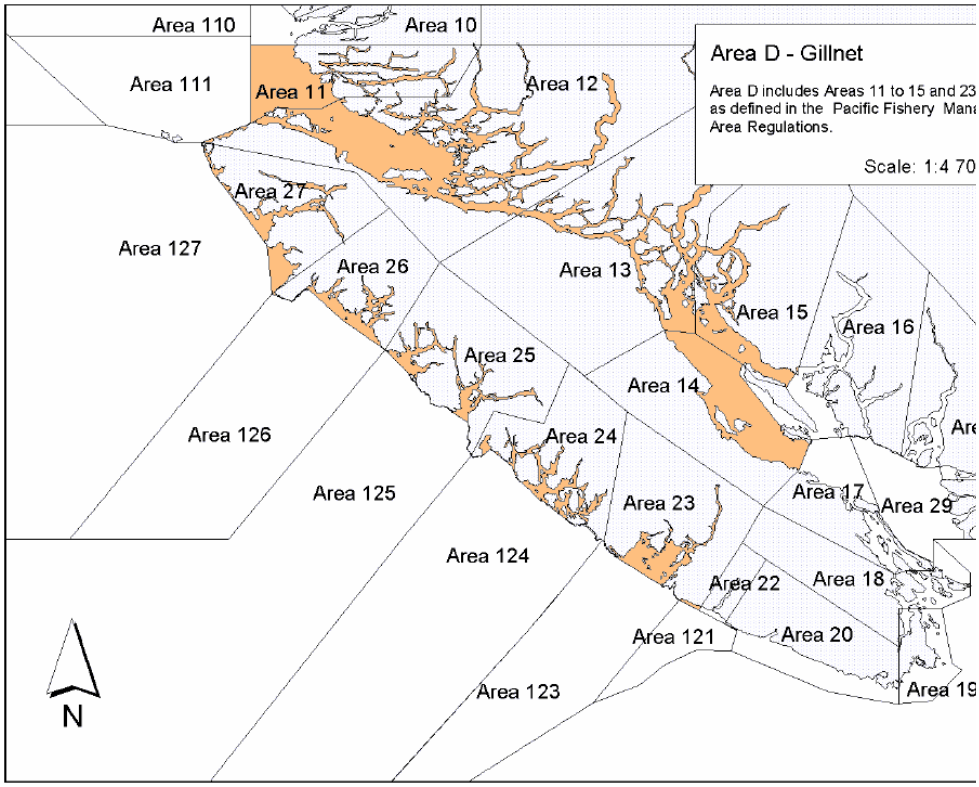


Figure 4: BC Salmon Fishery management area D – gillnet

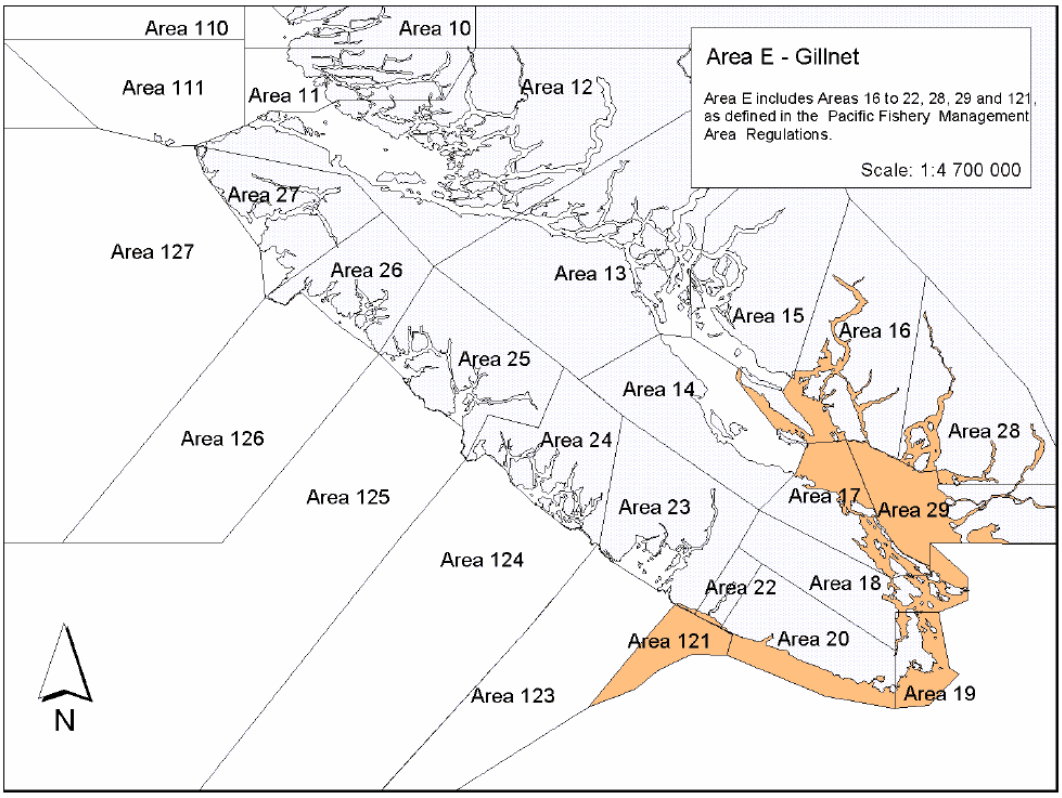


Figure 5: BC Salmon Fishery management area E – gillnet

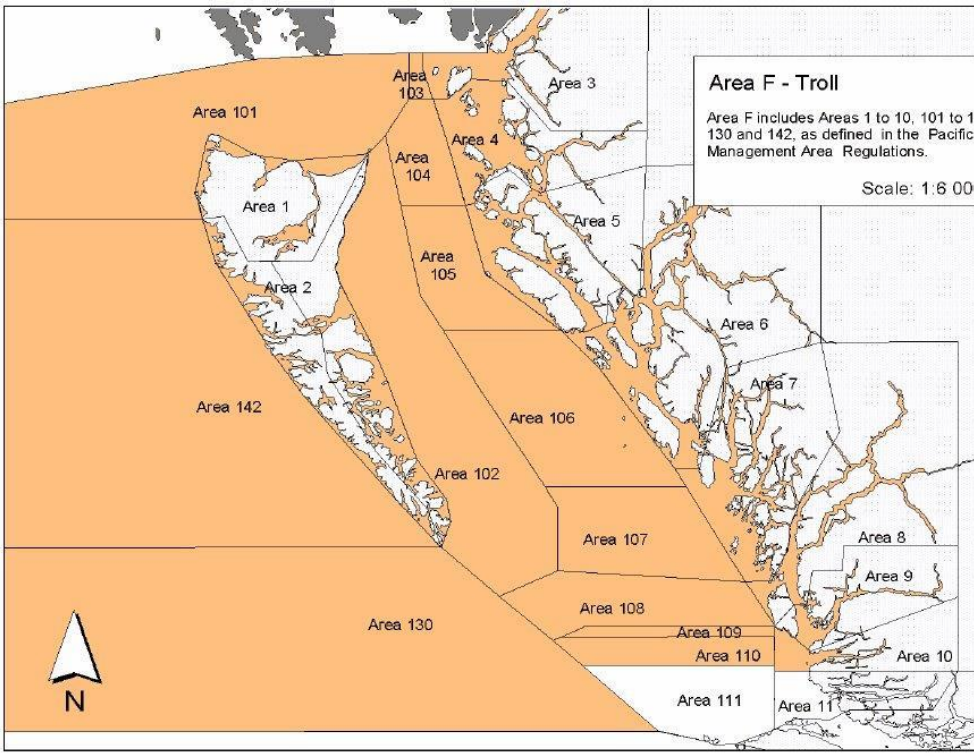


Figure 6: BC Salmon Fishery management area F – troll

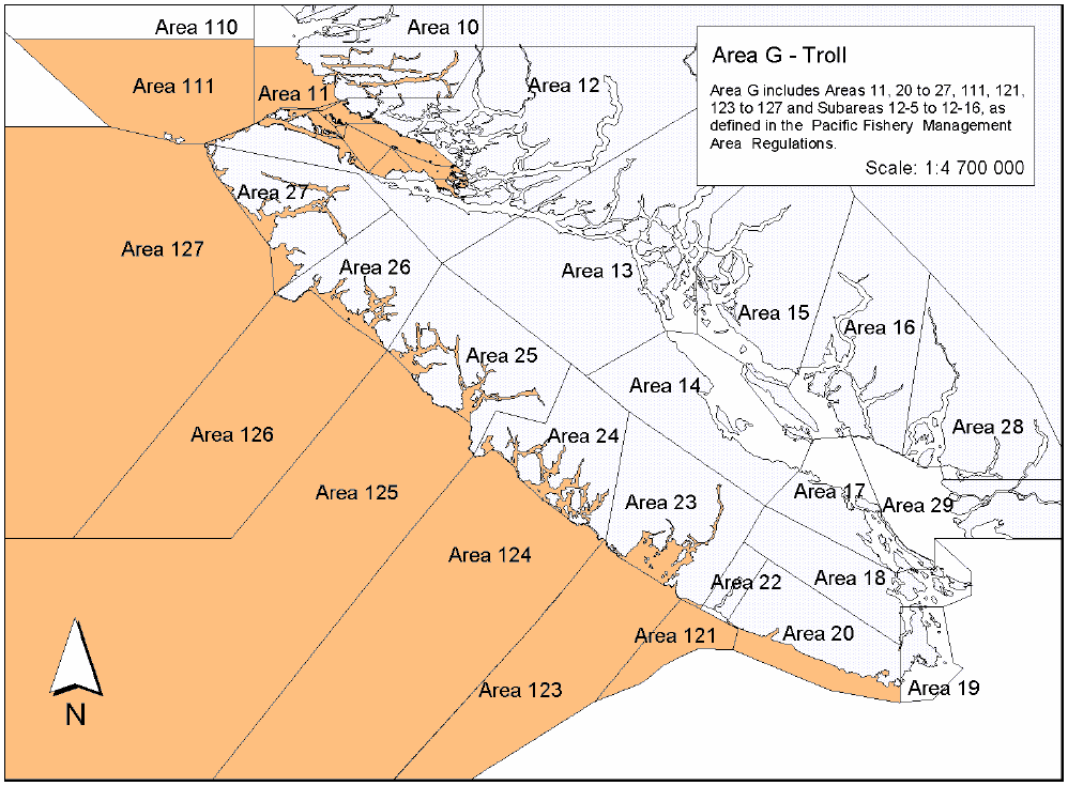


Figure 7: BC Salmon Fishery management area G – troll

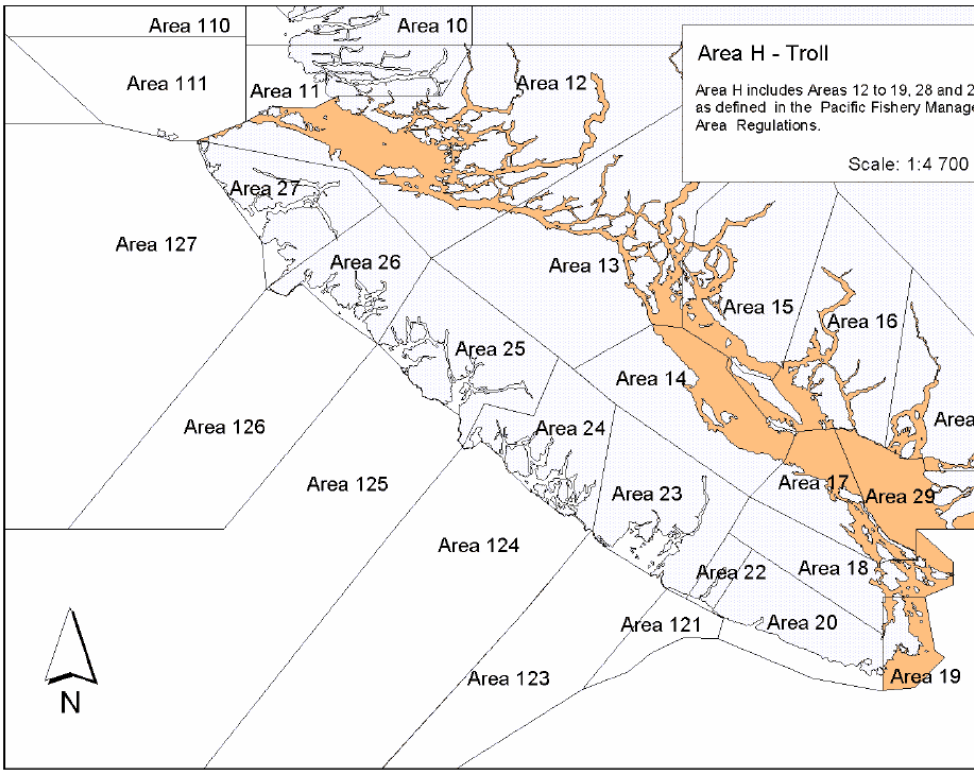


Figure 8: BC Salmon Fishery management area H – troll

UoC 1 – North and Central Coast

The Northern BC Integrated Fisheries Management Plan, June 1, 2017 – May 31, 2018, is available online, here: http://waves-vagues.dfo-mpo.gc.ca/Library/40600993.pdf.

Table 2 provides a summary of the total number of salmon retained by the certified commercial fisheries in UoC 1 for the period April 1, 2017 to March 31, 2018.There were no EO or ESSR fisheries in UoC 1 in 2017. Data were obtained from DFO, with additional review by the client to ensure catches were correctly attributed to UoC 1 (https://www-ops2.pac.dfo-mpo.gc.ca/Fos2_Internet/commercialSM/salmonCatchStats.cfm?year=2017).

Table 2: 2017 total commercial salmon retained catch to date (pieces) for UoC 1, North and Central Coast, April 1, 2017 – March 31, 2018.

Fishery	Sockeye	Pink	Chum
Area A – Seine	0	1,517,775	135,741
Area C – Gillnet	35,713	50,486	257,996
Area F – Troll	0	38,763	340
Total	35,713	1,607,024	394,077

Notes:
1. Data are of commercial fisheries and do not include catches from test fishing, recreational or First Nations Food, Social and Ceremonial fisheries.
2. All catch estimates are reported in pieces and included both adults and jacks.

The following information was provided to the Assessment Team by the client, taken from the DFO North Coast post-season review for the 2017 fishery.

Sockeye salmon:

- Area 3: The first commercial gill net sockeye salmon opening in Area 3 occurred June 7 with 61 vessels taking part in the fishery. However low sockeye salmon escapement estimates starting in June and persisting until the end of the season resulted in fishing time reductions. The 9 gillnet openings and 1,078 vessel operating days achieved a final gillnet catch of 34,900.

Pink salmon:

- Area 1/101: The majority of troll catch and effort was reported in Area 1/101 with a harvest of 33,000 pink salmon being recorded.
- Area 3: Commercial fishery openings in Area 3 for 2017 were: 9 gillnet and 14 seine. DFO closed Area 3 on 3 July to gillnet fisheries because of low sockeye salmon returns and on August 8 for seine fisheries. Commercial gillnet and seine harvest and release data for Nass salmon and steelhead trout in Area 3 indicate that the net fisheries caught 678,300 pink salmon.
- Area 6: There was a total of 6 seine openings with 22 vessel operating days. Area 6 seine pink salmon catch was 113,300. Gillnet fisheries started July 10 with 35 vessels fishing in Area 6-1 to take advantage of chum salmon returning to the Kitimat hatchery. For this fishery, there were 9 gillnet openings with 237 operating days. Gillnets finished the season with a final pink catch of 5,500.
- Area 7: There were 2 gillnet fisheries and no seine fisheries in 2017. Gillnets reported a total harvest of 900 pink salmon.
- Area 8: In total, there were 12 openings for gillnets in Area 8 and four conducted by the Nuxalk First Nation. Combined effort was 1,370 boat days (Area C 1,334 boat days and Nuxalk 36 boat days). Gillnets reported a total harvest of 46,400 pink salmon (with a further 1,300 pinks released). There were 6 seine fisheries, with a total harvest of 700,700.

Chum salmon:

- Area 3: Total commercial chum salmon catch for Area 3 was 60,496, of which seines took 56,288, and gillnets took 4,208. Seines also released 19,800 chum salmon.
- Area 6: Commercial gillnets took 17,740 chum salmon.
- Area 7: Commercial gillnets took 3,138 chum salmon.
- Area 8: This was the largest North and Central Coast fishery for chum salmon in 2017, harvesting 249,671 chum salmon in gillnets and 80,453 in seine fisheries.
- There were no EO or ESSR fisheries for chum on the North Coast in 2017.

UoC 2: Inner Southern including Fraser River.

The Southern BC Integrated Fisheries Management Plan, June 1, 2017 – May 31, 2018, is available online, here: http://waves-vagues.dfo-mpo.gc.ca/Library/40601006.pdf.

Table 3 provides a summary of the total number of salmon retained by certified commercial fisheries in UoC 2 for the period April 1, 2017 to March 31, 2018.EO and ESSR fisheries did occur in UoC 2 in 2017, as shown in the table. Data were obtained from DFO, with additional review by the client to ensure catches were correctly attributed to UoC 2 (https://www-ops2.pac.dfo-mpo.gc.ca/Fos2_Internet/commercialSM/salmonCatchStats.cfm?year=2017).

Table 3: 2017 total commercial salmon retained catch to date (pieces) for UoC 2, Inner South including Fraser River, April 1, 2017 – March 31, 2018.

Fishery	Sockeye	Pink	Chum
Area B – Seine	0	682	399,957
Area D – Gillnet	0	3	113,183
Area E – Gillnet	0	1	258,093
Area H – Troll	0	14	17,580
Cowichan Demonstration	0	0	11,025
Cowichan ESSR	0	0	5,000
Snuneymuxw ESSR	0	0	229
Lower Fraser ESSR	0	0	13,447
Lower Fraser EO	0	0	109,522
Total	0	700	928,036

Notes:
1. Data are of commercial fisheries and do not include test fishing, recreational or First Nations Food, Social and Ceremonial data.
2. All catch estimates are reported in pieces and included both adults and jacks.

The following information was provided to the Assessment Team by the client, taken from the DFO South Coast post-season review for the 2017 fishery.

Sockeye salmon:

- No commercial fisheries for sockeye salmon occurred in UoC 2 in 2017.
- Sockeye salmon returns to the Fraser River were 1.5 million and accordingly efforts focused on conservation; there were only very limited harvest opportunities for Fraser River sockeye salmon in First Nations FSC fisheries in which marine First Nations harvested 10,600 (9,200 in Canada and 1,400 in US) sockeye and in-river First Nations harvested 60,000.

Pink salmon:

- Poor freshwater conditions during the fall and winter of 2015/2016 and indications of poor marine state in 2016 likely contributed to a regional decline of pink salmon production.
- Areas 11-13 are of cycle for most systems (even year dominant). Strait of Georgia is also typically even year dominant, lower than brood in most areas.
- There were no ESSR fisheries conducted in 2017.

Chum salmon:

- Areas 11-13. For 2017, the seine fisheries were held on October 2 and October 16 harvesting a total of 288,100 chum salmon over the openings. Gillnet fisheries were held on October 5 to 7, 10 to 12 and Oct 24 to 26, harvesting a total of 96,200 chum salmon over all three openings.
- Area 14. Gillnets harvested a total of 17,000 chum salmon.
- Area 16. In 2017 there were gillnet, seine and troll openings for Nanaimo River chum salmon. The preliminary catches in the fisheries were 88,944 for gillnets, 35,522 for seines and 0 for troll.
- Areas 18 and 19. The total gillnet catch is estimated to be approximately 90,000 chum salmon, while the total seine catch is estimated at 75,000.

- A Cowichan Tribes commercial demonstration fishery began October 31 for approximately 13% of the forecasted surplus for the week, catching approximately 11,000 chum salmon. In addition there was an ESSR harvest by the Cowichan Tribes at the hatchery for 5,000 chum salmon.
- Area 29. Some of the lower Fraser River First Nations participated in EO and commercial "demonstration fisheries" with a total catch of 109,522 chum salmon. There were several FN ESSR chum salmon fisheries in the Lower Fraser conducted at Chehalis, Chilliwack, and Inch Creek Hatcheries for a total catch of 13,447.
- Two Area E gill net commercial openings took place in the Fraser River during the 2017 season, consisting of an 11 hour fishery on October 24 and an 11 hour fishery on October 27, for a total estimated harvest of 77,139 chum salmon retained.

UoC 3: West Coast Vancouver Island.

The Southern BC Integrated Fisheries Management Plan, June 1, 2017 – May 31, 2018, is available online, here: http://waves-vagues.dfo-mpo.gc.ca/Library/40601006.pdf.

Table 4 provides a summary of the total number of salmon retained by certified commercial fisheries in UoC 3 for the period April 1, 2017 to March 31, 2018.EO and ESSR fisheries did occur in UoC 3 in 2017, as shown in the table. Data were obtained from DFO, with additional review by the client to ensure catches were correctly attributed to UoC 2 (https://www-ops2.pac.dfo-mpo.gc.ca/Fos2_Internet/commercialSM/salmonCatchStats.cfm?year=2017).

Table 4: 2017 total commercial salmon retained catch to date (pieces) for UoC 3, West Coast Vancouver Island, April 1, 2017 – March 31, 2018.

Fishery	Sockeye	Pink (IPI)	Chum
Area B – Seine	16,463	-	-
Area D – Gillnet	9,936		20,435
Area E – Gillnet	-		36,051
Area G – Troll	-	25	156
Ditidhat (Nitinat) ESSR	-	-	23,082
Ditidhat (Nitinat) Broodstock	-	-	30,267
Total	26,399	25 (IPI)	109,991

Notes:
1. Data are of commercial fisheries and do not include test fishing, recreational or First Nations Food, Social and Ceremonial data.
2. All catch estimates are reported in pieces and included both adults and jacks.

The following information was provided to the Assessment Team by the client, taken from the DFO South Coast post-season review for the 2017 fishery.

Sockeye salmon:

- Area 23. The Somass sockeye salmon return was above pre-season expectations, and fishing opportunities were provided to all sectors. The commercial gillnet harvest was a total of 9,936 sockeye salmon while the seine harvest was 16,463.

Pink salmon:

- Pink salmon is Inseparable / Practically Inseparable (IPI) in the WCVI fishery (see Section 4.10 of this report).

Chum salmon:

- Areas 21 and 22. Gillnets had three 12 hour days of fishing for 36,051 chum salmon. The Ditidaht First Nation was issued an ESSR Licence for chum salmon at Nitinat Lake and Nitinat hatchery. The catch by gillnet in the lake was 23,082. The catch collected for Broodstock was 30,267
- Area 25. The gillnet fishery was limited to four vessels, for 5,770 chum salmon retained.
- Area 26. A limited effort gillnet chum salmon fishery opened in Kyuquot Sound on September 26. The total catch was 8,284 chum salmon.

4.2 Changes in the management system and/or relevant regulations

No significant changes were made to fishery management or to the stock assessment system since the 2017 year. Other developments include the following:

1) For Skeena River sockeye salmon, DFO adopted the recommendation from the Skeena First Nations Technical Committee to change the fishery trigger level for the First Nations Section 35(1) fishery from 400,000 to 600,000 sockeye salmon as a means to further protect Skeena River sockeye salmon given the very small projected return in 2017. The 2017 fishing season will start closed for fisheries targeting Skeena River sockeye salmon and measures will be taken to minimize the by-catch of Skeena River sockeye salmon in all fisheries targeting other non-sockeye salmon stocks or other species. The allowable commercial exploitation rate remains at 0% for a preseason run forecast below 1.05 million, increasing to 20% at a projected run size of 2.0 million, 30% at 3.0 million, and up to a maximum of 40% at a return of 4.0 million or greater.

2) On February 6, 2018, the Government of Canada introduced a Bill (Bill C-68) in Parliament that proposes amendments to the Fisheries Act. On June 20, 2018, the House of Commons adopted Bill C-68. The Bill is now before the Senate for review (http://www.parl.ca/DocumentViewer/en/42-1/bill/C-68/first-reading). The Bill contains proposed amendments related to maintaining fish stocks and implementing rebuilding plans for fish stocks that have declined. However, as the Bill has not yet been passed, it is too early to ascertain potential impacts to the directed fishery for salmon.

3) Regulatory amendments to the Marine Mammal Regulations (https://laws-lois.justice.gc.ca/eng/regulations/SOR-93-56/index.html) were adopted on July 11, 2018 to reduce human disturbance of marine mammals by controlling whale watching and other activities. The objective of the proposed amendments is to ensure the conservation and protection of marine mammals. There is concern that the cumulative effects of repetitive exposure and interaction with humans may interrupt or prevent marine mammals from completing normal life processes (example, mating, calving and nursing), cause habituation of the animals with human activities, and threaten the overall survival of individual animals.

   The amended Marine Mammal Regulations for whale watching and approaching marine mammals came into effect on July 11, 2018. The regulations include a minimum approach distance of 200 meters for all killer whale populations in Canada's Pacific waters and 100 meters for other whales, dolphins and porpoises.

4) The largest marine mammal survey in Canadian Pacific waters will get underway July 3 to September 6, 2018, will cover the offshore waters within Canada's Exclusive Economic Zone and inshore areas. More info can be found at: https://www.canada.ca/en/fisheries-oceans/news/2018/07/dfo-conducting-largest-marine-mammal-survey-ever-in-canadas-pacific-waters.html.

5) Minister LeBlanc announced the creation of a new Sustainable Fisheries Resource Advisory Council of Canada (SFRACC), a national arm's-length advisory body designed to offer the Minister broad-based advice and recommendations on fisheries issues. More details can be found at: https://www.canada.ca/en/fisheries-oceans/news/2018/04/government-of-canada-establishes-advisory-panel-on-marine-protected-areas.html.

6) The Pacific Salmon Treaty (PST) was signed by Canada and the United States (US) in 1985 and provides the framework through which the two countries work together to conserve and manage Pacific salmon. Canadian and US representatives on the bilateral Pacific Salmon Commission (PSC) spent several months reviewing five chapters in Annex IV of the Treaty, which expire on December 31, 2018, and negotiating potential amendments. The five expiring chapters are:
   - Chapter 1 (Transboundary Rivers);
   - Chapter 2 (Northern British Columbia and Southeast Alaska);
   - Chapter 3 (Chinook);
   - Chapter 5 (Coho); and
   - Chapter 6 (Chum).

   The PSC has now reached agreement on proposed changes to all five chapters and has provided their recommendation to the governments of Canada and the US for consideration. If ratified by both countries, the agreement would create a new 10-year conservation and harvest sharing arrangement under the PST. Chapter 6 (Chum) covers chum salmon stocks in Southern BC and Washington State. The revised chapter would include new management thresholds ("break points") for Canadian (Fraser River) chum stocks; lower US catch ceilings in years of moderate abundance for Fraser chum with higher catch ceilings in years of high-abundance; and new requirements related to stock assessment and escapement monitoring to inform decision-making.

   The provisions of Chapter 4 Fraser River sockeye and pink salmon expires December 31, 2019 and preliminary negotiations are underway within the PSC, led by the Fraser River Panel.

4.3 Changes to personnel involved in science, management or industry

There have been no significant changes to personnel involved in science or management for the BC Salmon Fishery since the fishery was certified.

In 2017/18, the client was assisted by Paul Ryall, an ex-DFO employee.

4.4 Changes to scientific base of information including stock assessments.

With the exception of the emergency COSEWIC assessment in January 2018 of Thompson River steelhead trout and Chilcotin River steelhead trout, where both populations were assessed to be 'Endangered' based on population declines of 79% and 81% over the last three generations, respectively, there were no significant changes to the scientific base of information including stock assessments.

4.5 Changes and updates on Ecosystem issues

A unique marine heat wave, known as "The Blob", was a prominent feature of the Gulf of Alaska and coastal British Columbia from late 2013 to 2016, a period that could influence salmon returning to BC in 2017. The warm temperatures were associated with strong and persistent sea level pressure over the region, reduced vertical mixing, increased winter stratification, all of which contributed to additional unique oceanographic and biological

conditions (McKinnell 2017, Chandler *et al.* 2018, McDonald *et al.* 2018).
The warm ocean conditions and associated factors were unfavourable for the survival of salmon returning to British Columbia, as highlighted by the synchronous coast-wide decline of sockeye salmon in 2017. Warm ocean conditions are also associated with warm river water, which is an important consideration in the management of Fraser sockeye salmon because high temperature reduces survival of migrating sockeye salmon.

In 2017, the warm "Blob" conditions dissipated and surface ocean temperatures returned to normal for the recent period, 1981-2010 (Chandler et al. 2018). La Niña conditions in the equatorial Pacific contributed to these cooler temperatures. In 2017, the upwelling of cool, nutrient rich water along the west coast of Vancouver Island started later than usual, and was not as intense as earlier years, but conditions were considered favourable for productivity and fish growth. Non-toxic, highly visible, coccolithophorid algal blooms occurred again in 2017 but not to the same extent as in 2016. Numerous gelatinous pyrosomes and salps were observed along the entire BC coast in 2017.

During fall 2018, at the time of this audit, unusually warm "Blob-like" conditions returned to the Gulf of Alaska, raising concerns about the survival of juvenile salmon that will return in 2019 and beyond. It is not known how long these highly warm conditions will persist.

4.6 Updates on enhanced fishery's position in relation to scope criteria

The BC Salmon Fishery is enhanced in part. An update on enhancement activities is provided in Error! Reference source not found.. There are no changes to the fishery's position in relation to scope criteria (i.e., linkages to and maintenance of a wild stock, feeding and husbandry, and habitat and ecosystem impacts), as reported in the full BC Salmon Fishery reassessment report (Blyth-Skyrme *et al.* 2017), so enhancement activities remain in scope.

Table 5: Update on enhancement activities.

Using the latest available data (2016), from http://www.pac.dfo-mpo.gc.ca/sep-pmvs/data-donnees/2018/SC&NC-IFMP-2018-PSR-eng.xlsx); where:

OPS = Major Operations DFO SEP facilities operated by DFO staff.
CDP = Community Economic Development projects that are operated under contract to DFO SEP, by First Nations or community groups, and are supported by Community Advisors.
DPI = Designated Public Involvement projects that are operated by volunteers belonging to community organizations, and are supported by Community Advisors.

UoC	Species	Hatchery	Type		2016 Releases
1: North and Central Coast	Sockeye salmon	Fulton River #1	OPS	Spawning channel	68,226,660
		Fulton River	OPS	River (Natural emerging)	
		Fulton River #2	OPS	Spawning channel	95,397,777
		Pinkut	OPS	Spawning channel	52,685,803
		Pinkut Creek	OPS	River (Natural emerging)	13,797,976
		Atnarko River	OPS	Fed fry	23,789
		Lonesome lake	OPS	Fed fry	29,687
		Total UoC 1 sockeye salmon releases			**239,833,170**
	Pink salmon	N/A	-	N/A	0
		Total UoC 1 pink salmon releases			**0**
	Chum salmon	Kitimat	OPS	Hatchery fed fry	1,766,658
		Snootli Creek	OPS	Hatchery fed fry	7,039,788
		Heiltsuk	CDP	Seapen	1,511,975

		Kitasoo Creek	CDP	Seapen	705,013
		Total UoC 1 chum salmon releases			**11,023,434**
2: Inner Southern including Fraser River	Sockeye salmon	Nadina River	OPS	Spawning channel	9,671,478
		Gates Creek	OPS	Spawning channel	53,315
		Rosewall Creek	OPS	Hatchery fed fry	256,851
		Inch satellite	OPS	Hatchery fed and unfed fry, smolt	1,318,314
		Weaver	OPS	Spawning channel	140,000
		Total UoC 2 sockeye salmon releases			**1,768,480**
	Pink salmon	Puntledge River	OPS	Hatchery unfed	1,813,775
		Quinsam River	OPS	Hatchery unfed	5,835,840
		Englishman	DPI	Hatchery unfed	795,000
		Fanny Bay	DPI	Hatchery unfed	752,685
		Nile Creek	DPI	Hatchery unfed	3,600
		Oyster River	DPI	Hatchery unfed	350,000
		Nanaimo River	CDP	Seapen	782,088
		Port Hardy	CDP	Hatchery unfed	269,702
		Total UoC 2 pink salmon releases			**10,602,690**
	Chum salmon	Big Qualicum River	OPS	Channel	28,213,058
		Big Qualicum River	OPS	Natural Emerging	13,962,715
		Little Qualicum River	OPS	Spawning channel	45,304,800
		Puntledge River	OPS	Hatchery fed fry	2,635,535
		Chapman Creek	DPI	Hatchery unfed fry	12,000
		Fanny Bay	DPI	Hatchery fed fry	45,976
		French Creek	DPI	Hatchery fed fry	89,000
		Goldstream River	DPI	Hatchery fed fry	11,598
		Little River	DPI	Hatchery fed fry	70,000
		Oyster River	DPI	Hatchery fed and unfed fry	319,500
		Gwa'ni	CDP	Hatchery fed fry	174,204
		Nanaimo River	CDP	Hatchery unfed fry	463,337
		Port Hardy	CDP	Hatchery fed fry	30,016
		Powell River	CDP	Hatchery fed fry	786,316
		Sliammon River	CDP	Hatchery fed fry	1,210,900
		Thornton Creek	CDP	Hatchery fed fry	274,816
		Chehalis River	OPS	Hatchery fed fry	3,416,998
		Chilliwack River	OPS	Hatchery fed and unfed fry	2,851,369
		Inch Creek	OPS	Hatchery fed fry	1,606,819
		Tenderfoot Creek	OPS	Hatchery fed fry	1,346,134
		Weaver	OPS	Spawning channel	1,180,000
		Alouette River	DPI	Hatchery fed fry	312,798
		Kanaka Creek	DPI	Hatchery fed fry and eyed egg	260,500
		Nicomekl River	DPI	Hatchery fed fry	32,466
		Serpentine River	DPI	Hatchery fed fry	60,490
		Seymour River	CDP	Hatchery fed fry	353,137
		Total UoC 2 chum salmon releases			**105,024,482**
3: WCVI	Sockeye salmon	N/A	-	N/A	0
		Total UoC 3 sockeye salmon releases			**0**
	Chum salmon	Nitinat River	OPS	Hatchery fed fry and seapen	26,443,305
		Conuma River	OPS	Hatchery fed fry and seapen	4,219,609
		Total UoC 3 chum salmon releases			**30,662,914**

4.7 Harmonisation

A number of Pacific salmon fisheries are MSC certified, including the Alaska Salmon Fishery and the Annette Islands Reserve Fishery, but these target different stocks (Principle 1), the environmental interactions may be different (Principle 2), and the management regime is different (Principle 3). Therefore, there are no fisheries of harmonisation relevance.

4.8 Any developments or changes within the fishery which impact traceability or the ability to segregate between fish from the Unit of Certification (UoC) and fish from outside the UoC (non-certified fish).

There are no developments or changes within the BC Salmon Fishery which impact traceability or the ability to segregate fish from the UoC and fish from outside the UoC.

4.9 TAC and catch data

Please note, salmon catch data are reported in pieces (i.e., fish numbers). Green weight values are therefore based on numbers but with average weight estimates applied as provided by https://www.bcsalmon.ca/five-species/.

Table 6: Catch data for UoC 1 (North and Central Coast)

Criterion	Year	Species	Number
Total Catch (not including recreational or FSC)	2017	Sockeye salmon	35,713
		Pink salmon	1,607,024
		Chum salmon	394,077
UoC share of the catch (%)	2017	Sockeye salmon	100% (of commercial)
		Pink salmon	100% (of commercial)
		Chum salmon	100% (of commercial)
Total green weight catch by UoC	2017	Sockeye salmon	96 t
		Pink salmon	3,214 t
		Chum salmon	1,379 t
	2016	Sockeye salmon	637t
		Pink salmon	3,751t
		Chum salmon	0t

Table 7: Catch data for UoC 2 (Inner Southern Including Fraser River)

Criterion	Year	Species	Number
Total Catch (not including recreational or FSC)	2017	Sockeye salmon	0
		Pink salmon	700
		Chum salmon	928,036
UoC share of the catch (%)	2017	Sockeye salmon	100% (of commercial)
		Pink salmon	100% (of commercial)
		Chum salmon	100% (of commercial)
Total green weight catch by UoC	2017	Sockeye salmon	0 t
		Pink salmon	1.4 t
		Chum salmon	3,248 t
	2016	Sockeye salmon	0t
		Pink salmon	1,053t
		Chum salmon	6,344t

Table 8: Catch data for UoC 3 (West Coast Vancouver Island)

Criterion	Year	Species	Number
Total Catch (not including recreational or FSC)	2017	Sockeye salmon	26,399
		Chum salmon	109,991
UoC share of the catch (%)	2017	Sockeye salmon	100% (of commercial)
		Chum salmon	100% (of commercial)
Total green weight catch by UoC	2017	Sockeye salmon	71 t
		Chum salmon	385 t
	2016	Sockeye salmon	1,970t
		Chum salmon	1,130t

4.10 Inseparable or Practically Inseparable Stocks/Species

Where catches of the target species in a certified fishery include inseparable or practically inseparable (IPI) species/stocks, the MSC requires the CAB at each surveillance audit to review and document the performance of those IPI stock(s) and their eligibility to enter further certified chains of custody (PA5.1, MSC 2014).

<u>UoC 1: North and Central Coast</u>

It is noted that salmon bound for Alaskan rivers do not qualify as IPI because the Alaska fishery is also MSC certified (7.4.13.1.e, MSC 2014); therefore, at the time of certification, there were no IPI catches in UoC 1 (Blyth-Skyrme et al. 2017). The Alaska salmon fishery is still MSC certified, and so there are still considered to be no IPI catches in UoC 1 at this Year 1 audit.

<u>UoC 2: Inner Southern including Fraser River</u>

UoC 2 catches may include a small component of sockeye salmon, pink salmon and chum salmon that are bound for rivers in Washington, Oregon or California, USA. Clearly, these fish cannot be distinguished from Canadian-bound fish during catching or processing, and so they are considered IPI.

At certification, data for 2014 showed that US-bound sockeye salmon and pink salmon each made up less than 1% of the total UoC 2 catch of those species, while data for 2012-2014 showed that US-bound chum salmon made up 1.4% of the UoC 2 catch of chum salmon (Blyth-Skyrme *et al.* 2017). Section 7.4.14.2 of CR v.2.0 provides for an exemption to the IPI requirements, such that very small catches (<2%) of non-target species/stocks may be allowed to enter in to chains of custody without being assessed against the IPI requirements. The exemption was adopted for all three species in UoC 2 at certification.

There were no commercial Fraser River sockeye or pink salmon fisheries in 2016 or 2017 due to conservation constraints for Fraser River sockeye and low abundance of Fraser River pink salmon.

The latest data available for the years 2015-17 show that US-bound chum salmon made 1.2% of the total UoC 2 catch of those species, respectively. Estimates of US Bound chum salmon were developed by Pacific Salmon Commission Chum Technical Committee (P. Van Will). As these catches remain below the 2% threshold, the exemption to the IPI

requirements is still adopted for catches of US-bound sockeye salmon, pink salmon and chum salmon in UoC 2.

UoC 3 : WCVI

Pink salmon is not a Principle 1 target species in UoC 3 and catch data for 2013 and 2014 showed that pink salmon made up just 0.01% of the WCVI catch. As such, an exemption to the IPI requirements was requested for pink salmon in UoC 3, on the basis that this level of catch poses no threat to any pink salmon population. Sockeye salmon and chum salmon fisheries in UoC 3 are centred around terminal areas, such that there is very little risk of IPI stocks being taken.

Past analysis of years with pink salmon harvest have shown that is very little risk of IPI stocks being taken and catches of pink salmon in UoC 3 do not pose a threat to any pink salmon population.

4.11 Summary of Assessment Conditions

The following table summarises the status of each of the 22 Conditions that were set against the BC Salmon Fishery following the completion of the Year 1 Surveillance Audit. A full description of the status is provided in the following section of the report (Section 5).

Table 9: Summary of Condition status following the Year 1 Surveillance Audit

Condition number	UoC	Performance Indicator (PI) and Scoring Issue (SI)	Status	PI Original Score	PI Revised Score
1	1	1.1.1, SIb	Behind Target	75	Not revised
2	1	1.2.4, SIe	Behind Target	75	Not revised
3	1	1.3.1, SIa	Behind Target	75	Not revised
4	1	1.3.3, SIa	Behind Target	75	Not revised
5	2	1.2.3, SIa	On Target	75	Not revised
6	2	1.2.4, SIg	On Target	75	Not revised
7	2	1.3.1, SIa	On Target	75	Not revised
8	2	1.3.2, SIb	Behind Target	75	Not revised
9	2	1.3.3, SIa	Behind Target	65	Not revised
10	2	1.3.3, SIb	Behind Target	65	Not revised
11	3	1.2.4, SIe	On Target	75	Not revised
12	3	1.3.1, SIa	On Target	75	Not revised
13	3	1.3.3, SIa	Behind Target	75	Not revised
14	2	2.1.1, SIa	On Target	75	Not revised
15	All 3	2.1.2, SIc	Behind Target	75	Not revised
16	1 & 2	2.3.1, SIb	Ahead of Target	75 (70 – UoC 2)	Not revised
17	All 3	2.3.1, SIb	Ahead of Target	75 (70 – UoC 2)	Not revised
18	All 3	2.3.1, SIb	Ahead of Target	75 (70 – UoC 2)	Not revised
19	All 3	2.3.2, SIe	On Target	75	Not revised
20	All 3	2.3.3, SIa	On Target	75 (70 – UoC 2)	Not revised
21	All 3	2.4.3, SIb	On Target	75	Not revised
22	All 3	3.2.4, SIb	On Target	70	Not revised

5 Results

5.1 Condition 1

UoC	1: North and Central Coast
Target Species	**Chum salmon**
Performance Indicator	**1.1.1:** The stock management unit (SMU) is at a level which maintains high production and has a low probability of falling below its limit reference point (LRP)
Scoring Issue (SG80)	**b:** The SMU is at or fluctuating around its TRP
Score	**75**
Rationale	SG 60 met by default. Only two of the chum salmon SMUs meet SG80 (Areas 8 & 9 were above the SEG in about 55% of years since 2000) (Ionson 2016). Since 2000, nine SMUs failed to achieve the lower SEG in 50% or more of the years. The estimated harvest rates were typically low in years when the TRP was not met: 0-10% harvest rate in Areas 1, 2E, 2W, 7, 9, 10; 15-25% in Areas 4, 5, 6, and 8, and approximately 34% in Area 3 (Ionson 2016). Chum salmon run reconstruction models incorporate mortality from chum salmon non-retention in Areas 3, 4, and 5 (English et al., 2016). Although management has reduced harvest rates when appropriate, the failure to meet the lower TRP in 50% of years by most SMUs provides evidence that chum salmon do not meet SG80.
Condition	For chum salmon, within **10** years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*The SMU is at or fluctuating around its TRP*."
Milestones	It is noted that milestones are set over 10 years for this Condition. This is because the performance of UoC 1 chum salmon against PI 1.1.1 is influenced by long-term productivity issues and meeting the Condition cannot be achieved within one certification period (FCR 7.11.1.3, MSC 2014). 10 years is set as the timeline as it comprises two generational periods for chum salmon. <u>Year 1</u>: Develop and present a plan to address the condition (resulting score = 75). <u>Year 2</u>: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). <u>Years 3-9</u>: Provide an update to show that the plan is being implemented and present partial results (resulting score = 75). <u>Year 10</u>: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Develop plan to collect information and undertake programs to support status assessment and conduct preliminary analysis. Year 2: Complete CSAS Paper on methods of setting benchmarks in data limited populations with a focus on chum salmon (C. Holt). Year 3: DFO to apply methods detailed in CSAS Paper to develop benchmarks for each CU. The CU benchmark that is adopted will be compared to SEGs for each of the SMUs and adjustments considered where necessary to ensure CU lower biological benchmarks are achieved. Year 4: Industry to participate with DFO to provide an update on progress of work to

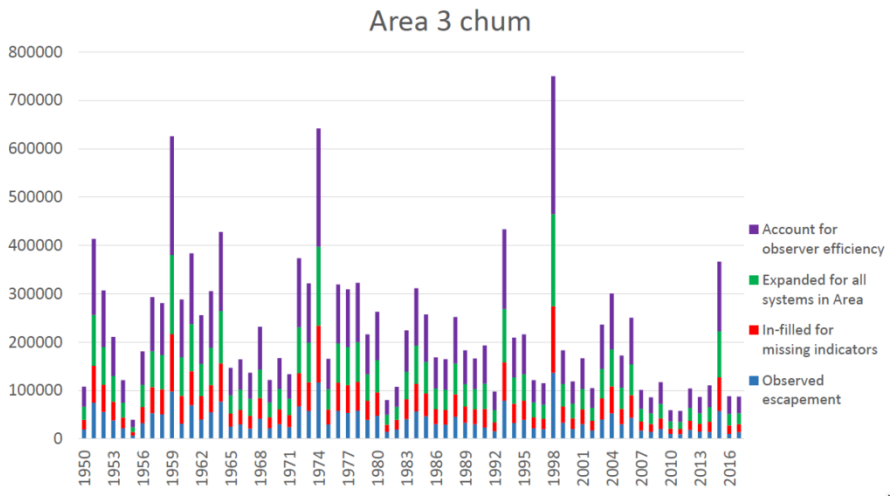
	date. Years 4 – 9: Provide an update on the application of the management plan (IFMP) and performance of chum salmon CUs relative to benchmarks. Consider adjustments to management actions if required consistent with status of each of the stocks. Year 10: Complete a report detailing the information used to set benchmarks, and the record of catches and escapement. This will result in applying a peer reviewed process in the setting of bench-marks, and the catches and escapements from throughout the period that will show each of the stocks are fluctuating around its TRP.
Client Update on Progress [Year 1]	Unfortunately, due to resourcing and other priorities work was not initiated on this Condition. The last comprehensive review of chum stock status for the North Coast was conducted by Spilsted and Pestal (2009). Work will be initiated in 2019 to undertake a preliminary analysis of chum stock status. The research paper Evaluating Benchmarks of Biological Status for Data-Limited Conservation Units of Pacific Salmon, Focusing on Chum Salmon in Southern BC by Holt et al. (2017) was accepted by CSAS with revisions. The working paper was accepted with the revisions. The main conclusion from the CSAS review was that "*percentile benchmarks tend to align or be more precautionary than traditional stock-recruitment models when productivity is moderate to high and harvest rates are low to moderate, according to retrospective analysis and simulation modelling in southern BC Chum Salmon. The specific percentile benchmarks recommended depends on the productivity and harvest rate combination. However, percentile benchmarks perform poorly in medium to high harvest rates with low to medium productivity combinations. Future work is recommended to evaluate their applicability to other Chum Salmon stocks and other salmon species. (CSAS Proceedings Series 2018/001 p. 16)."* Work will be initiated in 2019 on the setting benchmarks for the northern BC chum Conservation Units.
Status of condition	**<u>Behind target</u>** DFO confirmed during the audit meeting that it will begin to set benchmarks for North and Central Coast chum salmon in 2019, but focus will be on areas 3, 4, and 6. The benchmark report by Holt et al. (2017) was completed and will facilitate this effort. However, Holt et al. (2017) acknowledged that additional analyses are needed for chum salmon populations having low productivity and low to moderate harvest rates: *".....under various combinations of moderate-high harvest rates and low-moderate productivities, even the lower benchmark, S50th, tended to be below the "true" Sgen benchmark (Figure 14, bottom right corner). This occurred when harvest rates were approximately ≥40% and productivities were approximately <4 recruits/spawner, or* ***harvest rates were between 20-40% and productivities were low (≤2.5 recruits/spawner). Under these scenarios, percentile-based benchmarks may overestimate status, possibly generating relatively healthy status assessments when conservation concerns may exist. Further research into alternative percentiles or other types of benchmarks (e.g., derived from habitat capacity) are warranted in this case."*** Additional analyses by DFO are needed for chum populations in the North and Central Coast where productivity is very low and harvest rates are low to moderate. The primary concern is that developing benchmarks that are too low will hinder recovery of the depleted populations. **Condition 1 is behind target**, even though some progress has been made. Considerable effort is needed to maintain progress and achieve a passing score. First, as described by Holt et al. (2017), DFO must address the issue of developing benchmarks for chum salmon in this region where productivity is very low and harvest

	rates are low to moderate. Second, DFO must establish new benchmarks if needed using the new methodology, then evaluate the status of chum populations against those benchmarks. This evaluation should account for the contribution of hatchery salmon to catch and spawning escapements, including how hatchery salmon create greater uncertainty in population metrics. Third, in some statistical areas, such as Area 8, there is evidence that the existing target reference point (TRP) is not being met for natural origin chum salmon and harvest rates in the mixed stock fishery (hatchery and wild) are high (see Condition 4, which is behind target). As part of this evaluation, DFO may choose to update the run reconstruction analysis by English et al. (2016), as data such as these are needed for setting benchmarks and evaluating status. Furthermore, as described in Condition 2, it is understood that there is considerable concern within DFO and among stakeholders over the decline in escapement monitoring effort since implementation of the Wild Salmon Policy. High uncertainty in stock status should be considered when developing benchmarks used for managing the fisheries.

5.2 Condition 2

UoC	1: North and Central Coast
Target Species	**Sockeye salmon, pink salmon and chum salmon**
Performance Indicator	**1.2.4:** There is an adequate assessment of the stock status of the SMU
Scoring Issue (SG80)	**e:** The assessment of SMU status, including the choice of indicator populations and methods for evaluating wild salmon in enhanced fisheries is subject to peer review
Score	**75**
Rationale	SG 60 met by default. Much of the assessment of SMU status for sockeye salmon, pink salmon, and chum salmon is based on unpublished documents provided to the Assessment Team by DFO and Bert Ionson (e.g., DFO 2015a, DFO and Ionson 2015a, Ionson 2016). These documents contain highly informative graphs but with little or no written description of data, methods, assumptions, results and discussion. Korman and English (2013) provide a benchmark analysis for Skeena CUs but it is not know to what extent DFO has adopted this analysis. Internal memos have been developed by DFO to address issues about catch and discard reporting accuracy, etc. However, a comprehensive report is needed to document 1) catch and escapement statistics used to develop reference points, 2) total catch mortalities including chum salmon discard estimates that incorporate adjustments for under-reporting in logbooks, 3) methodology to calculate reference points, 4) evaluation of performance in achieving reference points (including how wild salmon managed in large enhanced fisheries), 5) evaluation of CU status, and 6) a discussion of assumptions, findings and uncertainties. Without documentation of status assessments by the management agency in a report, a peer review of SMU status is not possible. Therefore, SG80 is not met for sockeye salmon, chum salmon or pink salmon.
Condition	For all three species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*The assessment of SMU status, including the choice of indicator populations and methods for evaluating wild salmon in enhanced fisheries is subject to peer review*."

Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Compile information to support status assessment and conduct preliminary analysis for sockeye, pink, and chum salmon. Year 2: Complete CSAS Paper on methods of setting benchmarks in data limited populations with a focus on chum salmon (C. Holt). Year 3: DFO to apply process detailed in CSAS Paper and define benchmarks for each CU. Year 4: Write up report detailing requirements in points 1 – 6 above. As well, CU benchmarks that are adopted will be compared to SEGs for each of the SMUs and adjustments considered where necessary to ensure CU lower biological benchmarks are achieved.
Client Update on Progress [Year 1]	This work has not been conducted due to resourcing issues. Many issues with the Pacific Salmon Explorer analyses have been documented by the sockeye biologist in the past, but in the absence of more thorough review, the PSE status and gap information can be used for interim status assessments for North and Central Coast Sockeye. **Year 2 Status** The research paper Evaluating Benchmarks of Biological Status for Data-Limited Conservation Units of Pacific Salmon, Focusing on Chum Salmon in Southern BC by Holt et al. (2017) was accepted by CSAS with revisions. The working paper was accepted with the revisions. The main conclusion from the CSAS review was that "*percentile benchmarks tend to align or be more precautionary than traditional stock-recruitment models when productivity is moderate to high and harvest rates are low to moderate, according to retrospective analysis and simulation modelling in southern BC Chum Salmon. The specific percentile benchmarks recommended depends on the productivity and harvest rate combination. However, percentile benchmarks perform poorly in medium to high harvest rates with low to medium productivity combinations. Future work is recommended to evaluate their applicability to other Chum Salmon stocks and other salmon species. (CSAS Proceedings Series 2018/001 p. 16)."* Work will be initiated in 2019 on the setting benchmarks for the northern BC chum Conservation Units.
Status of condition	**Behind target.** A plan to address the condition needs to be developed, then implemented. DFO noted at the audit meeting that some new staff have been hired in the North and Central Coast but that the Section Head position previously occupied by Dave Peacock (retired) has yet to be filled permanently. DFO noted that considerable effort is being made to improve the quality of escapement estimates via training of surveyors. However, it was also stated that the budget for monitoring escapement has not increased and that the steady decline in monitoring effort, as documented by English et al. (2016) and Price et al. (2017) will not be reversed at least in the near future. As an illustration of the monitoring effort problem, Beach (2017) reported in the 2017 post season review that most fishing on chum in 2017 was focused in Areas 3 and 6, yet ~85% of the estimated total escapement in Area 3 was from expansions of observed escapement counts based on observer efficiency, unmonitored streams,

	and infilling of missing indicators streams:  On July 25, 2018, an email was sent from DFO North and Central Coast Directors (e.g., Collin Masson) to Carmel Lowe (Regional Director, Science) stating that funding is insufficient to adequately monitor salmon stocks in the North and Central Coast region (Masson 2018). The letter also described how the lack of funds hinders DFO's ability to address stock assessment issues raised by First Nations and other stakeholders. The email highlights the need for additional funds to support salmon stock assessments so that fisheries can be safely prosecuted and stocks conserved, as required in policy. The Assessment Team encourages the Client to assist DFO with obtaining funds needed to adequately conduct stock assessments. A key component of Condition 2 involves the production of a comprehensive annual report that documents 1) catch and escapement statistics used to develop reference points, 2) total catch mortalities including chum salmon discard estimates that incorporate adjustments for under-reporting in logbooks, 3) methodology to calculate reference points, 4) evaluation of performance in achieving reference points (including how wild salmon are managed in large enhanced fisheries), 5) evaluation of CU status, and 6) a discussion of assumptions, findings and uncertainties. This report could build from the DFO reports produced for the MSC review in 2009 (e.g., Splitsted & Pestal 2009a, Splitsted & Pestal 2009b).

5.3 Condition 3

UoC	1: North and Central Coast
Target Species	**Sockeye salmon**
Performance Indicator	**1.3.1:** Enhancement activities do not negatively impact wild stock(s)
Scoring Issue (SG80)	**a:** It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks
Score	**75**
Rationale	Available information (e.g., Price & Connors 2014) provides some evidence that the sockeye salmon spawning channels likely do not have a negative impact on wild sockeye salmon productivity and diversity, indicating that SG60 is met. However,

	SG80 is not met until evidence is provided that it is highly likely that production from the spawning channels does not negatively impact wild sockeye salmon productivity and diversity.
Condition	For sockeye salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Finalize report dealing with productivity of Babine Lake. Year 2: Review draft report and determine if additional studies are required to demonstrate meeting the condition. Years 3 and 4: Follow-up with additional studies, analysis and report(s) as appropriate (see note below). A report dealing with productivity of Babine Lake sockeye salmon (supported by the PSC Northern Fund) is focused on recent declining productivity trends in Babine Lake and identifying potential causes. Productivity contributions by enhancement and their impacts are being considered in the review and will provide an analysis of whether enhancement is having a negative impact on the productivity of wild stocks. The status of these action items will be detailed in each of the annual audits. NOTE: Based on discussion with stock assessment biologists, obtaining further evidence to demonstrate that the spawning channels are not having a negative impact on Babine wild stocks or other Skeena wild stocks is problematic. Historic numerical comparisons of smolt output from each of wild and enhanced systems are not separately available. Behavioural (e.g., migration timing) and physiological characteristics (e.g. size, scale, DNA, etc.) of smolts and adults from each of the systems are indistinguishable. Accordingly, the lack of a relationship of productivity as detailed in Price and Connors, 2014 may be the best indication that the spawning channels are not having a negative impact on other Babine and Skeena wild stocks.
Client Update on Progress [Year 1]	Babine Lake sockeye salmon comprise the bulk (90%) of Skeena River sockeye captured in Canadian and U.S. fisheries. Any reductions in returns significantly affect fisheries and subsistence in both countries. The worrisome trends observed in freshwater survival, and routinely depressed escapements over the past ~20 years, highlight the critical importance of understanding the modern freshwater ecology of Babine Lake sockeye salmon and their nursery habitat. The PSC Northern Endowment Fund has provided funding for studies to gather long-term data to assess specific mechanisms of lake change and stock decline so that informed decisions can be made to guide fisheries resource management, salmon enhancement, and habitat stewardship. As such, the current project led by Dr. Selbie consists of lake-wide limnological assessments, surveys of juvenile sockeye abundance, size, feeding ecology, physiological condition and freshwater survival, and an implementation of a spatially-resolved multiple trophic level paleolimnological food web assessment over the last 200 years (or more).

	Selbie et al. (2018) completed year one of a multi-year study that is examining the productivity of Babine Lake.
Status of condition	**<u>Behind Target.</u>** The progress report by Dr. Selbie (Barouillet et al. 2018) involving a paleoliminological investigation of Babine Lake based on sediment core samples is interesting and could eventually shed light on lake production over the past ~200 years. However, it is not clear from this progress report how the specific MSC question is addressed of whether Fulton and Pinkut creek spawning channel sockeye have adversely affected productivity (and diversity) of wild sockeye salmon in Babine Lake. Assuming this research effort is designed to specifically address this MSC Condition 3, it should describe the hypothesis that will be tested and what analyses will be undertaken. The progress report implies that core samples taken near Fulton and Pinkut creeks reflect changes over time in those two nearby creeks, but what evidence can be presented to support the suggestion that other regions of the lake are not strongly influenced by spawning channel sockeye salmon, e.g., sockeye densities? In other words, a description of the experimental controls is needed. Price and Connors (2014) stated that their approach of using sockeye return per spawner data to estimate the effects of spawning channel sockeye on wild sockeye in the Skeena watershed is weak because the metric spans the entire life sockeye salmon (they did not detect an effect). They would have preferred to use smolts per spawner and adults per smolt data in this assessment but smolt abundances were not assessed in a number of years. Smolt counting has resumed in recent years but it is unknown if counts will continue into the future. DFO noted that escapement goals of sockeye in the Skeena watershed will be examined via a CSAS effort in 2019 and that these analyses might shed light on Condition 3, but this effort is not specifically designed to address Condition 3. The plan is to develop an aggregate escapement goal for the Skeena (and Nass) watershed with the objective of keeping the CUs above the lower benchmark. The analysis will look at productivity of wild versus enhanced runs. Condition 3 is behind target because it is not clear how Condition 3 will be addressed. Some information has been provided to the Assessment Team, but this information needs to be directly linked to the condition. We note that the ongoing collection of smolt data (abundance, size at age) at Babine is key for assessing Condition 3.

5.4 Condition 4

UoC	1: North and Central Coast
Target Species	**Chum salmon**
Performance Indicator	**1.3.3:** Relevant information is collected and assessments are adequate to determine the effect of enhancement activities on wild stock(s)
Scoring Issue (SG80)	**a:** Sufficient relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery brood stock
Score	**75**
Rationale	For chum salmon, some relevant information is available, but information provided to the Assessment Team is not sufficient for the contribution of enhanced adult chum salmon to three of four Bella Coola River tributaries where fry are released, to the Bella Coola River, and to the hatchery brood stock. The Bella Coola River is a major

	index river for evaluating achievement of target reference points (escapement goals) in Area 8, leading to some uncertainty whether the goal is being met with wild chum salmon; spawning escapements should be revised after excluding the contributions by hatchery chum salmon. Additionally, while data were available to estimate the percentage of hatchery and wild-origin chum salmon in the 2012 and 2013 fishery harvests, no such data were provided for recent years such as 2014 when 24% of the total chum run was harvested and total escapement was well below the lower goal in Area 8. This information is needed to ensure that harvests on hatchery chum salmon do not impact achievement of spawning escapement goals for wild chum. Therefore, for chum salmon, SG60 is met but SG80 is not met.
Condition	For chum salmon, within **4** years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Sufficient relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery brood stock*."
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Develop a plan to collect information and conduct analyses to estimate the enhanced contributions to four enhanced tributaries in the Bella Coola River system, and to evaluate the contribution of wild origin salmon to the escapement goal. Year 2: Undertake analysis of data collected over the last 15 years to estimate the enhanced contribution to the commercial catch, the spawning escapement, and the brood stock collection for the Bella Coola River, including the four enhanced tributaries. Evaluate the spawning escapement of wild chum salmon relative to escapement goals in the Bella Coola River over the past 15 years. Years 3 & 4: Complete and update the report identified in Year 2 summarizing the enhanced contribution of chum salmon in the Bella Coola River system and escapements of wild chum salmon in managed systems in Area 8 versus the escapement goals. Provide annual updates on contributions of enhanced fish to commercial catch, spawning escapements and brood stock collection.
Client Update on Progress [Year 1]	A data collection and analysis plan was formalized and is currently being executed to estimate the enhanced contributions of chum in the Bella Coola River systems. Snootli Creek Hatchery enhances four tributaries within the Bella Coola watershed. For assessment purposes, Snootli Creek chum are marked with an adipose-fin-clip. These clipped fish are recovered in the Area 8 commercial fishery and enumerated in the escapement every fall. Based on the adult mark rate, enhanced contribution to the total escapement is calculated for Snootli Creek (Table 1). This estimate will be used as an index for calculating enhanced contribution to the remaining enhanced systems (Thorsen Creek, Salloomt Creek and Fish Creek/Airport Channel). By year four of reporting, the data set will span 15 Years.

Table 1: Total Escapement of Major Bella Coola Tributaries

*2004 brood were not clipped, enhanced contribution is an estimate based on age distribution 2007 to 2009 returns.

Year	Total Escapement to Major Bella Coola Tributaries				Enhanced Contribution
	Snootli Creek	Thorsen Creek	Salloomt Creek	Fish &Airport	Snootli Creek
2005	6308	6408	2597	2431	13.5%
2006	4140	7327	1922	2480	26.4%
2007*	7399	5490	2262	2285	10.0%
2008*	3498	2933	1553	2046	30.9%
2009*	3409	2599	949	2846	19.7%
2010	1732	1762	1109	965	35.6%
2011	16384	7371	5689	2650	11.4%
2012	7994	4197	1153	2126	29.8%
2013	12177	8926	1775	6558	45.7%
2014	2007	2536	1328	4035	48.5%
2015	17939	1804	1983	1807	18.6%
2016	27778	7387	2973	8658	14.6%
2017	14277	1657	1778	1841	30.0%

Spiltsted and Pestal (2009) summarizes the population structure of North Coast & Central Coast chum by grouping individual spawning sites according to management area, statistical area, and conservation unit. The MEG of chum for managed systems in Area 8 are listed in Table 6 and Figure 9, and provide a summary of trends in commercial harvest, index of escapement, survey coverage and total escapement to Area 8. The chum escapement goal to the Bella Coola is 60,000.

Annual chum catches depend on in-season assessments of actual stock strength, management measures taken to ensure conservation of individual stocks. Fishery management actions are taken to address conservation of the entire CU, with the objective of ensuring spawner abundance is distributed across populations within the area.

The Area 8 net fishery which targets enhanced Bella Coola chum salmon occurs in the Bella Coola Gillnet Area (Burke Channel) for gillnets and Fisher Channel - Fitz Hugh Sound area for seines and gillnets. Some of the net fishery area occurs as a mixed stock chum fishery; however commercial fishery guidelines attempt to limit impacts on non-target species. Gillnet mesh restrictions, time and area restrictions and seine brailing, sorting and release guidelines attempt to limit impacts on sockeye, coho, chinook and steelhead stocks.

Chum management plans for next harvest of enhanced chum incorporate time, area and gear restrictions as strategies to address potential weak chum stocks of concern.

Status of condition

Behind target even though some progress has been made on specific components**.**

A plan has been initiated to estimate the contribution of hatchery chum into specific Bella Coola tributaries (pHOS) so that the impact of hatchery fish on natural origin salmon can be considered and spawning escapement of natural origin salmon can be estimated in those streams.

To fully satisfy year 1 progress, the plan should also describe how it will use pHOS estimates from these four tributaries to estimate pHOS in the Bella Coola watershed, as a means to evaluate spawning escapements of natural origin chum salmon against the spawning goal.

The DFO plan is to fin clip approximately 10% of the hatchery chum salmon; close out of this condition will require that adequacy of this marking rate to estimate the

	contribution of hatchery fish to harvest, escapement, and broodstock is demonstrated. Also, it is difficult to clip adipose fins on small chum fry, therefore the hatchery should evaluate the percentage of marked fish that will have a fin clip that can be easily detected when the adults return. Poor fin clipped fish will be counted as natural origin salmon, and this will bias values in the fishery, the hatchery, and in the spawning escapement, i.e., hatchery fish will be under counted. DFO plans to apply estimated survival rates of Snootli chum salmon to estimate the contribution of unmarked hatchery fish released into the other tributaries. This approach will increase uncertainty in the hatchery contribution to these other tributaries; the analysis should account for this uncertainty. Spawning escapement evaluations in Area 8 and comparison with target reference points should be based on the number of natural origin spawners, i.e., hatchery fish should be subtracted from the total escapement counts (see SC2.2.2, MSC 2014). Presently, the DFO post season reports do not attempt to subtract hatchery fish from total spawning escapement counts. Thus, the Assessment Team is uncertain whether this condition to meet MSC standards is recognized by the management personnel. This reporting issue should be rectified. To satisfy the milestone in year 2, the program needs to also show how it will estimate the contribution of hatchery origin salmon in the Area 8 fisheries, especially in the mixed-stock Fisher/Fitz Hugh area versus the more terminal Bella Coola area. Hatchery fish in the hatchery broodstock should also be estimated. As a somewhat related issue, management of the 2017 fishery raised concerns with the Assessment Team in relation to MSC standards. The commercial gillnet and seine fishery in Area 8 harvested 330,124 chum salmon or 60% of the estimated total run (DFO 2017). However, the reported spawning escapement in Area 8 was 211,437 (including hatchery fish) or 20% (56,013 fish) below the spawning target (TRP). The spawning escapement shortfall in 2017 would be even less after subtracting hatchery fish that spawned in the rivers. The Post Season Report states that Area 8 spawning escapements fell short, except for the Bella Coola River where the hatchery is located and where hatchery salmon contribute to the spawner count. An estimated 148,054 chum salmon were harvested in the mixed-stock Fisher/Fitz Hugh area, or 45% of the total commercial catch in Area 8. This catch presumably included a high percentage of natural origin chum salmon, and so this is why hatchery marks are needed for estimating catch origin. Based on this limited information, it appears that the Area 8 target reference point (267,450 wild chum spawners) could have been met if the fishery was curtailed in Fisher/Fitz Hugh area and more fishing was allowed in the Bella Coola area close to the hatchery. This issue is critical to Condition 1, as well. Another concern in this fishery is the high catch of non-target salmon that were released by fishermen in Area 8. A reported 14,490 salmon were released by the seine gear and 2,849 salmon released by gillnet gear, presumably based on log book values (DFO 2017). Bycatch consisted of 4,231 sockeye, 11,541 coho, 1,370 Chinook, and 197 steelhead. Survival of these fish depends on the gear type and the condition of the fish prior to release. It would be helpful if the post season report detailed mortalities associated with catch and release and incorporate these into total fishing-related mortalities (see Condition 2).

5.5 Condition 5

UoC	2: Inner Southern including Fraser River
Target Species	**Chum salmon**
Performance Indicator	**1.2.3:** Relevant information is collected to support the harvest strategy
Scoring Issue (SG80)	**a:** Sufficient relevant information related to SMU structure, SMU production, fleet composition and other data is available to support the harvest strategy, including harvests and spawning escapements for a representative range of wild component populations
Score	**75**
Rationale	Some relevant and direct information related to SMU structure, SMU production is available to support the harvest strategy (DFO 2014g). Fleet structure is well established (Nelson 2014, DFO 2015d). Some genetic data, although older, provide basic information for SMU determination (Beacham & Murray 1985, Beacham 1990). Extensive run reconstruction data provide confidence that the current harvest strategy working, including estimates of the impacts of fishery harvests on the SMU and the majority of wild component populations. However, information supporting the CU structure of SMUs is insufficient. CU, Management Area, and Stat Area (DFO 2014g) do not readily transfer into the seven management designations as listed in the IFMP (DFO 2015d, p.108) or the four major stock units described by the PSC Joint Technical Chum Committee (PSC 2016b, p.7). Chum salmon meets the SG60 level of performance but does not meet the SG80 level of performance.
Condition	For chum salmon, within 2 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Sufficient relevant information related to SMU structure, SMU production, fleet composition and other data is available to support the harvest strategy, including harvests and spawning escapements for a representative range of wild component populations.*"
Milestones	Year 1: Develop and implement a plan to address the condition (resulting score = 75). Year 2: Present the final results and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: DFO to provide CAB with revised Southern BC Salmon Integrated Fisheries Management Plan which details management unit structure, conservation units and population structure, as well as, post-season reporting of information on catches and spawning escapements, organized consistent with SMU and CU structure. Years 2-4: Annual post-season reporting.
Client Update on Progress [Year 1]	The Southern BC Salmon IFMP has been revised to include details of the management unit structure, conservation unit structure and population structure for chum salmon (Section 13.2, Southern BC Salmon IFMP, 2017-18). Post-season reporting of catch at the management unit level is not yet available. Delivery of this information relies on completion of a run reconstruction model, which is currently being developed through the PST Chum Technical Committee. Target timelines for the completion of this model are by the end of 2019, and delivery of catch and escapement data at the MU level is anticipated for the Spring 2020.
Status of condition	**On target.**

	DFO described current work in progress to formalize a report, using run reconstruction, to parse the harvest in the mixed stock fisheries in Johnstone Strait. This report is expected to provide linkage among CUs, SMUs, and harvest in statistical areas. The work is being done by a new staff member who is coordinating through the Chum Technical Committee of the Pacific Salmon Commission. DFO anticipates that the results should be available by the end of next year.

5.6 Condition 6

UoC	2: Inner Southern including Fraser River
Target Species	**Chum salmon**
Performance Indicator	**1.2.4:** There is an adequate assessment of the stock status of the SMU
Scoring Issue (SG80)	**g:** The SMUs are well-defined and include definitions of the major populations with a clear rationale for conservation, fishery management and stock assessment requirements
Score	**75**
Rationale	The majority of chum salmon SMUs are defined with a clear rationale for conservation, fishery management and stock assessment requirements, meeting the SG60 requirement. The Assessment Team felt that chum salmon did not meet the SG80 level of performance, however, because the rationale for CU determination was not made clear (DFO 2014g) and there is lack of correspondence between the clear SMU definitions in DFO (2015d) and the CU and SMU definitions and thus the basis for Sgen calculations in DFO (2014g). Chum salmon have a life history and homing that lead to subdivision somewhat more finely than that of pink salmon; UoC 2 chum salmon include a summer run CU that apparently is not monitored. The Assessment Team recognised that CUs for chum salmon may also be subdivided on a scale much finer than genetics would suggest in order to facilitate assessment, management, and conservation; however, the specific description of SMUs, CUs, and escapement goals needs to be more clearly published. Chum salmon meets the SG60 level of performance but not the SG80 level of performance.
Condition	For chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*The SMUs are well-defined and include definitions of the major populations with a clear rationale for conservation, fishery management and stock assessment requirements.*"
Milestones	Year 1: Develop and implement a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action	Year 1: DFO to provide CAB with revised Southern BC Salmon Integrated Fisheries Management Plan which details management unit structure, conservation

plan	units and population structure, including indicator populations, organized consistent with SMU and CU structure. Year 2: Annual report of performance of SMU (i.e. escapement) compared with fishery reference points (i.e. escapement goal) for the previous year. DFO to complete CSAS Paper (C Holt) on setting benchmarks in data limited populations with a focus on chum salmon conservation units. Year 3: Annual report of performance of SMU (i.e. escapement) compared with fishery reference points (i.e. escapement goal) for the previous year. DFO to develop specific benchmarks for individual CUs for Inside Southern Chum (ISC), excluding the Fraser, based on the Holt analysis. Year 4. DFO to develop specific benchmarks for the Fraser CUs based on the Holt analysis. This action will result in a better understanding of the CU structure and the linkage to each SMU and supporting indicator stocks for the fall timed chum salmon stocks that are actively fished.
Client Update on Progress [Year 1]	The Southern BC Salmon IFMP has been revised to include details of the stock management unit structure, conservation unit structure and population structure (Section 13.2, Southern BC Salmon IFMP, 2017-18 Post-season reporting of catch at the management unit level is not yet available. Delivery of this information relies on completion of a run reconstruction model, which is currently being developed through the PST Chum Technical Committee. Target timelines for the completion of this model are by the end of 2019, and delivery of catch and escapement data at the MU level is anticipated for the Spring 2020. **Year 2 Status**: The research paper Evaluating Benchmarks of Biological Status for Data-Limited Conservation Units of Pacific Salmon, Focusing on Chum Salmon in Southern BC by Holt et al. (2017) was accepted by CSAS with revisions. The working paper was accepted with the revisions. The main conclusion from the CSAS review was that "*percentile benchmarks tend to align or be more precautionary than traditional stock-recruitment models when productivity is moderate to high and harvest rates are low to moderate, according to retrospective analysis and simulation modelling in southern BC Chum Salmon. The specific percentile benchmarks recommended depends on the productivity and harvest rate combination. However, percentile benchmarks perform poorly in medium to high harvest rates with low to medium productivity combinations. Future work is recommended to evaluate their applicability to other Chum Salmon stocks and other salmon species. (CSAS Proceedings Series 2018/001p. 16)."* Work will be initiated in 2019 on the setting benchmarks for the southern BC chum Conservation Units.
Status of condition	**<u>On target.</u>** This condition is tightly linked to Condition 5 where DFO described current work in progress to formalize a report, using run reconstruction, to parse the harvest in the mixed stock fisheries in Johnstone Strait. This report is expected to provide linkage among CUs, SMUs, and harvest in statistical areas. Most importantly, the basis of this report will include the rationale for CU determination and clear SMU definitions to provide the basis for Sgen calculations. DFO anticipates that the results should be available by the end of next year.

5.7 Condition 7

UoC	2: Inner Southern including Fraser River
Target Species	**Chum salmon**
Performance Indicator	**1.3.1:** Enhancement activities do not negatively impact wild stock(s)
Scoring Issue (SG80)	**a:** It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks
Score	**75**
Rationale	The Assessment Team was unable to access reports that provide the marking or tagging assessments needed to evaluate the actual production of hatchery fish to the hatchery rack or hatchery fish straying into streams. Hatchery releases are detailed on the DFO website; recovery of hatchery fish is not. The fishery meets the SG60 level of performance but there is a paucity of reporting, and even given the integrated hatchery approach the Assessment Team could not score chum salmon at the SG80. A report that evaluates the impacts of enhancement activities on the local adaptation, reproductive performance and productivity and diversity of wild stocks needs to be clearly described and published. Chum salmon meets only the SG60 level of performance,
Condition	For chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Develop a plan to assess the enhanced contribution to spawning and in the fishery for Fraser and East Coast Vancouver Island (ECVI) chum salmon and its impact. For the ISC (including the Fraser) this will include an analysis of projected adult returns of hatchery origin chum salmon as a proportion of total run size. Year 2: Undertake data analysis of historical marking rates and survival information to estimate expected contributions of enhanced chum salmon in the Inside Southern Chum (ISC). Year 3: Provide preliminary results from analysis. Year 4: Provide final results from analysis. A summary of the historical information is intended to provide evidence that incidence of enhanced chum salmon in the fisheries of the ECVI is low or alternatively, if the hatchery component is significant, that hatchery components are limited to the terminal areas of the 3 major enhanced stocks. For the Fraser, the available data to review is limited; however the report showing the final results is expected to provide

	evidence that enhanced contributions are a low component of the total production. A low incidence of enhanced fish in the harvest is expected to provide evidence that it is highly likely that enhancement activities do not have significant negative impacts on the productivity of wild populations.
Client Update on Progress [Year 1]	A data collection and analysis plan was formalized and is currently being executed to assess the enhanced contributions of chum in the Fraser River and ECVI systems. DFO SEP will determine the enhanced contribution to spawning escapement (pHOS and pNOB) and to the fishery of these stocks by compiling known annual hatchery release numbers with escapement estimates and run reconstructions. Best available SEP biostandards (based on historical and/or indirect marking data) will be applied to annual release numbers to calculate the expected return of enhanced fish. These expected returns will be applied to catch data and the annual reconstructed run size (by age class) to determine an estimate of enhanced contribution to the fishery and to spawning populations of these stocks.
Status of condition	**On Target.** Condition seven is on target, assuming that the proposed analyses include estimates of pHOS in the streams and pNOB in the hatchery. We note that the SC2.9.1 (MSC 2014) requirement allows for expert judgement in PI 1.3.1, while guidance associated with PI 1.3.3 (GSC2.11, MSC 2014) states "*'Sufficient relevant qualitative and quantitative information' should be interpreted to mean a large representative fraction of artificially produced fish carry recognizable marks (e.g., fin clips, coded-wire tags, otolith marks, parent-based tagging (PBT) or thermal marks) to accurately estimate contributions of hatchery salmon to harvests, hatchery broodstocks, spawning populations and escapes.*"

5.8 Condition 8

UoC	2: Inner Southern including Fraser River
Target Species	**Chum salmon**
Performance Indicator	**1.3.2:** Effective enhancement and fishery strategies are in place to address effects of enhancement activities on wild stock(s)
Scoring Issue (SG80)	**b:** There is some objective basis for confidence that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts
Score	**75**
Rationale	The practices and protocols in place are considered likely to be effective based on plausible argument, so meeting SG60. The Assessment Team acknowledged the precautionary approaches of 1) DFO hatchery guidelines and integrated brood stocks and 2) focus on fishing terminal areas to harvest integrated hatchery stocks while promoting more conservative ERs on non-enhanced wild stocks. Yet the Assessment Team could not access reports that provide objective basis for confidence that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts in order to meet the SG80. Detailed reporting of brood stock collection process, pHOS numbers, hatchery marks and recoveries, straying, and other assessments is needed to provide some objective basis for confidence that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts in

	order to meet the SG80.
Condition	For pink salmon and chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*There is some objective basis for confidence that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Responses to Conditions 7 & 9 will address the components of Condition 8 regarding information on pHOS and straying for ISC pink and chum salmon. Year 1: Develop a plan to document information on brood stock collection practices, spawning guidelines, production planning and risk management that are employed to minimize potential detrimental impacts to wild salmon stocks. Year 2: Summary report detailing metrics to be used to measure and manage pHOS and straying, and an update on the status of organizing information to compare returning stocks to target metrics. This work will build on the Withler et al. work scheduled for 2017 that will provide renewed scientific advice on appropriate pHOS guidelines for enhanced stocks. This Year 2 report will document how the metrics will be used in evaluation of empirical data and will form the basis of future shifts in enhancement and management approaches. Year 3: Update on potential adjustments to management and enhancement approaches based on results of Years 1 and 2. If analyses indicate that wild stocks are at elevated risks of negative impacts due to enhancement, as measured through pHOS, adjustments will be considered. Year 4: Update on potential adjustments to management and enhancement approaches.
Client Update on Progress [Year 1]	DFO SEP can provide documentation that clearly outlines the brood stock collection process, spawning guidelines, and production planning and risk management. The following documents are publicly available: 1. DFO. 2012. SEP Production Planning A Framework. Prepared for: Salmonid Enhancement Program, Fisheries and Oceans Canada, Pacific Region. (Updated 2018). http://www.dfo-mpo.gc.ca/Library/361270.pdf 2. DFO. 2013. A Biological Risk Management Framework for Enhancing Salmon in the Pacific Region. Prepared for: Salmonid Enhancement Program, Fisheries and Oceans Canada, Pacific Region. http://publications.gc.ca/collections/collection_2016/mpo-dfo/Fs144-38-2013-eng.pdf 3. DFO. 2016. A Compilation of Operational and Planning Guidelines for the Salmonid Enhancement Program. Prepared for: Salmonid Enhancement Program, Fisheries and Oceans Canada, Pacific Region. http://waves-vagues.dfo-mpo.gc.ca/Library/366032.pdf 4. DFO. 2018. Review of genetically based targets for enhanced contributions to Canadian pacific Chinook Salmon populations. DFO Canada Science Advisory Secretariat Science Advisory Report 2018/001.

	http://publications.gc.ca/collections/collection_2018/mpo-dfo/fs70-6/Fs70-6-2018-001-eng.pdf 5. Cross, C., and D. Lawseth. 2018. SEP Assessment Framework (in preparation). Prepared for: Salmonid Enhancement Program, Fisheries and Oceans Canada, Pacific Region.
Status of condition	**Behind target** The client update listing DFO planning documents demonstrates that there is a strategy in place to protect wild stocks from negative impacts of enhancement. However, the plan as described in the Client Update does not demonstrate that, by Year 4, there will be an objective basis for confidence that the strategy is effective. Addressing this condition must be documented by a reporting of implementation and performance metrics. Detailed reporting of brood stock collection process, pHOS numbers, hatchery marks and recoveries, straying, and other assessments are needed to provide some objective basis for confidence that the strategy is effective, based on evidence that the strategy is achieving the outcome metrics used to define the minimum detrimental impacts in order to meet the SG80. It is important to note that the summary report proposed for year two, detailing metrics used to measure and manage pHOS, may put this condition back on schedule. We also note that, at the original assessment meeting, DFO contemplated producing an annual report of hatchery performance where each year, given no major change, performance metrics could be simply added as new rows in annual performance tables; the Assessment Team believes this would facilitate the client meeting this and other conditions on enhancement.

5.9 Condition 9

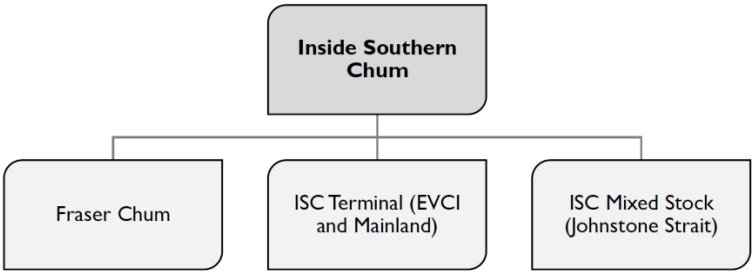
UoC	2: Inner Southern including Fraser River
Target Species	**Pink salmon and chum salmon**
Performance Indicator	**1.3.3:** Relevant information is collected and assessments are adequate to determine the effect of enhancement activities on wild stock(s)
Scoring Issue (SG80)	**a:** Sufficient relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery brood stock
Score	**65**
Rationale	Both pink salmon and chum salmon meet the SG60 because some relevant information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced), and hatchery brood stock. The NUSEDs database (http://open.canada.ca/en/suggested-datasets/new-salmon-escapement-database-nuseds) provides wild escapement by stream which is useful to justify the integrated hatchery approach, and solid inferences about hatchery contributions can be made. Hatchery releases of chum salmon from Big Qualicum River Hatchery and Sugsaw Creek Hatchery are marked with fin clips. Contributions to PSC fisheries and escapement for those groups are estimated by associating them with a marked release group having a similar size and release timing (PSC 2016b).

	However, information provided to the Assessment Team is not sufficient to evaluate the overall contribution of hatchery adult pink salmon and chum salmon to UoC 2 fisheries and to the hatchery brood stock. Therefore, SG60 is met but SG80 is not met, and a Condition of Certification is set
Condition	For chum salmon and pink salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Sufficient relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery brood stock*."
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	The action plan for chum presented in Condition 7 will be applied for chum stocks in this Condition. For pink salmon: Year 1: Develop a plan to document the contribution of enhanced fish for Fraser and ECVI pink salmon (only very low levels of pink salmon enhancement in the Fraser) through run reconstruction of enhanced abundance and distribution based on indirect and historic marking data. Year 2: Update on ongoing work to reconstruct enhanced pink salmon abundance and distribution in Fraser and ECVI using indirect and historic data. Years 3 and 4: Update on the status of organizing information to compare to target metrics. Provide a summary of results for reconstructed abundance and distribution of enhanced pink salmon in ECVI and Fraser.
Client Update on Progress [Year 1]	A data collection and analysis plan was formalized and is currently being executed to assess the enhanced contributions of pinks in the Fraser River and ECVI systems. DFO SEP will determine the enhanced contribution to spawning escapement (pHOS and pNOB) and to the fishery of these stocks by compiling known annual hatchery release numbers with escapement estimates and run reconstructions. Best available SEP biostandards (based on historical and/or indirect marking data) will be applied to annual release numbers to calculate the expected return of enhanced fish. These expected returns will be applied to catch data and annual reconstructed run size (by age class) to determine an estimate of enhanced contribution to the fishery and to spawning populations of these stocks.
Status of condition	**Behind target** Condition nine is behind target, in that the Assessment Team has seen a basic outline of a plan, but not the details. The indirect marking data needs to be clearly described. Successful closeout of this condition depends upon the reporting of qualitative and quantitative information on the contribution of hatchery fish to the harvest and escapement. It is unclear how the DFO approach will provide estimates of hatchery-origin pink and chum salmon in streams adjacent to hatchery programs. Details of the analyses should be provided in Year 2 to ensure the condition is on target. Also, results from the approach should be presented for recent years, e.g. % hatchery fish in harvest, broodstock, and escapement. The MSC guidance on for a passing score on performance indicator 1.3.3.a is most

	strident: *'sufficient relevant qualitative and quantitative information should be interpreted to mean a large representative fraction of artificially produced fish carry recognizable marks (e.g., fin clips, coded-wire tags, otolith marks, parent-based tagging (PBT) or thermal marks) to accurately estimate contributions of hatchery salmon to harvests, hatchery broodstocks, spawning populations . . .'* The audit team recognizes that many enhancement projects in ISC are small community-oriented projects that individually may be too small to merit consideration under performance indicator 1.3.3; yet in total the SEP program releases about 11 million pink salmon fry and 105 million chum salmon fry in the ISC (Table 2). The audit team is operating in the dark on this evaluation because no DFO reports are available that detail historical tagging efforts and results to evaluate the SEP program in ISC (while data seems to be available from the other UoCs). Of most interest are results from major SEP facilities operated by DFO that release approximately 7.5 million hatchery pink salmon fry (Puntledge River and Quinsam River hatcheries) and up to 25 million hatchery chum salmon fry (Big Qualicum River, Puntledge River, Chehalis River, Chilliwack River, Inch Creek, and Tenderfoot Creek hatcheries). The Assessment Team notes that the client provided links to databases that include CWT and, possibly, thermal marking data. However, the links did not initially work and although new links were provided subsequently, we were not able to extract relevant information.

5.10 Condition 10

UoC	2: Inner Southern including Fraser River
Target Species	**Pink salmon and chum salmon**
Performance Indicator	**1.3.3:** Relevant information is collected and assessments are adequate to determine the effect of enhancement activities on wild stock(s)
Scoring Issue (SG80)	**b:** A moderate-level analysis of relevant information is conducted and used by decision makers to quantitatively estimate the impact of enhancement activities on wild-stock status, productivity, and diversity
Score	**65**
Rationale	The Assessment Team could not identify documentation that a moderate-level analysis of relevant information is conducted and used by decision makers to quantitatively estimate the impact of enhancement activities on wild-stock status, productivity, and diversity. As such, pink salmon and chum salmon in UoC 2 do not meet the SG80 and a Condition of Certification is set
Condition	For pink salmon and chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*A moderate-level analysis of relevant information is conducted and used by decision makers to quantitatively estimate the impact of enhancement activities on wild-stock status, productivity, and diversity.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is

	met (resulting score = 80).
Client action plan	The actions outlined in Conditions 7 and 9 will also address Condition 10. Year 1: Develop a plan to document the contribution of enhanced fish for Fraser and ECVI pink salmon (only very low levels of pink salmon enhancement in the Fraser) through run reconstruction of enhanced abundance and distribution based on indirect and historic marking data (same as Condition 9). Develop a plan to assess the enhanced contribution to spawning and in the fishery for Fraser and East Coast Vancouver Island (ECVI) chum salmon and its impact (same as Condition 7). As well, the IFMP will be updated to demonstrate that this information is considered in the development of fishing plans. Year 2: Update on ongoing work to reconstruct enhanced pink salmon abundance and distribution in Fraser and ECVI using indirect and historic data (Condition 9). Undertake data analysis of historical marking rates and survival information to estimate expected contributions of enhanced chum salmon in the Inside Southern Chum (Condition 7). Years 3 and 4: Update on the status of organizing information regarding Inside Southern pink and chum salmon regarding contribution of enhanced stocks and the status of analysis (Conditions 9 and 7). The IFMP will reflect a summary of this information and that it is considered in the development of fishing plans.
Client Update on Progress [Year 1]	**Year 1 Status** The actions outlined in the Client Update on Progress [Year 1] for Conditions 7 and 9 also address Condition 10. The plan to document the contribution of enhanced fish for Fraser and ECVI pink salmon through run reconstruction of enhanced abundance and distribution based on historical and/or indirect marking data is outlined in Condition 9. The plan to assess the enhanced contribution to spawning and in the fishery for Fraser and ECVI chum and its impact is outlined in Condition 7. The 2017/2018 Salmon Integrated Fisheries Management Plan (IFMP) was updated to reflect the clearly defined SMU's and linkages to CU. Section 13.2.2 of the IFMP outlines an overview of the SMU's and the associated CU's (p. 231).  Figure 13.2-2: Overview of Inside Southern Chum *"Inside Southern Chum (ISC) salmon spawn throughout Inner South Coast and in the Fraser River watershed, with Fraser stocks typically making up a significant portion of the returning abundance. ISC are managed in two distinct fall timed (mid-September into December) groups: Fraser Chum with two Conservation Units (CU) and ISC Terminal with 7 CUs; with ISC fisheries classified as ISC Mixed Stock (Johnstone Strait), ISC Terminal (ECVI and Mainland), and the Fraser River (Figure 13.2-2). In addition to these fall timed populations, there are summer timed chum within the ISC which have distinct timing (late July through to mid-September). There are no directed fisheries on these populations and they are passively managed as by-catch in Fraser directed sockeye and pink fisheries (p. 231 IFMP)."*

	This followed by detailed sections in the IFMP for Fraser (Section 13.2), Inside Southern Chum (Section 13.2.5) and Inside Southern Chum Mixed Stock (13.2.5). Each of these sections covers details for that SMU on: • Stock assessment; • Decision guidelines; • Incidental harvest, by-catch and constraints; and • Allocation and fishing plans. Hatchery programs for ISC are mostly done to supplement harvest (Chehalis, Chilliwack, Inch, Weaver channel, Big Qualicum, Little Qualicum, Puntledge), but there are also some rebuilding programs (e.g. Nimpkish Chum). ISC enhancement facilities are listed in section 13.2.1 of the IFMP. Proposed targets for the 2018 brood year can be found at: http://www.pac.dfo-mpo.gc.ca/sep-pmvs/projects-projets/ifmp-pgip-eng.html
Status of condition	**Behind target** Condition 10 is tightly linked to the progress for Condition nine. The client update on progress against the Year 1 milestone for Condition 10 indicates that relevant information to determine the effect of enhancement activities on wild stocks will be used, but the Assessment Team has not seen the details of the plan, leaving us unsure as to whether the Condition will be met. The Assessment Team suspects, from DFO interviews, that historical evaluations of relevant information were used to document responsible harvest and hatchery management strategies, but no published evidence of these evaluations has been made available to the Assessment Team.

5.11 Condition 11

UoC	3: WCVI
Target Species	**Sockeye salmon and chum salmon**
Performance Indicator	**1.2.4:** There is an adequate assessment of the stock status of the SMU
Scoring Issue (SG80)	**e:** The assessment of SMU status, including the choice of indicator populations and methods for evaluating wild salmon in enhanced fisheries is subject to peer review
Score	**75**
Rationale	SG 60 met by default. For sockeye salmon, the methods used to produce pre-season return forecasts have been peer-review in DFO's Centre for Science Advice Pacific (CSAP) peer-review process (e.g. DFO 2012). However, the specific methods used to develop biological benchmarks for the Area 23 sockeye salmon have not been peer-reviewed. For chum salmon, information on the UoC 3 stock status and fishery impacts is not consolidated and presented in a single document, nor has there been a recent peer review. As such, for both species, SG80 is not met.
Condition	For sockeye salmon and chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*The assessment of SMU status, including the choice of indicator populations and*

	methods for evaluating wild salmon in enhanced fisheries is subject to peer review."
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	For Chum Salmon: Year 1: Develop a plan to document benchmarks and provide chum salmon stock status information. Year 2: DFO to complete CSAS Paper (C Holt) on setting benchmarks in data limited populations with a focus on chum salmon. Year 3: DFO to develop specific benchmarks for individual CUs detailed in final CSAS paper. The CU benchmark that is adopted will be compared to SEGs for each of the SMUs and adjustments considered where necessary to ensure CU lower biological benchmarks are achieved. Year 4: Summary report documenting harvest and status of each of the CUs. For Sockeye Salmon: Year 1: Develop a plan to document benchmarks and provide sockeye salmon stock status information. Year 2: Set benchmarks for Henderson Lake stocks (using Holt, and other research) Year 3: Complete Stock Assessment paper and review with internal and external reviewers. (DFO) Year 4. Revise post season reviews consolidating information on stock status and fishery impacts. These actions will establish benchmarks in accordance with the WSP and will consolidate stock status information.
Client Update on Progress [Year 1]	For Chum Salmon: • Harvest reference points and stock status of WCVI chum salmon are documented in the annual WCVI chum forecast and management bulletin. These benchmarks are also documented in the Southern BC Salmon IFMP. • The harvest reference points and benchmarks used for data limited chum situations, such as WCVI chum, were evaluated in 2017 through a peer-review CSAS process (see Holt et al. 2017). • The benchmarks and harvest reference points applied for WCVI chum stock assessment and harvest management are consistent with the guidance provided in Holt et al. (2017). For Sockeye salmon: • Benchmarks for salmon are documented in the annual WCVI sockeye forecast and management bulletin. These benchmarks are also documented in the Southern BC salmon IFMP. • The benchmarks used for Great Central and Sproat Lake sockeye apply methods developed by Holt et al. (2009) for data rich systems. This method was developed and evaluated through a peer-reviewed CSAS process. • The benchmarks used for Henderson sockeye apply methods more suitable

	to data-limited situations. Similar to the Holt et al. (2017) work on data limited chum systems, these benchmarks need further evaluation. The plan is to submit a Request for Science Advice to the CSAS process in October 2018. The purpose of the work will be to evaluate and recommend appropriate benchmarks for data limited sockeye situations.
Status of condition	**<u>On target</u>** The assessment team agrees that both the chum and sockeye salmon client action plans (Year 1) are on track. The assessment team supports the client action plan toward a CSAS review in Year 3 of biological benchmarks developed for individual WCVI wild chum salmon CUs based on the CSAS approved methodology applied in Holt et al. (2017) that provides a quantitative basis for evaluating percentile-based benchmarks for data limited chum salmon against simulated outcomes under different assumption about stock productivity and exploitation rate levels, as noted for North and Central Coast chum salmon (Condition 1, above). For Area 23 sockeye salmon, the Assessment Team supports the client action plan and CSAS review of biological benchmarks for data limited Henderson Lake sockeye salmon based on Holt et al. (2017). The Team acknowledges that biological benchmarks for Sprout Lake and Great Central Lake sockeye are best derived from the methodology for data-rich CUs with reliable stock-recruitment data (Holt et al. 2009). The team notes, however, that specific documentation of estimates of the lower and upper benchmarks, Sgen and Smsy, for Sprout and Great Central lakes is lacking. The lack of documentation of these benchmarks for Sprout Lake and Great Central Lake sockeye salmon is a cause for concern.

5.12 Condition 12

UoC	3: WCVI
Target Species	**Chum salmon**
Performance Indicator	**1.3.1:** Enhancement activities do not negatively impact wild stock(s)
Scoring Issue (SG80)	**a:** It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks
Score	**75**
Rationale	Based on hatchery thermal marking experiments, the proportion of hatchery origin fish in the natural spawning population within the Nitinat SMU (MSC Condition Summary Final Report May 2014) has been relatively high averaging 54% (2006-2013). The average (2007-2008) proportion of unmarked (natural-origin) fish in the Area 21/22 fishery (54%) was slightly higher than the proportion of hatchery-origin fish. Although estimates of pNOB were not provided, the pNOB:pHOS ratio is likely about 1 given the proportions of hatchery and natural chum salmon observed in the escapement and fishery. Estimates of pNOB and pHOS were not available for the Conuma Hatchery. The hatchery mark rate in periodic sampling of the Area 25 inside and outside fisheries beginning in 1995 was highly variable but averaged 30% and 35% (Dobson et al. 2009). The SG60 for chum salmon is met. SG80 is not met because the Assessment Team could not conclude that it is highly likely that the enhancement activities of chum salmon do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.

Condition	For chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Provide an update to show that the plan presented in Year 1 is being implemented, and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Develop plan to complete analysis on the presence of hatchery chum in Nootka Sound fisheries. Year 2: DFO to present analysis on the presence of hatchery chum in the Nootka Sound fisheries. A run reconstruction analysis is planned. The Area 25 (Nootka) fishery was sampled to collect otoliths for detecting enhanced origin chum in 2016 and 2015. Conduct assessment to determine whether or not the issue of hatchery origin fish straying to wild systems needs to be further studied. Review biological guidance in the Withler et al report (scheduled for delivery in spring 2017) and literature to determine whether this sampling would be helpful or required to address the condition. Year 3: Provide preliminary results of analyses from Years 1 and 2. Year 4: Provide final results. This monitoring program and consequential analysis will demonstrate the incidence of enhanced and unenhanced chum salmon in the fishery. This, in combination with a risk-based fishing strategy (low pressure in approach areas plus target fisheries in terminal areas) is expected to show the enhancement activities do not have a negative impact on the local adaptation, reproductive performance or productivity and diversity of wild stocks.
Client Update on Progress [Year 1]	Chum fisheries in Nootka Sound are now sampled annually to monitor the presence of hatchery chum. (See data in table below.) Over the next few years, further work with commercial harvesters is required to embed sampling requirements in annual harvest plans and sort out logistical details such as reporting and landing requirements. **Table 10. Proportion of hatchery origin (thermally marked) fish sampled in 2017 Nootka Sound commercial chum openings.**

Fishing Date	Not Marked	Marked
28/09/2017	74%	26%
05/10/2017	85%	15%
12/10/2017	88%	12%
Total	**83%**	**17%**

Table 11. Proportion of hatchery origin (thermally marked) fish sampled in 2017 Esperanza Inlet commercial chum openings.

Fishing Date	**Not Marked**	**Marked**	
28/09/2017	93%	7%	
05/10/2017	94%	6%	
12/10/2017	92%	8%	
Total	**93%**	**7%**	

Status of condition	**On target** The client action plan notes that sampling for thermal marked hatchery fish in chum salmon fisheries occurred in 2015, 2016 and 2017 in Nootka Sound and Esperanza Inlet. A preliminary analysis of the 2017 data is provided in Tables 7 and 8 but without estimates of the hatchery of origin in the catch. The run reconstruction planned for Year 2 may help determine if further sampling of the escapement is required in subsequent years.

5.13 Condition 13

UoC	3: WCVI
Target Species	**Chum salmon**
Performance Indicator	**1.3.3:** Relevant information is collected and assessments are adequate to determine the effect of enhancement activities on wild stock(s)
Scoring Issue (SG80)	**a:** Sufficient relevant qualitative and quantitative information is available on the contribution of enhanced fish to the fishery harvest, total escapement (wild plus enhanced) and hatchery brood stock
Score	**75**
Rationale	All Nitinat hatchery chum salmon have been thermally marked in recent years and catch and escapement sampling in Area 21/22 has provided some relevant information on the proportion of hatchery origin chum salmon compared to unmarked (natural) fish (English et al. 2014a). The proportion of hatchery marked chum salmon from Conuma Hatchery in Area 25 commercial fisheries for some years is tabulated in Dobson et al. (2009). To-date, there has been no systematic sampling of other statistical areas to determine the proportion of hatchery-origin chum salmon in natural spawning populations. The SG60 level of performance is met, but it is not clear that SG80 is met.
Condition	For chum salmon, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).

Client action plan	Year 1: Develop a plan to conduct small bite[1] commercial fisheries to determine the presence of enhanced fish in fisheries in unenhanced areas. Year 2: Industry to conduct a small pilot fishery working within fishing and sampling plans designed by DFO. Industry to collect and analyse samples and report initial results from fishery. If the level of enhanced contribution is high in the catch, in-stream stock assessment to be conducted. Year 3: Evaluate and report on need to undertake stream-based stock monitoring in specific streams in the event enhanced stocks are found in significant amounts in unenhanced areas. Industry to collect and analyse sampling for stream-based assessment. Year 4: Report on the estimated contribution of enhanced fish in WCVI chum salmon fisheries. This will provide qualitative and quantitative information related to the contribution of enhanced fish to the fishery harvest and total escapement (wild plus enhanced) in areas not previously investigated.
Client Update on Progress [Year 1]	Small-bite chum fisheries occurring in WCVI areas are now routinely sampled to monitor the presence of hatchery chum. For example, in 2017 small-bite chum fisheries in PFMA 25 (Esperanza Inlet and Nootka Sound) were sampled for size, sex, age and hatchery mark, and in PFMA 26 (Kyuquot Sound), were sampled for size, sex and age. Over the next few years, further work with commercial harvesters is required to embed sampling requirements in annual harvest plans and sort out logistical details such as reporting and landing requirements.
Status of condition	**Behind target** The client action plan (Year 1), as provided, is to sample small-bite chum salmon fisheries in terminal fishing areas in the UoC and assess straying rates by SMU, including SMUs without chum enhancement, for example in areas 23, 24 and 26. Area 25 (Esperanza Inlet and Nootka Sound) fisheries were sampled to estimate the proportion of hatchery origin chum salmon in the catch. Area 25 is the location of the Conuma Hatchery. The client action plan does not include a study design to sample terminal locations in areas 23, 24 and 26 needed to assess the overall straying rates of hatchery origin chum salmon in the UoC. Rather, as stated, the action plan only provides for opportunistic sampling of fisheries in areas where they may occur. It is likely that sampling in this way may not be sufficient to assess hatchery straying rates to natural spawning location by SMU within the 4-year surveillance period, hence putting the fishery's continued MSC certification at risk (as specified in FCR subsection 7.23.13.2). The Assessment Team concludes that without a contingency plan in place, perhaps using test fisheries, in areas 23, 24 and 26 when annual commercial fisheries are unplanned, the Condition will not pass by Year 4. It is important to note that the rationale for PI 1.3.1 is to estimate the proportion of hatchery-origin WCVI chum salmon in the commercial fishery by Year 4 and then, based on that analysis, assess the future need to sample the natural escapement to estimate the proportion on hatchery-origin chum salmon in the escapement to natural spawning streams as well as the fisheries. Without sampling for hatchery-origin chum salmon in terminal marine approaches in each SMU in the UoC, the sampling effort needed to adequately estimate the proportion of hatchery-origin fish in nature spawning streams will remain unknown. In other words, the intent of PI 1.3.1 (enhancement activities do not negatively impact wild stocks) may not be met.

[1] A small bite fishery is a commercial fishery during which only a limited number of harvesters participate.

5.14 Condition 14

UoC	2: Inner Southern including Fraser River
P2 Element	**Steelhead**
Performance Indicator	**2.1.1:** The UoC aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI
Scoring Issue (SG80)	**a:** Main primary species are highly likely to be above the PRI OR If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoCs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding
Score	**75**
Rationale	It is not clear that it is highly likely that steelhead is above the PRI, or that recovery is occurring, primarily because the Chilcotin River run (Fraser watershed) has been fluctuating around the lower extreme conservation concern escapement goal. Nevertheless, some fishery measures are in place to reduce bycatch mortality, such as mandatory catch and release and time/area closures (although the Assessment Team is aware that time/area management measures were adjusted recently for the chum salmon fishery), and these measures are expected to ensure that the UoC does not hinder recovery and rebuilding, so UoC 2 meets the SG60 level, but does not meet the SG80.
Condition	For steelhead, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "Main *primary species are highly likely to be above the PRI, OR, If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoCs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Show that the plan presented in Year 1 is being implemented and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: DFO and the Province of BC will form a technical working group (TWG) to review the key inputs, parameters and assumptions of the existing steelhead impact assessment model to improve the understanding of key fisheries, assumptions and parameters that influence projected Interior Fraser (IF) steelhead exposure or impacts in salmon fisheries. TWG may recommend refinements to model as required. This work will include development of fishery profiles that overlay fishing effort and IF steelhead run timing in the various fisheries to evaluate where steelhead impacts are most likely to occur. This could include a retrospective analysis of past years and a sensitivity analysis of key uncertainties and assumptions to provide insight into where most effective measure can be put in place to reduce impacts on steelhead stocks of concern. Incorporation of information from additional

	studies or analyses that would improve understanding of key model uncertainties will be considered. DFO and the province will work towards agreement on conservation and management objectives for IF steelhead and other salmon stocks where salmon harvesting may have impacts on IF steelhead. A fishing plan evaluation framework for assessing impacts of alternative fisheries management approaches will be explored. The potential set of fishery management actions will be consistent with the precautionary approach to management. Management strategy evaluation via simulation will be used to assess the efficacy of different salmon harvesting approaches on IF steelhead stock recovery and rebuilding. Year 2: DFO and the Province will complete a technical and social and economic analysis of proposed management approaches using the agreed-to fishing plan evaluation framework. This evaluation would include consultation with affected parties through existing fisheries advisory and consultative processes. Based on the results of the analysis and feedback from consultations, a plan will be developed that identifies appropriate management objectives and measures to address IF steelhead conservation risk. The plan will include pre-agreed indicators to evaluate, post-season, the performance of annual management actions relative to plan objectives. The technical working group will identify research and / or data collection initiatives that could assist in addressing key uncertainties in the emerging management framework. Year 3: Report on implementation of the management measures developed in year 2 using defined performance indicators. Consider further refinements to the management measures and fishery timing / closures / methods as required to ensure that performance targets are achieved. Year 4: Final report on implementation of the management plan and annual reporting on performance indicators.
Client Update on Progress [Year 1]	An expedited audit was conducted July 16, 2018 for this condition. The focus of the expedited audit was to review the MSC status of UoC 2, covering the Inner Southern including Fraser River region of British Columbia, Canada, following a recent decline in steelhead trout (*Oncorhynchus mykiss*) populations in the Thompson River and Chilcotin River that were described by COSEWIC (Neilson & Taylor 2018). Prior to the expedited audit meeting the Audit Team provided 12 questions they would like addressed (p. 8 MSC Sustainable Fisheries Certification- Off-Site Expedited Audit, 2018). Based upon the answers supplied by the Client and further clarification provided during the conference call between representatives of the Assessment Team, Client and Fisheries and Oceans Canada the Audit Team determined: • In 2017, DFO met the objective of protecting 80% of the steelhead trout run from Fraser River commercial gillnet fisheries with high degree of certainty; this was determined analytically (Jenewein, 2017). • DFO is also now discussing the steelhead bycatch issue with the Province through a Technical Working Group, and a simulation model was developed to help evaluate the exposure potential of steelhead trout to the fisheries. Fisher logbook data are known to underestimate bycatch, and DFO roving observer effort is currently insufficient to statistically estimate steelhead trout bycatch. The audit Team concluded, DFO is taking actions to address steelhead trout bycatch that are consistent with the requirements of Condition 14 (p. 18 MSC Sustainable Fisheries Certification- Off-Site Expedited Audit, 2018).

	Year 2 Status Update on SARA Emergency Listing Process for Thompson and Chilcotin Steelhead Trout: 1. Recovery Potential Assessment • Provide a brief summary of the CSAS review after the meeting, including expected dates for the SAR release (we can include this by Oct 3) • Provide the SAR when it is available (should be by Oct 17, but maybe later) 2. Public Consultations In the coming months, the Minister of Environment and Climate Change Canada must form an opinion on whether there is an imminent threat to survival for either or both of the Thompson and Chilcotin Steelhead Trout populations. In the event that she finds a threat to survival is imminent, the Governor in Council (GIC) will then be charged with making a listing decision based on information provided by the Minister, as well as considering socio-economic impacts and the results of consultations with Indigenous Peoples and stakeholders. Fisheries and Oceans Canada (DFO) is conducting consultations on the potential impacts of listing Thompson and Chilcotin Steelhead from October 1 through December 3. Further details on consultations can be found at: (www.sararegistry.gc.ca/involved/consultation/default_e.cfm). A listing decision is anticipated from GIC in the first half of 2019.
Status of condition (Expedited audit, Sept 2018)	As a result of their newly revised COSEWIC 'Endangered' status, through the Species at Risk Act (SARA) and as part of a Recovery Potential Assessment (RPA), DFO is required to engage in significant work focused on the Thompson River and Chilcotin River steelhead trout populations. This includes the collation and formulation of scientific information on their current status, threats to their survival and recovery, and the feasibility of recovery. The RPA will be reviewed on September 20-21, 2018 through DFO's peer review process led by the Canadian Science Advisory Secretariat. With respect to compliance, it is noted that DFO is in the process of reviewing a compliance strategy model study of the Johnstone Strait mixed-stock chum salmon net and troll fisheries in 2017. The study was initiated to establish the compliance level for purse seine (Area B), gillnet (Area D) and troll (Area H) vessels participating in the fishery, with planning conducted by Conservation and Protection in collaboration with Resource Management and Statistics Canada. The field component of the study was conducted in the fall of 2017, and the analysis and report are currently under review by National Headquarters. It is understood that the final report should be available this fall. In summary, DFO provided the Assessment Team with considerable information and described the approach taken in 2017 to manage bycatch of steelhead trout in the UoC 2 fishery. This included increasing observer coverage to >5% in the Fraser River commercial gillnet fishery, and the development of models to determine the effectiveness of the measures to constrain the possibility of steelhead trout bycatch. Specific management actions that will occur to minimise steelhead trout bycatch during 2018 commercial fisheries were also presented. The Assessment Team concludes that progress against Condition 14 is adequate at this time to be assessed as 'On target'. The Assessment Team will further evaluate status of Condition 14 during the annual audit in mid-October, 2018.
Status of condition	**<u>On Target.</u>** As noted above, an expedited audit of Condition 14 was completed by the Assessment Team in August 2018 because interior Fraser River steelhead had declined further in recent years and a COSEWIC assessment concluded that Thompson River steelhead trout and Chilcotin River steelhead trout were "Endangered" based on population declines of 79% and 81% over the last three

	generations, respectively (COSEWIC 2018). In fall 2018, an emergency recovery potential assessment (RPA) was conducted. The RPA provided evidence that the decline in steelhead is related primarily to marine conditions, especially predation by harbour seals and competition with pink, chum, and sockeye salmon (DFO 2018, Korman et al. 2018). The report concluded that there is high uncertainty in bycatch rates (mortality) in commercial and First Nation fisheries because there is a lack of reliable catch data for the steelhead (Korman et al. 2018). The authors approximated a 20% exploitation rate on interior Fraser River steelhead in 2016 to 2018 while recognizing that these values are highly uncertain and are best used as relative indices of bycatch for year-to-year comparisons. The recent exploitation rates are slightly lower than those in 2014 and 2015 (24-25%) but higher or equal to exploitation rates in 2006-2013. Appendix B of the report provides a rebuttal to a previous PSARC comment on the steelhead exploitation rate model. The report concludes that *"In the absence of management actions or natural processes that would reduce predation or competition, reducing exploitation rate via changes to salmon fisheries and in-river First Nations fisheries targeting Steelhead Trout, is the only option currently available to improve the status of Thompson and Chilcotin DUs."....."The majority of [simulation model] scenarios showed that reducing exploitation rate increased the probability of population growth or recovery. However, if future productivities remain at levels estimated from the last available year of the stock-recruitment time series, the populations will continue to decline even in the absence of exploitation, though lowering exploitation rates slows the rate of decline."* A key research recommendation is for better monitoring of catch and effort in First Nations terminal fisheries targeting steelhead trout in the Fraser, Thompson, and Chilcotin rivers (NB: this terminal fishery is not part of the MSC certified BC Salmon Fishery). The authors note the need for a better observer program in commercial fisheries but state that steelhead abundance is currently too low to provide reasonable data. They also note that improvements could be made in the exploitation rate model. They recommend development and implementation of alternative harvesting and enhancement strategies to reduce steelhead bycatch. In 2018, as described in the expedited audit report, DFO implemented a rolling fishery closure period that closed inshore and river commercial fisheries during periods when interior Fraser River steelhead are likely to be present. It would be useful to see a review of the performance of the 2018 rolling closure program at the year 2 audit of the fishery, next year, including comments on the approach by the BC Ministry of Forests, Lands and Natural Resource Operations.

5.15 Condition 15

UoC	All 3
P2 Element	**Chinook salmon, coho salmon, steelhead**
Performance Indicator	**2.1.2:** There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoC regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch
Scoring Issue (SG80)	**c:** There is some evidence that the measures/partial strategy is being implemented successfully.
Score	**75**

Rationale	A key element of the strategy to protect weak runs of Chinook salmon, coho salmon and steelhead is the use of particular gear types in gillnet fisheries (e.g., short nets, short sets, mesh size) to minimise the capture of particular species, and brailing for purse seines, as well as the use of recovery boxes, which are intended to minimise post-release mortality of fish that may not be retained. However, it is not clear that these requirements and handling / husbandry protocols are employed routinely. As such, the SG80 requirement is not met.
Condition	Within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*There is some evidence that the measures/partial strategy is being implemented successfully.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Show that the plan presented in Year 1 is being implemented and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: C&P to identify enforcement approaches and confirm potential indicators to report on fishery compliance rates. Years 2 and 3: Summarize the status of enforcement approaches and preliminary results of enforcement programs with a focus on compliance with provisions to reduce non-target mortality in the salmon fishery. Year 4: Provide final report on compliance rate indicators relative to reducing non-target mortality. This report will articulate the process for compliance rates related to the incorporation of provisions introduced to reduce non-target mortality and demonstrate that these provisions are being utilized.
Client Update on Progress [Year 1]	The Department conducted a compliance strategy (C-STAT) model study of the Johnstone Strait mixed-stock chum salmon net and troll fisheries in 2017. The study was initiated to establish the compliance index rate for the Johnstone Strait commercial chum fishery (combined compliance for purse seine (Area B), gill net (Area D) and troll (Area H) vessels participating in the fishery). Statistical methods were applied to estimate the compliance rate. The compliance rate included checking activity and catch reporting, licencing and documentation, regulations and gear. Conservation and Protection worked with Resource Management and Statistics Canada to plan the compliance audit. The field component of the compliance study was conducted by Conservation and Protection staff in the fall of 2017 and the analysis and report are currently under review by National Headquarters. A summary report should be available by the fall of 2018 and will be provided to the Audit Team. The Department also conducted pilot catch monitoring programs for Fraser River Sockeye fisheries harvested by Area D and Area E gill nets. The goal of the pilot programs was to validate 20% of the catch of sockeye caught in each of the 2014 sockeye fisheries; catch validation originated from at-sea and dockside monitors who were distributed aboard on grounds packers and at shore-based processing plants to intercept gill net landings. A summary report will be presented at the 2018 Post-Season Review process. Once that review is complete, the Area D and E reports will be provided to the Audit Team.
Status of condition	**Behind target,** pending client clarifications. The audit team understands that the C-STAT model study described in the client

	update has been completed and will be released soon, after translation. The audit team notes that the C-STAT study only covers UoC 2, but the condition applies to all three UoCs. Close out of this condition, based only on the C-STAT study, will require that the study, or robust interpretation of the study, show that requirements and handling / husbandry protocols are employed routinely in all three UoCs.

5.16 Condition 16

UoC	1: North and Central Coast 2: Inner Southern including Fraser River
P2 Element	**ETP Sturgeon**
Performance Indicator	**2.3.1:** The UoC and associated enhancement activities do not hinder recovery of ETP species
Scoring Issue (SG80)	**b:** Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species
Score	**75 (UoC 1 & 3), 70 (UoC 2)**
Rationale	The reported catch of sturgeon from UoCs 1 and 2 do not report catches to the species level. Catches are likely not to hinder the recovery of ETP sturgeon species, in particular because retention is not permitted and it appears likely that post-release mortality from the BC Salmon Fishery would be low (UoC 1 and 2), and because it is likely that the sturgeon do not come from ETP populations (UoC 2). However, more evidence is needed in order to be confident that UoC 1 and UoC 2 are highly likely not to hinder recovery of ETP sturgeon species to meet the SG80 level of performance.
Condition	For ETP sturgeon species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	This condition will be addressed by a combination of reporting by-catch at the species level (i.e. differentiating between white sturgeon and the threatened green sturgeon), and assessing the impact. Year 1: Consult with harvesters on the need for improved reporting and species identification through Harvest Committees and determine data required to demonstrate that recovery of ETP species is not threatened (local stock assessment biologists). Year 2: Implement improved reporting protocols and data collection (through changes to reporting requirements in conditions of licence and logbook requirements).

	Year 3: Report out catch statistics and preliminary results of data collection. Year 4: Report out catch statistics. The improved level of catch monitoring and reporting will provide better information to provide an opinion regarding the impact of each fishery on these stocks.
Client Update on Progress [Year 1]	Section 1.6.4 of the 2017-18 Southern BC Salmon IFMP outlines the reasons why a complete, accurate and verifiable fishery monitoring and catch reporting program is required to meet management objectives. The Department has been working across all salmon fisheries to improve catch monitoring programs by clearly identifying information requirements based on ecosystem risk and their supporting rationale for each specific fishery and evaluating the current monitoring programs to identify gaps. Consultation through the Integrated Harvest Planning Committee and other Advisory Bodies is ongoing. Section 12.1 of the 2017-18 Southern BC Salmon IFMP outlines minimum catch monitoring requirements identified by DFO and the Commercial Salmon Advisory Board Catch Monitoring Working Group (CSAB CMWG). Key fisheries were identified for the programs Area D Gillnet: sockeye (Johnstone Strait), Area E Gillnet: sockeye (Fraser River), Area G Troll: chinook (WCVI). Details on the catch monitoring programs are being discussed with Area Harvest Committee representatives and will be communicated via Fisheries Notices and the 2017 Conditions of Licence. Given recent poor survival nothing was planned when Conditions of licence were released. This will be reviewed during the 2018 post-season. Section 12.7 of the 2017-18 Southern BC Salmon IFMP explains mandatory harvest log and in-season reporting of catch information is required in all commercial fisheries. Harvest logs are a record of fishing activities and are required to be kept under the conditions of licence and can be administered through either a hard copy (paper) logbook version or an electronic (E-Log) version, unless otherwise specified. Commercial salmon harvesters are required to maintain a harvest log of all harvest operations and are responsible for any associated financial costs. Section 12.7.1 explains that the Department has been working with the Canadian Pacific Sustainable Fisheries Society to address conditions set out in the Marine Stewardship Council action plan for the continued certification of BC pink, chum and sockeye salmon fisheries. Several conditions within the action plan identify the need for improved reporting of catch, particularly in reference to Endangered, Threatened and Protected species. The harvest logs have been updated and include additional materials for identifying sturgeon, ground fish, seabirds, and marine mammals at the species level (Appendix 1 2017-18 Southern BC Sawqlmon IFMP). Harvesters are required to provide the correct identification of all catch to the species level in the harvest logs and when submitting catch reports to the service provider. **Year 2 Status**: Improvements to catch reporting are ongoing. Whether it is providing improved species identification information that is included with log books (e.g. sea bird identification, common Ground fish and Marine Mammal ID Guide) or annual review and updating of salmon Conditions of Licence. For example Conditions of licence in sections 9 and 10 contain specific requirements for licence holders for birds and Species at Risk. Furthermore, fishery notices have been updated to include reference to species or stocks of concern. The Area E gill net fishery notices have the following for species during sockeye fisheries (2018 Fishery Notice FN0716 https://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=view_notice&DOC_ID=211538&ID=all): *"The target species in this fishery is sockeye salmon. Retention of chum and pink salmon is permitted and there is a mandatory non-retention of all Chinook, Coho, steelhead, and sturgeon in effect (none of these species may be on-board a vessel that is engaged in fishing unless they are being revived in the revival tank immediately prior to release)."*

	And for chum fisheries (2017 Fishery Notice FN1096 https://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=view_notice&DOC_ID=202320&ID=all): *"The target in this fishery is chum salmon. Retention of hatchery marked coho salmon is also permitted and there is a mandatory non-retention and non-possession of wild (unclipped) coho, chinook, sockeye, pink, steelhead, and sturgeon in effect (none of these species may be onboard a vessel that is engaged in fishing unless they are being revived in the revival tank immediately prior to release). This fishery has been designed to address stocks of concern constraints."*
Status of condition	**Ahead of target** Consultation through the Integrated Harvest Planning Committee and other advisory bodies with harvesters on the need for improved data collection and to determine data required to demonstrate that recovery of ETP species are not threatened is occurring. In response to the BC Salmon Fishery reassessment, the client action plan (Year 1) notes changes in the 2017-2018 IFMPs have been made in harvest logs to specify the number of sturgeon in the catch by species. Nevertheless, while there is now good information provided in the logbooks to support identification of marine mammals, seabirds, turtles and some fish species, there is no information provided on green and white sturgeon; for consistency, and in support of meeting the condition, relevant information on these two species should also be included.

5.17 Condition 17

UoC	All 3
P2 Element	**ETP Marine Mammals**
Performance Indicator	**2.3.1:** The UoC and associated enhancement activities do not hinder recovery of ETP species
Scoring Issue (SG80)	**b:** Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species
Score	**75 (UoC 1 & 3), 70 (UoC 2)**
Rationale	There are a number of different ETP and non-ETP marine mammal species in BC waters. However, the species of marine mammal was not recorded in catches from the BC Salmon Fishery, and so it is difficult to determine the direct impact of the fishery on ETP marine mammal species. The number of reported catches from all three UoCs indicate that the BC Salmon Fishery is likely to not hinder the recovery of ETP marine mammal species (SG 60 is met), particularly because gears are always worked close to the boat and gillnets are worked as short nets with short sets (so there is a good possibility of survival post-release), but more evidence is needed in order to be confident that it is highly likely to not hinder recovery and meet the SG80 level of performance.
Condition	For ETP marine mammal species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75).

	Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Review test fishing data (recorded by observers) to assess encounters. Industry to provide improved communication materials to harvesters to support correct identification and reporting of ETP species. Years 2 and 3: Review catch reports and provide preliminary results of catches by species. Year 4: Provide catches by species. This approach will provide improved information related to catches of ETP marine mammals.
Client Update on Progress [Year 1]	Analysis of test fishing is complete (full report below). Analysis of test fishing data for 2015-2017 is complete. The ETP 'species' recorded in the catch considered to be yelloweye rockfish (*Sebastes ruberrimus*), sturgeons (white sturgeon – *Acipenser transmontanus*, and green sturgeon – *Acipenser medirostris*), marine mammals, porpoises and dolphins and unknown bird. No Yelloweye rockfish were identified in any of the Pacific Region test fisheries in the three years examined. There were a small amount of rockfish identified in the UoC3 Marine test fisheries (0.02% to 0.04% by weight). The majority of those rockfish were identified as widow rockfish. No sturgeon were recorded in any of the marine test fisheries or the Skeena Tyee test fishery. In the Fraser River test fishery the catch of identified White Surgeon averaged 225 per year and comprised 8-10% by weight of all species encountered. The only released marine mammals were three California sea lions, four Steller sea lions and one Harbour Seal all encountered in the UoC2 marine test fisheries. With regards to birds, there was one common murre encountered in the UoC2 marine test fisheries. Observers receive training by Departmental staff and are supplied with species identification material to assist in accurate reporting. Test fisheries provide crucial information on abundance, migration timing, stock identification and other biological parameters as salmon pass through internal waters on their homeward spawning migration. The data obtained from test fisheries is used to ensure conservation targets are met with a view to maintaining a sustainable fishery. As the need to document ETP species test fisheries have played an increasing role in providing data on the encounters in fishing gear used to harvest salmon. It should be noted that while every effort is made to record and document accurately the relatively rare encounters with ETP species there can be large numbers of the target species (sockeye, pink and chum salmon) encountered during purse seine harvests. Not all purse seine sets are brought on board the vessel, but instead, for many sets, fish are spilled over the cork line. This process can result in missing encounters with some sea birds and some fish. In addition, sections of both the North and South Coast 2017-18 IFMP's contains information on how to provide information on whale sightings in sections 5.3.9 and 5.3.10. page 82: *"The Department welcomes assistance in the reporting of any whale, turtle, or Basking Shark sightings or entanglement. Sightings for Basking Shark, Leatherback and other turtle species, as well as, many whale species are infrequent in Pacific Canadian waters, and the collection of sightings data is very useful to scientists in determining population size and distribution."* Section 12.7 of the 2017-18 Salmon IFMP explains mandatory harvest log and in-season reporting program for catch information is required in all commercial fisheries. Harvest logs are a record of fishing activities and are required to be kept under the conditions of licence and can be administered through either a hard copy (paper) logbook version or an electronic (E-Log) version, unless otherwise specified.

	Commercial salmon harvesters are required to maintain a harvest log of all harvest operations and are responsible for any associated financial costs. Section 12.7.1 explains that the Department has been working with the Canadian Pacific Sustainable Fisheries Society to address conditions set out in the Marine Stewardship Council action plan for the continued certification of BC pink, chum and sockeye salmon fisheries. Several conditions within the action plan identify the need for improved reporting of catch, particularly in reference to Endangered, Threatened and Protected species. The harvest logs have been updated and include additional materials for identifying sturgeon, ground fish, seabirds, and marine mammals at the species level (Appendix 1 2017-18 Salmon IFMP). Harvesters are required to provide the correct identification of all catch to the species level in the harvest logs and when submitting catch reports to the service provider. IFMP sections for both the North and South Coast 2018-19 IFMP's have updated section on Marine Mammals requirements at 5.3.11.4, 5.3.12, and 5.3.13. Regulatory amendments to the Marine Mammal Regulations were adopted on July 11, 2018 to reduce human disturbance of marine mammals by controlling whale watching and other activities. The objective of the proposed amendments is to ensure the conservation and protection of marine mammals. There is concern that the cumulative effects of repetitive exposure and interaction with humans may interrupt or prevent marine mammals from completing normal life processes (example, mating, calving and nursing), cause habituation of the animals with human activities, and threaten the overall survival of individual animals. The amended Marine Mammal Regulations for whale watching and approaching marine mammals came into effect on July 11, 2018. The regulations include a minimum approach distance of 200 meters for all killer whale populations in Canada's Pacific waters and 100 meters for other whales, dolphins and porpoises. The amended regulations clarify what it means to disturb a marine mammal, including: feeding, swimming or interacting with it; moving it (or enticing/causing it to move); separating a marine mammal from its group or going between it and a calf; trapping marine mammals between a vessel and the shore, or between boats; as well as tagging or marking it. There are now reporting requirements in the new Marine Mammal Regulations for any marine mammal interaction (i.e. vessel or gear). There is also a Marine Mammal condition of licence requirement for all salmon fisheries to report MM by-catch which was instituted in 2018 for all salmon fisheries. New Marine Mammal Reporting Requirements (information outlined in FN 0388 linked below) https://notices.dfo-mpo.gc.ca/fns-sap/indexeng.cfm?pg=view_notice&DOC_ID=207933&ID=all Links to species identification summaries you may find useful can be found here: http://wildwhales.org/wp-content/uploads/2018/01/BCCSN_IDGuide.pdf Industry has been working with harvesters to provide tools and work with harvesters to correctly identify sea birds, marine mammals and ground fish species. In 2017 Industry funded the printing and distribution of species identification guides for harvesters. These guides are included in commercial log books and installed electronically to computers for those harvesters using e-log software. Copies of the identification guides are attached for sea birds, marine mammal and ground fish species. **Test Fishery Analysis** Pacific salmon stocks are intensely managed in–season with data collected from three main sources: test fisheries, commercial fisheries and in-river assessment (e.g., hydro-acoustic counters for Fraser River sockeye and enumeration fences). Test fisheries provide crucial information on abundance, migration timing, stock identification and other biological parameters as salmon pass through internal waters on their homeward spawning migration. The data obtained from test fisheries is used to ensure conservation targets are met with a view to maintaining a sustainable fishery. In particular, the information is used to set Total Allowable Catch levels, time

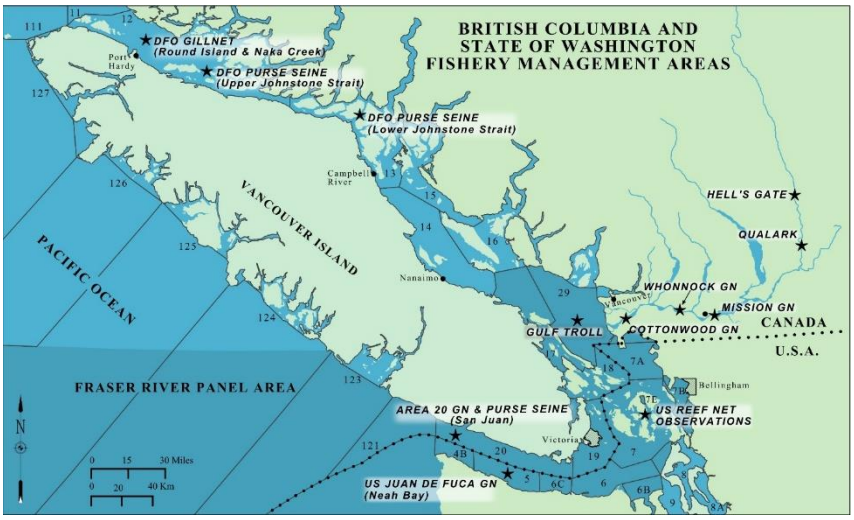
and duration of fishery openings when a surplus to requirements of First Nation FSC fisheries is identified, commercial and recreational access, as well as to support the implementation of the Pacific Salmon Treaty.

Data was analysed from 13 test fisheries that are conducted in marine waters of southern BC and in the Fraser and Skeena Rivers (Table 1).

Table 1. Summary of test fisheries included in analysis to assess encounters with ETP.

UoC	Test Fishery	Gear	Management Focus
1	Skeena Tyee	Gill Net	Skeena salmon
2	Round Island	Gill Net	Fraser River sockeye and pink salmon
	Upper Johnstone Strait	Purse Seine	Fraser River sockeye and pink salmon
	Lower Johnstone Strait	Purse Seine	Fraser River sockeye and pink salmon
	Cottonwood	Gill Net	Fraser River sockeye and pink salmon
	Whonnock	Gill Net	Fraser River sockeye and pink salmon
	Qualark	Gill Net	Fraser River sockeye and pink salmon
	Blinkhorn	Purse Seine	Inner South Coast and Fraser River chum salmon
	Albion Chinook	Gill Net	Fraser River chinook salmon
	Albion Chum	Gill Net	Fraser River chum salmon
3	Area 20	Gill Net	Fraser River sockeye and pink salmon
	Area 20	Purse Seine	Fraser River sockeye and pink salmon
	Area 23	Purse Seine	Barkley Sound sockeye salmon

Figure 1. Locations of key salmon test fishing operations. Not shown on the map is a gill net test fishery located on the lower Skeena River and purse seine test fishery located in Area 23.



Detailed information on each of the 13 test fisheries is contained in Appendix 3.

Salmon test fishing occurs in specific locations to determine abundance of salmon migrating to their natal streams and is focused around peak run times for sockeye, pink and chum salmon. The test vessels are selected for their expertise in salmon and each vessel has a trained observer on board at all times. The gear is closely monitored and designed to optimize the selective harvesting of the target species of sockeye, pink and chum salmon (e.g., through the use of particular mesh sizes for gill nets). Observers are required to record all species encountered by the gear and make all efforts to release non-target species with the least amount of harm.

The analysis of the test fisheries to calculate the percentage contribution of the different species contained in this report followed the same procedures identified in MSC Sustainable Fisheries Certification, BC Salmon Fishery (2017) section 3.5.2. To calculate the percentage contribution of the different species to the total catch within each UoC, weights had to be attributed to the different species taken in the fishery. Mean weight data for the five Pacific salmon species was estimated from troll, gillnet and seine catches from all three UoCs. Mean weight for white sturgeon was based upon converting fork length measurements of white sturgeon collected in the Albion test fishery in 2015 through 2017 to pounds. Conversion from length to weight ($\log_e W = -8.73 + 3.13 \log_e L$) was based upon data sturgeon samples collected in the Fraser River (Semakula, S.N. p. 49). For all other species, mean weights for individuals taken as bycatch were estimated based upon estimates from MSC Sustainable Fisheries Certification, BC Salmon Fishery report (2017, Table 7 p. 36-39).

Table 2. Mean weight (lb) of the five Pacific salmon species in UoCs 1, 2 and 3 used for calculating percentages. Salmon weights sourced from DFO Catch Stats.

Species	2015	2016	2017
Sockeye	5.11	5.85	5.57
Coho	6.13	6.91	7.72
Pink	3.60	5.11	4.50
Chum	9.50	9.43	10.68
Chinook	13.91	13.69	14.01

Table 3. Mean weights attributed to catch data for species other than Pacific salmon used for calculating catch percentages. Sourced from MSC Sustainable Fisheries Certification: BC Salmon Fishery Final Report. April 2017)

Species	2015	2016	2017
American Shad	2	2	2
Blue Shark	100	100	100
California Sea Lion	300	300	300
Common Murre	3	3	3
Harbour Seal	150	150	150
Jack Markerel	3	3	3
Pacific Hake	2	2	2
Pollock	4	4	4
Rockfish	4	4	4
Spiny Dogfish	8	8	8
Steelhead	12	12	12
Stellar Sea Lion	400	400	400
Sturgeon	30	30	30

Table 4. Catch data for UoC 1 Skeena test fishery (estimated mean weights attributed as in Table 2 and 3 for the different species).

Species	2015 (lb)	2015 (%)	2016 (lb)	2016 (%)	2017 (lb)	2017 (%)
Pink Salmon	9,347	17.16	4,941	8.41	12,585	25.52
Sockeye Salmon	23,476	43.11	29,432	50.09	20,578	41.73
Chum Salmon	3,145	5.78	4,095	6.97	1,731	3.51
Coho Salmon	2,059	3.78	4,854	8.26	4,471	9.07
Chinook Salmon	11,073	20.34	6,830	11.62	5,886	11.94
Steelhead	5,352	9.83	8,604	14.64	4,056	8.23
Total	54,452		58,756		49,307	

Table 5. Catch data for UoC 2 marine test fisheries.

Species	2015 (lb)	2015 (%)	2016 (lb)	2016 (%)	2017 (lb)	2017 (%)
Pink Salmon	449,726	38.39	337	0.20	91,782	30.23
Sockeye Salmon	616,467	52.62	109,510	64.92	93,015	30.63
Chum Salmon	4,694	0.40	1,613	0.96	7,768	2.56
Coho Salmon	32,925	2.81	11,472	6.80	29,493	9.71
Chinook Salmon	63,502	5.42	39,719	23.55	67,254	22.15
American Shad	-	0.00	2,004	1.19	2	0.00
Jack Mackerel	-	0.00	75	0.04	2,106	0.69
Pacific Hake	1,538	0.13	214	0.13	104	0.03
Pollock	8	0.00	120	0.07	7,460	2.46
Spiny Dogfish	680	0.06	3,080	1.83	4,184	1.38
Rockfish	512	0.04	32	0.02	-	0.00
Steelhead	1,476	0.13	504	0.30	456	0.15
Total	1,171,527		168,680		303,623	

Table 6. Catch data for UoC 2 Fraser River test fisheries.

Species	2015 (lb)	2015 (%)	2016 (lb)	2016 (%)	2017 (lb)	2017 (%)
Pink Salmon	13,226	5.06	5	0.00	28,586	12.81
Sockeye Salmon	46,861	17.92	32,996	17.92	28,990	12.99
Chum Salmon	101,775	38.91	116,150	63.08	120,812	54.15
Coho Salmon	772	0.30	3,043	1.65	4,070	1.82
Chinook Salmon	89,793	34.33	24,855	13.50	33,900	15.19
Steelhead	324	0.12	192	0.10	192	0.09
Sturgeon	420	0.16	660	0.36	810	0.36
White Sturgeon	8,400	3.21	6,210	3.37	5,700	2.55
Green Sturgeon	-	0.00	30	0.02	60	0.03
Total	261,571		184,141		223,120	

Table 7. Catch data for UoC 3 marine test fisheries.

Species	2015 (lb)	2015 (%)	2016 (lb)	2016 (%)	2017 (lb)	2017 (%)
Pink Salmon	449,726	38.39	337	0.20	91,782	30.23
Sockeye Salmon	616,467	52.62	109,510	64.92	93,015	30.63
Chum Salmon	4,694	0.40	1,613	0.96	7,768	2.56
Coho Salmon	32,925	2.81	11,472	6.80	29,493	9.71
Chinook Salmon	63,502	5.42	39,719	23.55	67,254	22.15
American Shad	-	0.00	2,004	1.19	2	0.00
Jack Mackerel	-	0.00	75	0.04	2,106	0.69
Pacific Hake	1,538	0.13	214	0.13	104	0.03
Pollock	8	0.00	120	0.07	7,460	2.46
Spiny Dogfish	680	0.06	3,080	1.83	4,184	1.38
Rockfish	512	0.04	32	0.02	-	0.00
Steelhead	1,476	0.13	504	0.30	456	0.15
Total	1,171,527		168,680		303,623	

Analysis of test fishing data for 2015-2017 is complete. The ETP 'species' recorded in the catch considered to be yelloweye rockfish (*Sebastes ruberrimus*), sturgeons (white sturgeon – *Acipenser transmontanus*, and green sturgeon – *Acipenser medirostris*), marine mammals, porpoises and dolphins and unknown bird. No yelloweye rockfish were identified in any of the Pacific Region test fisheries in the three years examined. There were a small amount of rockfish identified in the UoC3 Marine test fisheries (0.02% to 0.04% by weight). The majority of those rockfish were identified as widow rockfish. No sturgeon were recorded in any of the marine test fisheries or the Skeena Tyee test fishery. In the Fraser River test fishery the catch of identified white sturgeon averaged 226 per year and comprised 3% by weight of all species encountered. The only released marine mammals were three California sea lions, four steller sea lions and one harbour seal all encountered in the UoC2 marine test fisheries. With regards to birds there was one common murre encountered in the UoC2 marine test fisheries.

Status of condition

Ahead of target

The Client action plan has been provided (Year 1), and harvest logs have been updated and include additional materials for identifying marine mammals at the species level as reflected in Appendix 1 of the 2017-18 Salmon IFMP. This is an important step in future years of the client action plan (Year 2 and 3) for monitoring catches of marine mammals by species as well as other ETP species. The client has also provided ancillary information on test fishery ETP encounters for 2015-2017. The assessment team notes that test fishery data are a useful source of information on ETP encounter rates independent of commercial fishery ETP catches.

5.18 Condition 18

UoC	All 3
P2 Element	**ETP Bird Species**
Performance Indicator	**2.3.1:** The UoC and associated enhancement activities do not hinder recovery of ETP species
Scoring Issue (SG80)	**b:** Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species
Score	**75 (UoC 1 & 3), 70 (UoC 2)**
Rationale	Similar to marine mammals, there are a number of different ETP and non-ETP seabird species found in BC waters. Because the species of bird was not recorded in catches, it is difficult to determine the direct impact of the fishery on ETP bird species. Almost all birds captured in seine nets, and about 85% captured in gillnets, are released, although survival rates are unknown (DFO, pers. comm., as reported from bycatch data provided to the assessment team). Smith & Morgan (2005) reported on seabird bycatch in the BC salmon gillnet and seine fishery and found highly variable seabird bycatch rates, but common murres (*Uria aalge*) and rhinoceros auklets (*Cerorhinca monocerata*) made up around 90% of the catch; both of these species are non-ETP. The number of reported catches indicates that the BC Salmon Fishery is likely to not hinder the recovery of ETP bird species, but more evidence is needed in order to be confident that it is highly likely to not hinder recovery and meet the SG80 level of performance.
Condition	For ETP bird species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Direct effects of the UoC including enhancement activities are highly likely to not hinder recovery of ETP species.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Review test fishing data (recorded by observers) to assess encounters. Managers to review Environment Canada analysis for seabirds and provide feedback on assumptions made to complete analysis. Industry to provide improved communication materials to harvesters to support correct identification and reporting of ETP species. Years 2 and 3: Review catch reports and provide preliminary reports of catches by species. Year 4: Provide catches by species. This approach will help in providing better information related to catches of avian ETP species. This report will provide improved information of the catch by species.
Client Update on	Analysis of test fishing data for the most recent three years is complete (full report contained in Condition 17 response). The ETP 'species' recorded in the catch

Progress [Year 1]	considered to be yelloweye rockfish (*Sebastes ruberrimus*), sturgeons (white sturgeon – *Acipenser transmontanus*, and green sturgeon – *Acipenser medirostris*), marine mammals, porpoises and dolphins and unknown bird. No Yelloweye rockfish were identified in any of the Pacific Region test fisheries in the three years examined. There were a small amount of rockfish identified in the UoC3 Marine test fisheries (0.02% to 0.04% by weight). The majority of those rockfish were identified as Widow rockfish. No sturgeon were recorded in any of the marine test fisheries or the Skeena Tyee test fishery. In the Fraser River test fishery the catch of identified White Surgeon averaged 226 per year and comprised 3% by weight of all species encountered. The only released marine mammals were three California sea lions, four Steller sea lions and one Harbour Seal all encountered in the UoC2 marine test fisheries. With regards to birds there was one common murre encountered in the UoC2 marine test fisheries. Section 12.7 of the 2017-18 Salmon IFMP explains mandatory harvest log and in-season reporting of catch information is required in all commercial fisheries. Harvest logs are a record of fishing activities and are required to be kept under the conditions of licence and can be administered through either a hard copy (paper) logbook version or an electronic (E-Log) version, unless otherwise specified. Commercial salmon harvesters are required to maintain a harvest log of all harvest operations and are responsible for any associated financial costs. Section 12.7.1 explains that the Department has been working with the Canadian Pacific Sustainable Fisheries Society to address conditions set out in the Marine Stewardship Council action plan for the continued certification of BC pink, chum and sockeye salmon fisheries. Several conditions within the action plan identify the need for improved reporting of catch, particularly in reference to Endangered, Threatened and Protected species. The harvest logs have been updated and include additional materials for identifying sturgeon, ground fish, seabirds, and marine mammals at the species level (Appendix 1 2017-18 Salmon IFMP). Harvesters are required to provide the correct identification of all catch to the species level in the harvest logs and when submitting catch reports to the service provider. The 2017 licence conditions state the following for daily catch reporting: *"the vessel master using paper harvest logs shall provide the following information to the Catch Reporting Service Provider……* *(F) number of fish caught and retained by species category as indicated in the harvest log;* *(G) number of fish caught and released by species category as indicated in the harvest log; and* *(H) number of non-fish (i.e. turtles, birds and mammals) encountered by species.* *(d) The vessel master using an electronic harvest log shall submit this information, other than the harvest log page number, by digital transmission to the Salmon Fishery Database in a properly encoded electronic mail message."* For the harvest log section of the condition of licence for 2017: *"(7) Recording of harvest log data:* *(a) Daily Catch Records:* *(i) The vessel master shall ensure that separate Daily Catch Records are recorded in the harvest log for each day and Area fished, by no later than 08:00 h of the following day, and before any fish is landed.* *(ii) For each date and Area fished, the vessel master shall ensure the following information is recorded in the harvest log:* *(A) date fished;* *(B) Area fished;* *(C) number of hours fished;* *(D) number of sets;*

	(E) Subarea(s) fished; *(F) number of fish caught and retained by species category as indicated on the Daily Catch Record page of the harvest log;* *(G) number of fish caught and released by species category as indicated on the Daily Catch Record page of the harvest log; and* *(H) number of non-fish (i.e. turtles, birds and mammals) encountered by species.* *(iii) The vessel master using an electronic harvest log shall submit this information by digital transmission to the Salmon Fishery Database in a properly encoded electronic mail message."*
Status of condition	**<u>Ahead of Target</u>** The client update states that the fisheries managers have reviewed and are continuing to review test fishing seabird data and plan to interact with Environment Canada in the analysis of seabird encounters. As part of the Year 1 client action plan, industry is to provide improved communication materials to harvesters to support correct identification and reporting of ETP species; this has been done.

5.19 Condition 19

UoC	All 3
P2 Element	**ETP Species**
Performance Indicator	**2.3.2:** The UoC and associated enhancement activities have in place precautionary management strategies designed to: • meet national and international requirements • ensure the UoC does not hinder recovery of ETP species Also, the UoC regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.
Scoring Issue (SG80)	**e:** There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoC and enhancement related mortality of ETP species and they are implemented as appropriate
Score	**75**
Rationale	As part of the SARA listing process, management plans are required to be prepared for species listed as Special Concern, and Recovery Strategies have to be prepared for species listed as Threatened. These comprise reviews of the different threats and consider steps to reduce impacts, which are then taken up in to the IFMPs (DFO 2015d, 2015h). Although the IFMPs are produced annually, it is not clear that a specific review of alternative measures is undertaken regularly in their production.
Condition	For ETP species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoC and enhancement related mortality of ETP species and they are implemented as appropriate.*"
Milestones	<u>Year 1</u>: Develop and present a plan to address the condition (resulting score = 75). <u>Year 2</u>: Provide an update to show that the plan presented in Year 1 has been

	implemented (resulting score = 75). Year 3: Show that the plan presented in Year 1 is being implemented and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Commercial salmon fisheries have requirements to report encounters of ETP species and plans are in place to improve identification of these species for reporting purposes. Other management requirements are documented in IFMPs. Year 2: Encounters of ETP species in salmon fisheries are expected to be low; data will be reported publicly (i.e. IFMP) and reviewed annually. Years 2 to 4: Alternative measures under consideration to reduce encounters will be identified in IFMPs and actual measures implemented will be identified in IFMPs as required. This action will show whether or not alternative measures were identified and if proposed measures were implemented.
Client Update on Progress [Year 1]	Section 1.6.4 of the 2017-18 Salmon IFMP outlines the need the reasons why a complete, accurate and verifiable fishery monitoring and catch reporting program is required to meet management objectives. The Department has been working across all salmon fisheries to improve catch monitoring programs by clearly identifying information requirements based on ecosystem risk and their supporting rationale for each specific fishery and evaluating the current monitoring programs to identify gaps. Consultation through the Integrated Harvest Planning Committee and other Advisory Bodies is ongoing. Section 12.1 of the 2017-18 Salmon IFMP outlines minimum catch monitoring requirements identified by DFO and the Commercial Salmon Advisory Board Catch Monitoring Working Group (CSAB CMWG). Key fisheries were identified for the programs Area D Gill net: sockeye (Johnstone Strait), Area E Gill net: sockeye (Fraser River), Area G Troll: chinook (WCVI). Details on the catch monitoring programs are being discussed with Area Harvest Committee representatives and will be communicated via Fisheries Notices and the 2017 Conditions of Licence. Given recent poor salmon survival nothing was planned when 2018 Conditions of licence were released. This will be reviewed during the 2018 post-season. Section 12.7 of the 2017-18 Salmon IFMP explains mandatory harvest log and in-season reporting of catch information is required in all commercial fisheries. Harvest logs are a record of fishing activities and are required to be kept under the conditions of licence and can be administered through either a hard copy (paper) logbook version or an electronic (E-Log) version, unless otherwise specified. Commercial salmon harvesters are required to maintain a harvest log of all harvest operations and are responsible for any associated financial costs. Section 12.7.1 explains that the Department has been working with the Canadian Pacific Sustainable Fisheries Society to address conditions set out in the Marine Stewardship Council action plan for the continued certification of BC pink, chum and sockeye salmon fisheries. Several conditions within the action plan identify the need for improved reporting of catch, particularly in reference to Endangered, Threatened and Protected species. The harvest logs have been updated and include additional materials for identifying sturgeon, ground fish, seabirds, and marine mammals at the species level (Appendix 1 2017-18 Salmon IFMP). Harvesters are required to provide the correct identification of all catch to the species level in the harvest logs and when submitting catch reports to the service provider. To assist licence holders log books contains species identification material for sea birds and marine mammals. **Year 2 Status**

	Test fishery analysis of the years 2015-17 supports the argument that encounters with ETP using commercial salmon harvesting gear is very low. Sturgeon encounters in the Fraser River test fisheries shows the highest encounters with about 3% by weight in the Fraser River test fisheries. The encounters of ETP species in salmon fisheries will be reported publicly in the 2018 Post Season Review reports and there were will be annual reviews of the ETP encounter data.
Status of condition	**<u>On target</u>** The client action plan (Year 1) for ETP species is to improve identification of these species in commercial catches as presented in the 2017-2018 North and South Coast IFMPs. As identified in the client action plan (Year 2), catches are to be provided in the IFMPs and reviewed annually to assess the effectiveness and practicality of alternative measures to minimise UoC and enhancement related mortality of ETP species. While the condition is identified as on-target, many of the requirements to meet the condition are being fulfilled now. As reported in the 2017-18 IFMP, harvesters are required to provide the correct identification of all catch to the species level in the harvest logs as a condition of licence and when submitting catch reports to the service provider. As noted in the CAP, to assist licence holders, log books now contain species identification material for sea birds, fish and marine mammals.

5.20 Condition 20

UoC	All 3
P2 Element	**ETP Species, not including yelloweye rockfish**
Performance Indicator	**2.3.3:** Relevant information is collected to support the management of UoC and enhancement activities impacts on ETP species, including: • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species
Scoring Issue (SG80)	**a:** Some quantitative information is adequate to assess the UoC related mortality and impact and to determine whether the UoC and associated enhancement may be a threat to protection and recovery of the ETP species
Score	**75 (UoC 1 & 3), 70 (UoC 2)**
Rationale	For ETP species other than yelloweye rockfish, the catch data are qualitative only as they do not distinguish the ETP species from non-ETP species within the same groupings (e.g., sturgeons, marine mammals, birds). These data, together with other information such as the post-release survival of white sturgeon (LGL 2006) and information on release rates for seabirds and marine mammals (Smith & Morgan 2005, DFO, pers. comm.) are adequate to estimate the impact of the UoCs on ETP species, so meeting the SG60 level of performance. The SG80 level of performance is not achieved.
Condition	For ETP species, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Some quantitative information is adequate to assess the UoC related mortality and impact and to determine whether the UoC and associated enhancement may be a threat to protection and recovery of the ETP species.*"

Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Show that the plan presented in Year 1 is being implemented and present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	The response to Conditions 17 and 18 will facilitate the response to Condition 20 (i.e. providing quantitative data on projected encounters of ETP species, available information in the literature on release mortality rates, and provide estimated impacts on ETP populations). Year 1: Review test fishing data (recorded by observers) to assess encounters. Industry to provide tools and work with harvesters to correctly identify by-catch of ETP species. Years 2 and 3: Review by-catch information from harvest logs and provide expanded estimates of by-catch of ETP species. Year 4: Provide a report on the projected encounters of ETP species, available information in the literature on release mortality rates, and provide estimated impacts on ETP populations). The actions will result in quantitative information and analysis to show impact on ETP species.
Client Update on Progress [Year 1]	Analysis of test fishing data for the most recent three years is complete and the full report on test fishing data is contained in Year 1 Report Condition 17. The ETP 'species' recorded in the catch considered to be yelloweye rockfish (*Sebastes ruberrimus*), sturgeons (white sturgeon – *Acipenser transmontanus*, and green sturgeon – *Acipenser medirostris*), marine mammals, porpoises and dolphins and unknown bird. No yelloweye rockfish were identified in any of the Pacific Region test fisheries in the three years examined. There were a small amount of rockfish identified in the UoC3 Marine test fisheries (0.02% to 0.04% by weight). The majority of those rockfish were identified as widow rockfish. No sturgeon were recorded in any of the marine test fisheries or the Skeena Tyee test fishery. In the Fraser River test fishery the catch of identified White Surgeon averaged 226 per year and comprised 3% by weight of all species encountered. The only released marine mammals were three California sea lions, four steller sea lions and one harbour seal all encountered in the UoC2 marine test fisheries. With regards to birds there was one common murre encountered in the UoC2 marine test fisheries In addition, sections of both the North and South Coast 2017-18 IFMP's contains information on how to provide information on whale sightings in sections 5.3.9 and 5.3.10. page 82: *"The Department welcomes assistance in the reporting of any whale, turtle, or Basking Shark sightings or entanglement. Sightings for Basking Shark, Leatherback and other turtle species, as well as, many whale species are infrequent in Pacific Canadian waters, and the collection of sightings data is very useful to scientists in determining population size and distribution."* In the fishery notices in 2017, example from Area B seine Johnstone Strait chum fishery (FN0995): *"5. Fishers are reminded it is an offence under Section 7 of the Marine Mammals Regulations to disturb marine mammals. Fishers are advised to follow the Be Whale Wise: Marine Wildlife Guidelines for Boaters, Paddlers and Viewers (BWW) which are available from local Fisheries Offices or on-line at http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/mammals-*

	mammiferes/view-observer-eng.htm to avoid disturbing local killer whales and other marine mammals. *6. Fishers are requested to avoid fishing among birds and not to run the net if birds are near the net. Fishers are requested to retain all dead birds which are entangled and to release live and unharmed birds by placing them in the water. Please check all birds for metal bird bands (rings) on the leg. If a bird is banded please contact Laurie Wilson with the band number and capture date and location at 1-866-431-2473 (BIRD) or by the email below. Handle birds with gloves, double bag dead birds and label each bird with date, time, and location and store them on ice. Please call your local charter patrol to organize pick-up or drop them off at a local DFO office. Alternatively, please send photographs of birds with a reference object such as a coin, and the date, time and location to laurie.wilson@canada.ca. Your names and vessel names do not need to be identified or included.* *7. Fisheries and Oceans Canada is interested in reports of sea turtles in BC waters. By documenting sightings we are able to learn more about how, when and where these turtles are using our waters. If you see a sea turtle, please call this toll-free phone number: 1-866-I SAW ONE (1-866-472-9663). Please include information such as the type of sea turtle seen (i.e. leatherback), the location, and time of sighting.* *8. Fishers should be advised that whales can be encountered in the fishing area. Fishers should take precautionary measures to avoid fishing near whales to avoid potential contact with fishing gear. If a whale becomes entangled in fishing gear, fishers should immediately call the Observe, Record, Report (ORR) line at 1-800-465-4336. Fishers are advised not to attempt to free the whale of the fishing gear as this can pose a serious threat to the safety of the fisher and the animal."* Section 12.7 of the 2017-18 Salmon IFMP explains mandatory harvest log and in-season reporting of catch information is required in all commercial fisheries. Harvest logs are a record of fishing activities and are required to be kept under the conditions of licence and can be administered through either a hard copy (paper) logbook version or an electronic (E-Log) version, unless otherwise specified. Commercial salmon harvesters are required to maintain a harvest log of all harvest operations and are responsible for any associated financial costs. Section 12.7.1 explains that the Department has been working with the Canadian Pacific Sustainable Fisheries Society to address conditions set out in the Marine Stewardship Council action plan for the continued certification of BC pink, chum and sockeye salmon fisheries. Several conditions within the action plan identify the need for improved reporting of catch, particularly in reference to Endangered, Threatened and Protected species. The harvest logs have been updated and include additional materials for identifying sturgeon, ground fish, seabirds, and marine mammals at the species level (Appendix 1 2017-18 Salmon IFMP). Harvesters are required to provide the correct identification of all catch to the species level in the harvest logs and when submitting catch reports to the service provider. To assist licence holders log books contains species identification material for sea birds and marine mammals.
Status of condition	**<u>On target</u>** As stated in the client action plan (Year 1) for Conditions 17 and 18, the implementation data collection processes will provide quantitative data on projected encounters of ETP species, available information in the literature on release mortality rates, and provide estimated impacts on ETP populations.

5.21 Condition 21

UoC	All 3
P2 Element	**Main Habitats**
Performance Indicator	**2.4.3:** Information is adequate to determine the risk posed to the habitat by the UoC and associated enhancement activities and the effectiveness of the strategy to manage impacts on the habitat
Scoring Issue (SG80)	**b:** Information is adequate to allow for identification of the main impacts of the UoC and enhancement activities on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear
Score	**75**
Rationale	There are considered to be no commonly encountered habitats in the BC Salmon Fishery because the gears are designed to work off bottom, while MPAs and VMEs have been identified throughout BC waters. The BC Salmon fishery partially meets the SG80 level of performance. However, there is only broad-scale information available on the timing and location of use of different fishing gears, and there is no information for BC waters on the amounts of lost fishing gear in different areas that may be contributing to habitat degradation. As such, the fishery meets the SG60 level of performance, but does not fully meet the SG80.
Condition	For main habitats, within 4 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*Information is adequate to allow for identification of the main impacts of the UoC and enhancement activities on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 75). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 75). Year 3: Present initial results or partial results of the implemented plan (resulting score = 75). Year 4: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: Consult with industry on adding additional information to fishery notices requesting that fishers contact local DFO managers or patrol vessels (similar to the Area 23 Barkley sockeye salmon gill net fisheries notices) to report abandoned, lost or entangled gear. This approach has been used for Barkley Sound fisheries where the following provision has been added to fisheries notices: "*Please notify the local DFO manager or patrol vessel of the location of abandoned or entangled nets. A local diver has volunteered to remove the nets at no charge.*" Evaluate the feasibility of adding provisions to public documents (web-site, etc.) inviting the public to report gear found. Years 2 to 4: Provide regular reports related to the information received about lost gear. Preparation of a report demonstrating the level of fishing detail available (this would include maps showing sub-area locations as well as daily catches and

	effort). Review the results of investigations of derelict gear undertaken in the Salish Sea (and elsewhere as available) "and determine what further work is required". As a result of this action, data will be compiled related to lost commercial fishing gear.
Client Update on Progress [Year 1]	Natural Resources Consultants in conjunction with Environment Canada completed a report examining the impacts of lost fishing gear in southern BC waters (NRC, 2018). The focus of their study was the impact of lost gear on sea birds. The report covers a 2015 study of the Baynes Sound and areas around Hornby and Denman Islands. This area is the main fishing grounds for a herring fishery that takes place in late to early March and a fall chum fishery with purse seine and gill net gear. During their survey four lost gillnets were removed: two each from the herring and salmon fisheries. Based upon conversations with some commercial fishermen they considered undertaking a second survey in Johnstone Strait in the vicinity of Malcolm Island. Following additional consultation with fishermen ad DFO staff they determined the best areas to undertake the survey would be along the northern shore of Malcolm Island. During a site visit, one of the authors met with several members of the gill net fishing fleet, who identified locations where the heaviest gill net fishing effort occurs, where the heavy tidal currents effect fishing practices, and where their gear is prone to become snagged on seafloor features such as boulders, pinnacles, and reefs. In total 146 linear Km and 11 Km^2 were surveyed. Both the 2015 Baynes Sound and North Vancouver Island Straits survey found little evidence of lost gear especially compared to derelict gill net density in Washington State waters. Even though identification of specific survey areas in this project focused heavily on information from fishers to relatively few derelict nets were located, even at potential snag locations that would almost certainly have derelict nets if located in high fishing areas of Washington State waters. The authors propose that derelict gill nets from the salmon fisheries in marine waters are not as prevalent in British Columbia as they have historically been in Washington State, despite similar geography and similar fishing history. This supports our developing theory that derelict gill nets from the salmon fisheries in marine waters are not as prevalent in British Columbia as they have historically been in Washington State, despite similar geography and similar fishing history. The authors proposed *"It is possible that the reasons for gillnet loss in Washington and British Columbia are not the same, which could result in either less gear loss and/or lost gear becoming deposited in a location further from the point where it was lost. For example, Antonelis (2013) identified an association between gillnet depths (vertical distance from corkline to leadline) and depth at which derelict gillnets are found in Washington State waters. He found that a water-depth to net-depth mismatch (i.e., 30 m net fishing in 20 m of water) is the main reason for nets to become snagged on the seafloor and lost in Washington. In Washington, there are no restrictions on the depth of gillnets and they regularly reach 30 m (100 ft) deep. However, in British Columbia regulations prohibit gillnets to be any deeper than 60 or 90 meshes (i.e., 6 m – 14 m). This restriction could be a reason that fewer nets are lost in British Columbia waters than in Washington."* Regardless of the apparent low incident DFO remains concerned about lost gear and added to fishery notices in 2017 a request to notify and report abandoned, lost, or entangled gear. Following is an example Area B seine Johnstone Strait chum fishery notice (FN0995): *"9. Fishers are advised to notify local DFO managers or patrol vessels to report abandoned, lost, or entangled gear."* Canada has now become the second G7 country to sign on to the Global Ghost Gear

	Initiative https://www.ghostgear.org. This will help to raise awareness of the issue in Canada.
Status of condition	**On target**, although a formal action plan has yet to be developed. The client provided a field survey report that suggested the density of derelict salmon gear in British Columbia is much less than in Puget Sound, reportedly because depth of gillnets in British Columbia is much less than those in Puget Sound and gillnets in BC are less likely to contact the bottom. Nevertheless, lost gillnets have been observed in British Columbia, leading NRC (2018) to conclude *"While findings to this point suggest that derelict gillnet prevalence in British Columbia is less than it has been in Washington, it would be premature to conclude that derelict gillnets are not a threat to surf scoters and other species in the marine waters of British Columbia based on results from two study sites." "it should be noted that anecdotal information from multiple sources suggests that gear loss occurs more frequently along the northern British Columbia coast where greater fishing effort takes place."* As noted in the Client response above, DFO remains concerned about lost gear and so they added to fishery notices in 2017 a request to notify and report abandoned, lost, or entangled gear, e.g. *"Fishers are advised to notify local DFO managers or patrol vessels to report abandoned, lost, or entangled gear."* This request was identified for two fishing areas. Frequent posting of this derelict gear notice to fishermen is excellent. DFO and the Client should confirm whether or not this notice is routinely posted in **all** salmon fisheries. Furthermore, they should identify an action plan for removing lost nets in each area, as recommended by NRC (2018) and implemented in Puget Sound and in Barkley Sound. DFO mentioned that Enforcement and its Marine Mammal Officer will remove lost nets on the surface. However, divers are often needed to remove lost nets because much of the actively fishing net is beyond the reach of people operating from the surface. These actions would help ensure that derelict salmon gear is not continuing to be lost and continuing to "ghost fish". The Client also stated that Canada supports the Global Ghost Initiative. While this action helps raise awareness about lost fishing gear, there are no Global Ghost Initiative requirements for member countries to deter and remove derelict fishing gear. The Global Ghost Gear Initiative has developed a Best Practice Framework for the Management of Fishing Gears designed to provide guidance on practices to prevent, reduce, and eliminate harm from lost fishing gear: https://static1.squarespace.com/static/5b987b8689c172e29293593f/t/5bb64b578165f5891b931a6b/1538673498329/wap_gear_bp_framework_part_2_mm_lk-2017.10.23.pdf. Key practices include identification of high risk fishing areas, crew training, gear marking, reporting and retrieval. Reporting should include immediate reporting of lost gear so that gear can be immediately removed. Systematic reporting of lost gear in logbooks is needed to build understanding of the extent of gear loss in the fishery. This should include gear lost and retrieved by the fisher. The Client told the Assessment Team that they support identification tagging of salmon fishing gear so that 1) lost gear can be returned to the owner, and 2) fishermen are more likely to retrieve their lost gear. The Assessment Team supports this measure strongly as a part of good management, but we note that experience shows that tags should be attached to the lead line and float line of the gillnet rather than to the buoy line, which is often separated from the lost net. The derelict gear issue continues to be an important issue in British Columbia, and it is clear that more effort is needed to control it. On September 16, 2018, CBC News reported that at least five seals were entangled and died in a derelict gillnet found in the lower Fraser River on September 6 (https://www.cbc.ca/amp/1.4821101). The Assessment Team was informed that this was not a commercial net, but we also note that routine gear tagging in the commercial fleet would help to demonstrate good practice. DFO reportedly removed the net.

5.22 Condition 22

UoC	All 3
Performance Indicator	**3.2.4:** There is a system of monitoring and evaluating the performance of the fishery-specific and enhancement management system(s) against its objectives There is effective and timely review of the fishery-specific and associated enhancement program(s) management system
Scoring Issue (SG80)	**b:** The fishery-specific and associated enhancement program(s) management system is subject to regular internal and occasional external review
Score	**70**
Rationale	There was evidence that the enhancement program is reviewed through the SEP Biological Risk Based Framework, but the Assessment Team was not provided with evidence that the enhancement program is subject to occasional external review. The fishery therefore does not meet the SG80 requirement.
Condition	Within 3 years, the client shall demonstrate that the SG80 level of performance is met; i.e., that: "*The fishery-specific and associated enhancement program(s) management system is subject to regular internal and occasional external review.*"
Milestones	Year 1: Develop and present a plan to address the condition (resulting score = 70). Year 2: Provide an update to show that the plan presented in Year 1 has been implemented (resulting score = 70). Year 3: Present the final results, and demonstrate the SG80 level of performance is met (resulting score = 80).
Client action plan	Year 1: DFO to undertake an inventory of external reviews of the SEP Management System. Consider ways of making the 5 year internal review also available for external review. DFO to confirm that external experts were engaged in the development of the most recent review of the management system. Years 2 and 3: Provide update referencing the external reviews and the proposed approach regarding making internal reviews available to the public. These actions will demonstrate that the SEP Management System is subject to occasional external reviews.
Client Update on Progress [Year 1]	A 5-year economic evaluation of the SEP was completed by the Evaluation Directorate of DFO in accordance with the Treasury Board of Canada's 2009 *Policy on Evaluation.* The object of the evaluation was to determine the extent to which SEP was managed effectively and efficiently and has achieved its stated outcomes. This report was completed in the Spring of 2015 and is publicly available at: http://www.dfo-mpo.gc.ca/ae-ve/evaluations/13-14/6B167-Evaluation_Salmonid_Enhancement_Program_Mar2015-eng.html#ch1 In addition, SEP has yearly performance reviews in the *Departmental Performance Report* (most recent version is available at http://www.dfo-mpo.gc.ca/dpr-rmr/2016-17/dpr-eng.html#B5) and the IFMP Post-Season Report (most recent version available at http://www.pac.dfo-mpo.gc.ca/sep-pmvs/projects-projets/ifmp-pgip-

	eng.html), which involves public consultation.
Status of condition	**On target** The Assessment team considers this condition to be ahead of target, given that DFO agreed, at the 2018 site visit, to build periodic external review into the routine SEP review process. This review should be based on a report that describes and evaluates enhancement activities and performance metrics in each assessment area, including issues raised by Conditions in this MSC report.

5.23 Recommendation 1

UoC	All 3
Performance Indicator	**3.2.4:**
Recommendation	It is not clear why Skeena River sockeye salmon exploitation was capped at 40% in 2015 (beginning at 4 million sockeye salmon) when it was previously capped at 30% in 2013 (beginning at 5 million sockeye salmon), and so a non-binding Recommendation is set to provide a written explanation for this change in management by the year 2 audit
Progress on Recommendation [Year 1]	**This Recommendation remains Open** **Client**: The Northern BC Integrated Fisheries Management Plan for 2015/2016 IFMP provides for a commercial harvest decision rule similar to the "2009" plan for run sizes up to 2 million. In addition, allowable exploitation rates will be permitted to increase up to a maximum exploitation rate of 40% for returns to Canada of 4 million sockeye or greater (DFO 2015). The commercial harvest decision rule in the plan is intended to continue to support conservation and provide opportunities for rebuilding of wild sockeye populations while allowing for some additional sustainable harvest opportunities if sockeye returns are more abundant. Based on this approach, no commercial sockeye fisheries would take place in Management Area 4 unless the predicted return to Canada is greater than 1.05 million sockeye. The 2015 Skeena sockeye forecast return to Canada (after accounting for Alaskan fishery removals) is expected to be above average with a median of 3.0 million (range is approximately 2.1 million to 4.4 million). At a return of 3.0 million, the commercial exploitation rate permitted would be approximately 30%. Actual fishing opportunities will be based on in-season assessments of actual sockeye returns. **Assessment Team**: The Team was provided with a letter that was sent to stakeholders, describing the change to the HCR in 2015; in essence, DFO allowed for an increased harvest rate in years with large runs. Nevertheless, there was no analysis explaining why the maximum harvest rate was allowed to increase from 30% in 2013 to 40% in 2015.

5.24 Recommendation 2

UoC	All 3
Performance Indicator	**1.2.2, SIa**
Recommendation	DFO relies heavily on catch and release to minimize impacts on non-target salmon, including chum salmon. A non-binding Recommendation is set to provide tables of reported salmon catch and total mortalities of each salmonid species where total mortalities are based on catch and release mortality plus retained catch. Furthermore, the method used to roll-up index escapement counts to evaluate performance of the harvest control rule against the TRP needs to be described. It is noted that DFO 2016a, DFO 2016b and Raby et al. 2015 were highlighted by stakeholders as being of relevance to this Recommendation.
Progress on Recommendation [Year 1]	**This Recommendation remains Open** **Client:** Regarding estimates of total mortality for fisheries and reporting them, this is an area that requires some additional discussion within the DFO. An additional challenge is that the release mortality rates in the IFMP need to be updated with the framework that Patterson *et al*. developed and was approved through CSAS to determine Fishery Related Incidental Mortality estimates; unfortunately, this work has not been a high priority and those estimates have not been developed to date. **Assessment Team:** Little or no progress has been made on this recommendation. While post-season reports typically report salmon bycatch estimates, these values are not translated into mortalities based on gear-specific assumptions of catch and release survival. Therefore, DFO post season reports do not yet provide estimates of total mortalities in the fishery. The Assessment Team is not aware of the existence of a report describing the DFO method for "rolling-up" index spawning counts.

5.25 Recommendation 3

UoC	All 3
Performance Indicator	**1.2.3, Sia, b**
Recommendation	Although the information is generally sufficient, the Assessment Team notes that potential improvements to data management and reporting processes were identified by English et al, (2016). It is recommended that these improvements are implemented: 1. The procedures for uploading escapement estimates into the nuSEDS database and completing the review of these data need to be streamlined. Data coordinators need to be identified for each region and assigned the responsibility of ensuring that escapement data are complete and uploaded into the nuSEDS database in a timely manner. 2. The most reliable annual escapement estimates for every indicator stream must be added to the nuSEDS database. This is important for ensuring consistency between the various analyses conducted using salmon

	escapement data (e.g., Babine fence counts, Nass River escapement estimates derived using mark-recapture techniques). 3. Procedures and responsibilities for updating databases must be clearly defined. One individual in Prince Rupert and one in Bella Coola, with the necessary skills, should be responsible for ensuring that catch and exploitation rate data are uploaded into the appropriate DFO database. 4. DFO's catch databases for commercial, recreational and First Nation fisheries harvest statistics need to be upgraded to industry standards and more accessible to DFO staff (i.e., single source, consistent format, accessible through the web via high speed servers)."
Progress on Recommendation [Year 1]	**<u>This Recommendation remains Open</u>** **<u>Client:</u>** DFO is aware of shortcomings in the current salmon data management system, some of which the audit team has highlighted. The Department is discussing potential solutions and changes. A data management strategic plan will be developed which prioritizes actions and changes for implementation to ensure that data are secure, available and discoverable for partners and Canadians in a timely and effective manner. Specifically with respect to Recommendation 3.1, the Department agrees that escapement data should be loaded into nuSEDS in a timely manner. A single escapement data coordinator in the regional Salmon Data Unit works with the area-based staff in the various DFO offices to facilitate the data loading effort. There are not data coordinators in each area office; such an organizational model is not supported by current funding priorities. With respect to Recommendation 3.2, it is not entirely clear what is being requested. NuSEDS has been the Department's central repository for Pacific Region salmon escapement since the early 2000s. It is policy that all annual escapement estimates are loaded into this system as they are available. Therefore this recommendation is already in place and there are no plans to change this approach. With respect to Recommendation 3.3, one of the outcomes anticipated from the strategic planning work mentioned above is that roles and responsibilities for salmon data will be updated and documented. This work will likely take a few years to complete. Staffing changes are underway at the Prince Rupert area office but it is unlikely that a single person would be tasked with entering information for all databases. This is a shared responsibility between multiple staff members as best aligns with their areas and species of responsibility. There are no plans to have a staff member located in Bella Coola. With respect to Recommendation 3.4, there is recognition within DFO that its catch databases for commercial, recreational and First Nations need to be improved. The Department's long term vision is an integrated fisheries management database with corporate, modern web-tools. To realize an integrated fisheries database, development of the various web tools and reports will take some time. This work is currently at the Requirements Gathering stage, defining the full set of intake reports, and how to best structure an integrated fisheries data model. This will better enable accessible reporting and statistics, through web-based tools. It's expected that in spring 2019 the Department will have completed that assessment and will have a roadmap on how to leverage the past database development, and will have identified requirements to upgrade tools for managing harvest statistics. Once the Requirement Gathering stage and the database structure are completed, the Department will likely need to seek additional funds to develop the new integrated fisheries management database that can be accessed with corporate, modern web-tools.

	Assessment Team: Response is adequate, but more work needs to be done, as recognized by DFO. Funding continues to be an issue.

5.26 Recommendation 4

UoC	All 3
Performance Indicator	**1.3.1, SIa**
Recommendation	A non-binding Recommendation is set that DFO increase reporting of pink salmon hatchery practices and evaluations so to provide a more public understanding of the impacts on wild stocks of SEP activities undertaken in UoC 2
Progress on Recommendation [Year 1]	**This Recommendation remains Open** **Client:** DFO is taking this recommendation under consideration and will inform the MSC Audit Team when it has arrived at a decision. **Assessment Team:** The Assessment Team notes this response and will continue to monitor progress going forward.

5.27 Recommendation 5

UoC	All 3
Performance Indicator	**1.2.3, SIc**
Recommendation	The Assessment Team recognizes that the recreational catch of sockeye salmon and chum salmon in WCVI is low compared to the total catches in the last few decades (<10% average for sockeye salmon) but a non-binding Recommendation is set that DFO provides information to determine if the 10% CV for the recreational catch is achieved.
Progress on Recommendation [Year 1]	**This Recommendation is closed.** **Client:** For Barkley sockeye salmon, over the period 2012-2017 (table below) average recreational catch is 18,058 with average Standard Error of 10% (pers comm, Wilf Luedke). An assessment of the recreational harvest of chum salmon has not been undertaken but expect that it would have a Standard Error greater than 10%. However, given the low magnitude of the WCVI recreational chum harvest improving the estimate and lowering the Standard Error is not considered a high priority.

Year	June		July	
	Catch	Std. Error (%)	Catch	Std. Error (%)
2012	12,803	20.1%	4,998	12.7%
2013	4,887	5.7%	13,247	10.5%
2014	7,195	7.2%	13,081	9.8%
2015	39,055	6.3%	45,848	6.6%
2016	26,348	10.7%	25,611	6.1%
2017			11,006	13.5%
Average	18,058	10.0%	18,965	9.9%

Assessment Team:

The Assessment Team notes that data on recreational catch of sockeye salmon, together with the Standard Error figures. We also note the and accept the comment regarding the low magnitude of the chum salmon catch, and therefore close this Recommendation.

5.28 Recommendation 6

UoC	All 3
Performance Indicator	**3.2.3, SIc**
Recommendation	The Assessment Team notes that a recent survey of purse seine fishermen (Cook 2017) concluded that the most effective social solution to reduce catch and release mortality in selective fisheries is to improve communication between fishers and DFO management, and articulate why selective fishing approaches contribute to the sustainability of the fisheries. A non-binding Recommendation is set that work is undertaken to improve communication between fishers and DFO management on the rationale for carefully implementing selective fishing techniques, including why this approach is beneficial to those fishermen.
Progress on Recommendation [Year 1]	**This Recommendation is closed.** **Client:** We support the idea of communicating with fishers the importance of selective fishing techniques in order to contribute to the sustainability of salmon fisheries. The Department has made efforts over the years via its Advisory processes to raise the awareness and importance of selective fishing techniques. These efforts will continue and advice will be sought during this year's post-season review process to obtain input on how to improve communication with commercial harvesters on the importance of selective fishing techniques. It's also worth noting the role the Pacific Integrated Commercial Fisheries Initiative (PICFI) has played and continues to play in communicating selective fishing approaches. In 2007 PICFI was launched, designed to increase First Nation (FN) access to the commercial fisheries in British Columbia, develop common and transparent rules that apply to all participants, and improve the management of the commercial fisheries through greater collaboration amongst stakeholders.

	The Enhanced Accountability component of PICFI was designed to address fisheries accountability through new and enhanced fisheries monitoring, catch reporting, information management, data utilization and effective enforcement. Enhanced Accountability was primarily designed to develop innovative tools to improve fisheries accountability. An example of these new measures was the development of the *Strategic Framework for Fisheries Monitoring and Catch Reporting in the Pacific Fisheries* which provided consistent fishery monitoring standards based on the determination of a fisheries' risk profile The efforts on communicating the importance of selective fishing techniques to all harvesters will continue to be a key component of the Enhanced Accountability component of PICFI. More details can be found at http://www.pac.dfo-mpo.gc.ca/fm-gp/picfi-ipcip/elements-eng.html#accountability **Assessment Team:** Response is adequate. We encourage DFO to continue to engage with fishermen and stakeholders on a regular basis. Effective implementation of selective fisheries depends on complete compliance by fishermen.

5.29 Recommendation 7 (set at expedited audit – Blyth-Skyrme et al. 2018)

UoC	2
Performance Indicator	**2.1.2 SIf**
Recommendation	Although "weed lines" have been used with gillnets to reduce bycatch of surface-oriented steelhead trout in other areas (e.g., Nitinat, north coast – Ruggerone *et al*. 1990), the weed line approach has not yet been proposed for the Johnstone Strait and Strait of Georgia gillnet fisheries during periods when fishing is allowed and some steelhead trout may still be passing through the area. It is recommended that this approach is considered at the next opportunity as part of a 'Review of alternative measures' (i.e., PI 2.1.2, SIf).
Progress on Recommendation [Year 1]	**This Recommendation remains Open** **Client:** Weed lines are being used a selective fishing tool in North Coast Statistical Areas 3 to 5 and 8 and in the South Coast in Areas 21 and 121. During the 2019 fisheries planning process, the Department will explore selective fishing techniques (including the weed lines) in order to reduce the impacts on Interior Fraser River (IFR) steelhead. The potential use of weed lines will be considered along with other fishery management techniques evaluated and considered during consultation with affected parties through existing fisheries advisory and consultative processes. Based on the results of the analysis and feedback from consultations, a plan will be developed that identifies appropriate management objectives and measures to address IFR steelhead conservation risk. The plan will include pre-agreed indicators to evaluate, post-season, the performance of annual management actions relative to plan objectives. **Assessment Team:** The Assessment Team notes the willingness to consider options including weed lines in mitigating and minimising steelhead bycatch. We will continue to monitor progress in this regard.

5.30 Recommendation 8 (set at expedited audit – Blyth-Skyrme et al. 2018)

UoC	2
Performance Indicator	**2.1.1 SIa**
Recommendation	The Assessment Team understands that First Nations have not yet been invited to participate in the Technical Working Group established for Condition 14. It is recommended that this is addressed prior to any future meeting in order to ensure First Nations and other stakeholders who participated in the BC Salmon Fishery MSC assessment process are provided opportunity to engage in ongoing discussions.
Progress on Recommendation [Year 1]	**This Recommendation remains Open** **Client:** First Nation involvement is integral to developing the fishery management plan for 2019/20. They will be involved in a broad spectrum of processes over the coming months in developing the 2019/20 Salmon IFMP's for the North and South coast. Given the Emergency Listing Process for Thompson and Chilcotin Steelhead currently being undertaken by DFO, it is expected that First Nations participation in technical aspects of Interior Fraser River Steelhead will continue to be primarily through SARA-directed processes for at least the coming **Assessment Team:** DFO stated at the October meeting with the Assessment Team that they are working closely with the Province in relation to bycatch of interior Fraser River steelhead and they have had regular meetings with them. DFO stated that there is a 60 day consultation window regarding the potential SARA listing of steelhead, and that DFO met with First Nations in early October.

6 Conclusion

6.1 Summary of findings

At this Year 1 audit, the BC Salmon Fishery continues to perform at a level consistent with MSC Certification.

Thirteen of the 22 Conditions set on the fishery are considered to be 'on target' or 'ahead of target'. Nine of the 22 Conditions were considered to be 'behind target'; the client will need to demonstrate progress on these nine conditions by the next audit or risk suspension (7.23.13.2, MSC 2014).

Formal Recommendations present no risk to the ongoing certification of the fishery. We note that two of the eight Recommendations on the BC Salmon fishery have been closed this year, while the other six remain open.

The Assessment Team highlights that a considerable amount of useful information around the BC Salmon Fishery appears to have been collected by DFO staff in recent years, but much of this information has not been collated, described, or published in an accessible format, precluding its full consideration from within the assessment and audit process. We understand that DFO is in the process of recovering from a period where funding resources declined and became very limited, and we hope that the Department, with the client's ongoing support, can continue to rebuild from the extremely competent personnel base that exists. The Assessment Team recognises and appreciates the Department's continued, ongoing commitment to delivering sustainable management of the BC salmon resource.

7 References

NB: References from the 'Rationale' sections of the condition tables are retained from the original reassessment report, and are not replicated here. Please see the BC Salmon Fishery Public Certification Report for these references, here: https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=woZj5fJ2WKVSw1uvFzfDHhKyAfMlmvoZglhcsP5iV07Lf5tFIdMUl91zILZpl4U5.

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Appendix 1. Re-scoring evaluation tables

No rescoring has been undertaken at this Year 1 Surveillance Audit.

Appendix 2. Stakeholder submissions

The Marine Conservation Caucus, through Greg Taylor, provided 36 e-mails to the Lead Assessor during the period October 17 2018 - November 13 2018. These included, variously, commentaries, presentations and links to documents. For the purposes of brevity, these are not reproduced here, but can be forwarded to interested stakeholders in the BC Salmon Fishery as part of a transparent audit and assessment process. We have not attempted to respond point by point in this audit report. Instead, we have considered points provided carefully in preparing out comments against the status updates

Four submission overviews were provided, though, which summarized points made. These are reproduced, below:

Submission 1: MCC Submission to 2018 SA – Skeena HCR

This submission refers to PI 1.2.1a, 1.2.2d, 1.2.4g, 1.3.2a and Condition 3.

The core of the justification the Assessment Team employed in scoring these PIs at 80 were:

1. 'the control of fisheries management may cause the SMU to fall below the TRP. Fishery management is somewhat responsive to component population status issues by restricting harvest time and areas within the management area as a means to target components that are above the TRP (e.g., Kwinageese sockeye salmon in the Nass River and Nanika-Morice, Kitwanga and Babine stocks in the Skeena (DFO 2015h). In fisheries that target enhanced salmon, managers use time and area closures and selective fishing practices to reduce impacts on weaker wild populations.' (1.2.1a)
2. It is highly likely that the HCRs and tools are consistent with maintaining the diversity and productivity of the wild component populations, so SG80 is met (1.2.2d)
3. Migration timing patterns are generally known and used by management to target or avoid stocks.(1.2.4g)
4. These actions provide evidence that there is a partial strategy in place to protect wild stocks from significant negative impacts of enhancement and SG80 is met. (1.3.2a)

We provide evidence (see supporting evidence provided separately) that in 2016 and 2018 (there was no fishery in 2017), DFO and the Client failed to abide by the Management Strategy and HCRs they said were in place to protect component populations.

Babine River sockeye was once the largest sockeye population in the Skeena River. Since enhancement commenced it has been driven down to where it is now in the red zone and escapement rarely exceeds its LRP.

Babine River sockeye is later timed than the dominant enhanced populations peaking in early August as opposed to the peak of the total Skeena return, which is typically July 22-24th.

The Area A seine's fleet allocation is 25% of the total Canadian commercial allocation.
In 2016 and 2018 DFO and the Client, working together, delayed taking the seine allocation until the middle of August. This necessarily meant that the fisheries catch consisted of a high proportion of Babine River sockeye, even though managers knew it was highly likely the Babine River population's escapement would not exceed its LRP.

The ironic thing is they delayed the seine fishery to harvest pink salmon in conjunction with their sockeye allocation, but in both years DFO overharvested both Babine River and Skeena pink salmon.

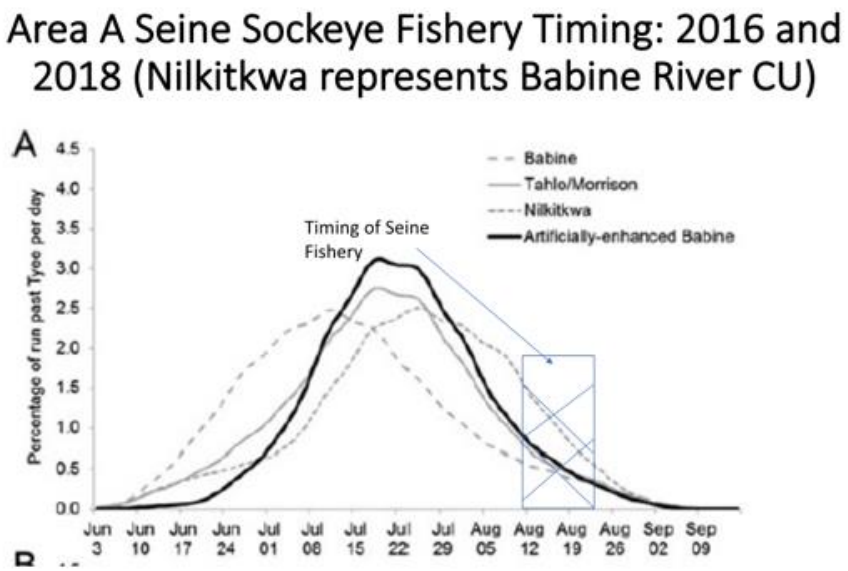
Condition 3

"It is highly likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks."

If 75% of the return (2017) did not consist of enhanced sockeye, this fishery would not occur. These fisheries are having a significant impact on what was once the largest sockeye population in the Skeena watershed.

This is its current status relative to the benchmarks DFO has adopted in the WSP Implementation Plan (2018)

Prepared by Rosenberger, 2014. Benchmarks produced by PSF and accepted by DFO in WSP Implementation Plan, 2018



Babine River Wild Sockeye

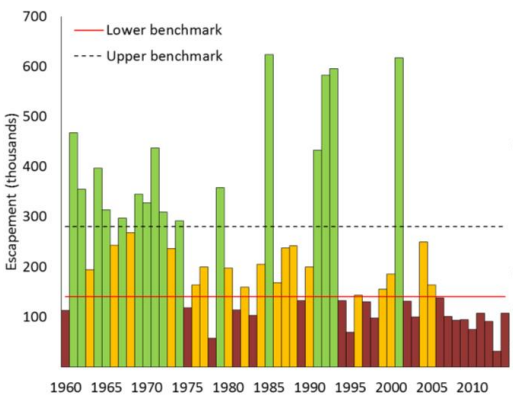


Figure: Escapement of Babine River sockeye since 1960. The benchmarks are based on Pacific Salmon Foundation and DFO collaborative analysis.

- In 2013, significant resources went into estimating biological benchmarks for Skeena salmon Conservation Units – Wild Salmon Policy
- LBN supports the use of benchmarks derived using Bayesian analysis for Babine River sockeye
- Upper BM – 280,000 spawners
- Lower BM – 140,000 spawners
- Escapement has only been above the upper benchmark once since 1995.
- Escapement has been below the lower benchmark since 2006.

Submission 2: MCC Submission to 2018 SA – Skeena Sockeye ARedits copy

The following comments refer to PI 1.1.1 a&b and 'Value of Reference Points' (p111/112), PI 1.3.1a and Condition 3

There is new information that requires the Assessment Team to review PI 1.1.1 a&b and the 'Value of Reference Points', and 1.3.1a. The original assessment employed DFO 2015g, DFO&Ionson, 2015a, and Ionson, 2016 to establish the reference points for Skeena sockeye. The Assessment Team accepted the analysis underpinning the Reference Points and used these Reference Points to evaluate the status of Skeena sockeye.

But in the spring of 2017 DFO changed the LRP for Skeena sockeye. The new LRP was incorporated in the 2017 and 2018 management plans. See 2017 IFMP p 281-282.

The new LRP was based on reviews by Peacock, 2016 and English, 2017 that argued the Reference Points used in the original assessment did not account for the relative proportions of wild and enhanced sockeye in the SMU. They argued, and DFO accepted – along with Skeena First Nations, that to potentially achieve the LRPs for wild sockeye (240,000), a total escapement of around 600,000 Skeena sockeye was required. This was based on about 40% of Skeena sockeye being of wild origin. Note the original assessment employed 70% and in 2017 the proportion of enhanced sockeye was 75%.

If this logic holds for the LRP, it must also hold for the TRP. The cumulative TRPs for the component wild populations is 560,000. Using the same logic the TRP for the SMU should be a minimum of 1,400,000, not the current 900,000. If the Assessment Team holds otherwise it is accepting enhancement activity can negatively impact wild stock(s) and that the SG60 in 1.3.1a cannot be met: 'it is likely that the enhancement activities do not have significant negative impacts on the local adaptation, reproductive performance or productivity and diversity of wild stocks.

A TRP for the SMU below 1.4 million must mean the Assessment Team supports enhanced populations meeting their TRP at the expense of wild stocks. It would mean commercial fishing would commence based on an aggregate abundance driven by the 70-75% enhanced contribution. And it would significantly increase the risk wild sockeye populations would not be rebuilt over time to fluctuate around their TRP.

If the Assessment Team does not employ this new information in reevaluating the relevant PI's, must provide solid reasoning for how its decision is in compliance with V2.0.

The Condition is behind schedule. The required plan has not been produced. Because such a plan may involve the Rights of the Lake Babine Nation; LBN would need to be consulted. LBN has not even been made aware such a plan is being developed. It is therefore difficult to believe such a plan will be implemented in year 2.

Further, the report on the productivity of Babine Lake has not been released as required by the Action Plan. Further, it is our understanding key people in DFO have not been engaged in its development or integrating it into the required plan.

In addition, we would note the Action Plan does not address the requirements of Condition 3. Promising more reports and studies is not consistent with the requirements of the Condition nor is it compliant with the requirement that Condition 3 be met in Year 4.

The Assessment Team must address a situation where we are 42% of the way through the Condition's timeline and there has been zero progress. It is very unlikely, unless the

Assessment Team takes action, that the requirements of the Condition will be achieved.

Submission 3: MCC Submission to 2018 SA – Assessment and Monitoring

The following applies to PI 1.2.3 and 1.2.4 and Condition 2.

In a memo dated July 25th, 2018 from the Area Director North/Central Coast to several senior DFO executives titled
'Concerns re: Salmon Stock Assessment Under Resourcing, the Area Director states:

1.Clearly program demands vastly exceed resourcing capacity.

2. additional funding relief must be found as the current impacts will significantly retard the Department's ability to meet our fundamental fisheries management responsibilities.

3. the regional ability to meet well-established core salmon assessment programs is no longer possible with allocated funding.

The memo is attached.

In that the memo was written in 2018 and argues the Department, because of cuts over recent years, does not have the capacity to monitor the status of SMUs, it calls into question the original scoring of PI 1.2.3 and 1.2.4. DFO's Area Director effectively argues the score is not justified. The scoring for the two PIs should be reviewed based on the information produced by DFO.

In that the memo was written in 2018, it is evident no progress has been made on addressing the Condition. Further, it would appear unlikely that significant progress will be made in the 2nd year. The Assessment Team should require the Client to either meet the monitoring targets and (inflation adjusted) expenditures recommended in English, 2016 or provide an independent analysis of the core stock assessment required for the North and Central Coasts along with the associated monitoring requirements and necessary budgets to achieve them. Using English, 2016 or an independent report would provide the Assessment Team with defensible performance measures to access whether the PIs are scored appropriately and progress against the Condition is being made.

Additional information, see: Price et al, 2017, Beach, 2017, Area 6 Charter Patrol Report, 2017, English, 2016

Submission 4: MCC Submission to 2018 SA – Compliance

The following applies to PI 2.1.2 and Condition 15.

DFO has a policy in place that requires every BC fishery to be compliant with the *Strategic Framework for Fishery Monitoring and Catch Reporting.* Assessing where the fishery is in terms of implementing the Policy would allow the CAB to verify if the Client meets the SG60 and is addressing the Condition.

The first step in implementing the *Strategic Framework for Fishery Monitoring and Catch Reporting* is for each salmon fishery to undergo a Risk Assessment (RA). From the results of the RA it is determined whether the fishery requires low, generic, or enhanced monitoring. The fishery is then required to introduce the necessary level of monitoring.

Last updated: Mar 16, 2018

Sector	Species/Fishery	Area	Draft RA complete?	Draft RA consultation with harvester complete?	Draft RA consultation with other sectors complete?	RA finalized?	RESULTS: Draft RA current monitoring level	RESULTS: Draft RA target monitoring level	RESULTS: Notes
Groundfish									
Commercial	Groundfish Hook & Line	Coastwide	Y	Planned 2019 IFMP			Enhanced	Enhanced	
Commercial	Groundfish Trap	Coastwide	Y	Planned 2019 IFMP			Enhanced	Low	
Recreational	Rockfish	Inside/Outside	Y	Poss SFAB			Generic	Enhanced	
FSC	Groundfish Hook & Line, Trap	Inside/Outside	Y	Prob 2019 IFMP			Low*	Enhanced	*dual fishing-licenced fishery currently Enhanced
Pelagics									
Commercial	Roe Herring (by **seine**)	All major & minor stock assessment areas	Y	In progress	via IHHPC/IFMP		Enhanced	Enhanced	
Commercial	Roe Herring (by **gillnet**)	All major & minor stock assessment areas	Y	In progress	via IHHPC/IFMP		Generic	Generic	
Commercial	Spawn on Kelp	All major & minor stock assessment areas	Y	No advisory body	via IHHPC/IFMP		Generic	Generic*	*open pond fishery target is Low
Commercial	Tuna	Canadian EEZ; Offshore; US waters	Y	In progress	via TAB		Low	Low	
Recreational	Tuna	Canadian EEZ	Y	In progress	via TAB		Low	Low	
FSC	Eulachon	All DUs (Nass/Skeena; Central Coast; Lower Fraser)	Y	Prob 2019 IFMP	via IFMP		Low*	Generic	*Fraser fishery currently Enhanced
FSC	Spawn on Kelp/Boughs	All major & minor stock assessment areas	Y	Prob 2019 IFMP	via IHHPC/IFMP		Low	Low	
Shellfish									
Commercial	Shrimp Trawl	Coastwide	Y	Draft requires redo			Generic*	Enhanced*	*Draft RA requires redo given recent mgmt changes
Recreational	Clam	Coastwide	Y	Poss SFAB or 2019 IFMP			Low	Low	
Recreational	Crab	Coastwide	Y	Poss SFAB or 2019 IFMP			Low	Generic	
Recreational	Prawn and Shrimp Trap	Coastwide	Y	In draft 2018 IFMP			Low	Generic	
FSC	Clam	Coastwide	Y	Planned 2019 IFMP			Low	Low	
FSC	Crab	Coastwide	Y	Planned 2019 IFMP			Low	Generic	
FSC	Prawn and Shrimp Trap	Coastwide	Y	In draft 2018 IFMP			Low	Enhanced*	*non-commercial trap and ringnet gear target is Low
Salmon									
Commercial	Chum	Fraser	No commitment given	competing priorities and limited human resources					
Commercial	Chum	Central Coast							
Commercial	Sockeye	WCVI-Barkley/Somass Sockeye							
Commercial	Sockeye	Skeena							
Commercial	Pink	Fraser							
Commercial	Chinook	Southern ISBM Chinook							
Commercial	Coho	Northern BC							
Recreational	Chum	Fraser							
Recreational	Chum	Central Coast							
Recreational	Sockeye	WCVI-Barkley/Somass Sockeye							
Recreational	Sockeye	Skeena							
Recreational	Pink	Fraser							
Recreational	Chinook	Southern ISBM Chinook							
Recreational	Coho	Northern BC							
FSC	Chum	Fraser							
FSC	Chum	Central Coast							
FSC	Sockeye	WCVI-Barkley/Somass Sockeye							
FSC	Sockeye	Skeena							
FSC	Pink	Fraser							
FSC	Chinook	Southern ISBM Chinook							
FSC	Coho	Northern BC							

LEGEND:
- On track
- Ongoing
- Needs attention
- Target monitoring level is higher than current

The following report produced by DF in the spring of 2017 shows that zero salmon fisheries have undergone a RA.

In terms of either the milestones or the Action Plan, it must be concluded that no progress has been made in Year 1 or 2 because the path DFO provides for addressing the Condition is through implementation of the Strategic Framework for Fishery Monitoring and Catch Reporting.

DFO is currently rolling a National Policy. But DFO has said it will be very similar to the current Framework and the current Framework will remain in place until the National Policy is fully implemented.

Appendix 3. Surveillance audit information

7.1 Related to Condition 17: Specific Information on 13 Pacific Region salmon test fisheries

Table A1. Summary of 2013/2014 Pacific Region stock salmon stock assessment test fishery activities.

	Data Uses							
Test Fishery Name	Timing	Abundance	Stock Id	Diversion	Harvest rate	Late Run Sockeye Management	Project Escapement	Project Abundance US entering waters
Area 20 Sockeye Gillnet Fishery	X	X	X	X	X		X	X
Area 20 Sockeye and Pink Seine Test Fishery	X	X	X	X	X	X	X	X
Cottonwood Sockeye and Pink Gillnet Test Fishery	X	X	X			X	X	
Whonnock Sockeye and Pink Gillnet Test Fishery	X	X	X			X	X	X
Area 29 Gulf Troll	X	X	X			X		
Area 12 Sockeye and Pink Seine Test Fishery (Blinkhorn)	X	X	X	X	X	X	X	X
Area 13 Sockeye and Pink Seine Test Fishery	X	X	X	X	X	X	X	
Round Island / Naka Creek Sockeye Gillnet Test Fishery	X	X	X	X				X
Mission Sockeye and Pink Gillnet Test Fishery	X		X			X	X	X
Qualaark Test Fishery		X	X					
Albion Chinook & Chum Gillnet Test Fishery	X	X	X				X	
Area 12 Chum Seine Test Fishery	X	X	X					X
Skeena Gillnet Test Fishery	X	X	X				X	

<u>Description of Test Fisheries: Project Schedule and Milestones</u>

<u>A. Fraser River Sockeye and Pink salmon test fisheries:</u>

1. Juan de Fuca Strait (Area 20) San Juan Gillnet Test Fishery:

Details:

- Time Period: June 24 to August 15 (approximately 101 days within this time period). Includes up to two gillnet vessels operating nightly. In recent years the dates and number of vessels have been reduced given the low pre-season forecast for Early Stuart Fraser River Sockeye.

Overview of Fishery:

- Stock identification primarily for the Fraser (Early Stuart, Early Summer and Summer run sockeye stock groups) and non-Fraser sockeye (DNA and scale sample collection).
- Provide information on run timing and abundance estimation of the Early Stuart, Early Summer and Summer run stock groups.
- Provide information for the estimation of diversion rate through Juan de Fuca Strait.
- Provide information on impacts of stocks of concern.

- Project daily abundance of Early Stuart, Early Summer and Summer run sockeye passing through Juan de Fuca Strait.

Rationale:

- The collection of data from this test fishery will be used for in-season management of Fraser River sockeye and pink salmon.

2. Juan de Fuca Strait (Area 20) San Juan Purse Seine Test Fisheries:

Details:

- Time Period: July 20 to September 10 (approximately 37 days within this time period). One seine vessel operating in Area 20. Adjustment to the start date will depend upon abundance indication from marine gill net test fisheries. If the abundance indications are low in July the start time for the purse seine test fisheries may be adjusted to a later start date. This test fishery may be terminated based on low pink salmon catch per unit effort.

Overview of Fishery:

- Stock identification primarily for the Early Summer, Summer and Late run sockeye stock groups and pink salmon (DNA and scale sample collection).
- Provide information for the estimation of diversion rate through Juan de Fuca Strait.
- Provide estimates of timing and daily abundance of Early Summer, Summer and Late run Fraser sockeye and pink stocks migrating through Juan de Fuca Strait for management of fisheries on these stocks.
- Provides sockeye/pink species composition ratios that are used by the PSC to assist in determining daily sockeye and pink abundance estimates past the Mission hydro acoustic site.
- Provide information on Late Run to assist in the assessment of impacts for planning fisheries.
- Provide information on impacts of other stocks of concern.
- Estimates of late run abundance entering the Strait of Georgia for use in subsequent management model inputs that predict early upstream timing and mortality of late run sockeye.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

3. Area 29 Gulf Troll Test Fishery:

Details:

- Time Period: Approximately August 12 – September 15 if required. Includes up to three troll vessel operating daily.

Overview of Fishery:

- Provide information for stock identification primarily for the Summer and Late run sockeye stock groups and pink salmon. (DNA and scale sample collection) that are holding in the Strait of Georgia.
- Provide estimates of the abundance of Late-run sockeye holding in the Strait of Georgia and their approximate distribution including species composition and base-line information required to estimate the daily abundance of sockeye migrating upstream.
- Provide additional information on late run sockeye and pink salmon delay behaviour.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye salmon.

4. Fraser River (Area 29B) Cottonwood Gillnet Test Fishery:

Details:

- Time Period: July 10 to September 18 (approximately 67 test fishing days within this time period). Includes one gillnet vessel operating daily.

Overview of Fishery:

- Provide information for stock identification primarily for the Early Summer, Summer and late run sockeye stock groups (DNA and scale sample collection) that are applied to Mission Hydro acoustics estimates of sockeye escapements.
- Provide an indication of estimated sockeye abundance prior to Mission Hydro acoustics estimate.
- Provide additional information on late run sockeye delay behaviour.
- Provide a direct estimate of Upper Pitt River sockeye timing and abundance.
- Estimate the daily passage of late run sockeye on pink salmon years for the period after which the Mission Hydro acoustics program estimates are compromised by species composition problems.
- Due to increasing Seal interference and predation on Fraser River gillnet test fisheries, the combined catches from Cottonwood and Whonnock test fisheries are required to provide adequate samples used for sockeye stock composition analysis.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

5. Fraser River (Area 29D) Whonnock Gillnet Test Fishery:

Details:

- Time Period: June 24 to October 4 (approximately 103 test fishing days within this time period). Includes one gillnet vessel operating daily.

Overview of Fishery:

- Provide information for stock identification primarily for the Early Stuart, Early Summer, Summer and Late run sockeye stock groups. (DNA and scale sample collection) that are applied to Mission Hydro acoustics estimates of sockeye escapements.
- Provide species composition and base-line information required to estimate the daily abundance of sockeye migrating upstream from the Mission Hydro acoustics program.
- Provide additional information on Late run sockeye delay behaviour.
- Estimate the daily passage of late run sockeye on pink salmon years for the period after which the Mission Hydro acoustics program estimates are compromised by species composition problems.
- Due to increasing seal interference and predation on Fraser River gillnet test fisheries, the combined catches from Cottonwood and Whonnock test fisheries are required to provide adequate samples used for sockeye stock composition analysis.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

6. Fraser River (Area 29D) Mission Gillnet Test Fishery:

Details:

- Time Period: August 10 – September 7. Includes one gillnet vessel and two set nets operating 3-4 days per week.

Overview of Fishery:

- Provide stratified estimates of species composition during the initial period of the upstream migration of pink salmon.

- Coupled with hydro acoustic estimates of total salmon for near and offshore areas it is used to compare with other estimates of the daily abundance of sockeye migrating upstream from the Mission Hydro acoustics program.

Provide information for stock identification primarily for the Summer and Late run sockeye stock groups (DNA and scale sample collection) that may augment data from other river test fisheries and can be used to evaluate differences in nearshore vs. offshore stock composition.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

7. Qualark Creek Gillnet Test fishery

Details:

- Time Period: July 1 –September 15. Includes one gillnet vessel operating daily.

Overview of Fishery:

- Provide species composition and base-line information required to estimate the daily abundance of sockeye and pink salmon migrating upstream from the Qualark Hydro acoustics program.
- Provide information for stock identification primarily for the Early Summer, Summer and Late run sockeye stock groups (DNA and scale sample collection) that are applied to Qualark Hydro acoustics estimates of sockeye escapements.

Rationale:

- The collection of data from this test fishery will be used to estimate the daily abundance of sockeye and pink salmon migrating upstream from the Qualark hydro acoustic station.

8. Round Island / Naka Creek (Area 12 and 13) Gillnet Test Fishery:

Details:

- Time Period: July 12 to August 15 (approximately 40 test fishing days within this time period).

Overview of Fishery:

- Stock identification primarily for the Early Summer and Summer run sockeye stock groups and pink salmon (DNA and scale sample collection), as well as non-Fraser sockeye stocks.
- Assist in run timing and abundance estimation of the Early Summer and Summer run stock groups.
- Assist in migration diversion rate estimation through Johnstone Strait.
- Provide information on impacts of stocks of concern.

Rationale:

The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

9. Johnstone Strait (Area 12 and 13) Purse Seine Test Fisheries:

Details:

- Time Period: July 20 to September 10 (approximately 37 test fishing days in each of Area 12 and 13, respectively within this time period). Two seine vessels will be operating in Area 12 with no overlap days, and one seine vessel will operate in Area 13. Adjustment to the start date will depend upon abundance indication from marine gill net test fisheries. If the abundance indications are low in July the start time for the purse seine test fisheries may be adjusted to a later start date. These test fisheries may be terminated based on low pink salmon catch per unit effort.

Overview of Fishery:

- Stock identification primarily for the Early Summer, Summer and Late run sockeye stock groups and pink salmon (DNA and scale sample collection).
- Provide estimates of timing and daily abundance of Early Summer, Summer and Late run Fraser sockeye and pink stocks migrating through Johnstone Strait for management of fisheries on these stocks.
- Provides migration diversion rate estimation through Johnstone Strait.
- Provides sockeye/pink species composition ratios that are used by the PSC to assist in determining daily sockeye and pink abundance estimates past the Mission hydro acoustic site.
- Provides assessment information on Late Run sockeye abundances and also in assessing impacts on these and other stocks when planning fisheries.
- Provides information on impacts of stocks of concern.
- Estimates of late run abundance entering Strait of Georgia for use in subsequent management model inputs that predict early upstream timing and mortality of late run sockeye.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Fraser River sockeye and pink salmon.

Other Test Fisheries

10. Skeena River Tyee Gillnet Test Fishery (Area 4):

Details:

- Time Period: May 21 to August 25 (approximately 100 test fishing days).
- One gillnet vessel using a gillnet with 10 different mesh panels (from 3.5" to 8"), fishing for one hour on each daylight slack tide.
- Test fishery has operated annually since 1955.

Overview of Fishery:

- Provides daily index of escapement for chinook, sockeye, coho, steelhead, pink and chum salmon.
- Requires lengths, scales and DNA samples from sockeye, chinook, coho, steelhead and chum.
- Age length and stock ID samples are taken according to a designed sampling program to provide escapement age structure, stock specific components of the escapement.

Rationale:

- Provides estimate of daily in-season sockeye escapement required to assess whether weekly conservation and production targets are met. Used in conjunction with catch to estimate sockeye harvest rates (IFMP goals are stated as abundance based HR goals).
- Used to derive the non-Babine escapement estimates for PST and Nisga'a stock reconstruction model), and to provide stock specific timing.

11. Johnstone Strait Chum Salmon Seine Test Fishery:

Details:

Time Period: September 15 to October 30 (approximately 65 test fishing days within this time period). Includes two seine vessels operating.

Overview of Fishery:

- Biological information for the chum run (DNA, length, weight, sex and scale sample collection).
- Catch information determines the occurrence of Area 12 and 13 commercial chum salmon fisheries. The latest revision of the chum annex to the Pacific Salmon Treaty (2005) requires the consideration of chum test fishery data before considering fishing opportunities in U.S.

waters. When the in-season run size estimate indicates there is little or no harvestable surplus, management actions are required both in Canada and the US.

- In addition to critical abundance levels, timing, and relative stock abundance, stock identification and bycatch information. This test fishery has also has provided sea lice samples for analysis as part of an ongoing project.

Rationale:

- The collection of data from this test fishery will be used in the in-season management of Southern BC chum, both domestically and internationally.

12. Albion (Area 29) Chum Gillnet Test Fishery:

Details:

- Time Period: 1 September to November 30 (approximately 45 test fishing days within this time period). Includes one gillnet vessel operating. Chum test fishing alternates daily with Chinook testing fishing from approximately 1 September to 20 October, after which time only the Chum net is used.

Overview of Fishery:

- Biological information for the chum run (length, weight, sex and scale sample collection).
- The in-season run size estimate of Fraser River chum is based on Albion catches. This information determines the occurrence of in-river commercial and First Nations' economic opportunity chum salmon fisheries. The latest revision of the chum annex to the Pacific Salmon Treaty (2005) requires the consideration of Albion chum test fishery data before considering fishing opportunities in adjacent U.S. waters. When the in-season run size estimate indicates there is little or no harvestable surplus, the U.S. is to take measures to restrict encounters of Fraser River chum in their fisheries
- Identifies any potential conservation issues with Fraser River chum stocks.
- Efforts are made to reduce mortality of incidental catch of all stocks of concern.
- All chum catch will be retained as biological samples as it is not possible to release these fish caught and have many survive.

Rationale:

The collection of data from this test fishery will be used in the in-season management of Fraser River chum, both domestically and internationally.

13. Albion (Area 29) Chinook Gillnet Test Fishery:

Details:

- Time Period: third week of April to October 20 (approximately 175 test fishing days within this time period). Includes one gillnet vessel operating. Chinook test fishing alternates daily with chum testing fishing from approximately 1 September to 20 October, after which time the fishery switches to chum assessment.

Overview of Fishery:

- Stock identification for the chinook stock groups. (CWT, DNA and scale sample collection).
- The Albion test fishery provides data essential to implementing components of the Pacific Salmon Treaty. The test fishery provides CWT recovery data from Fraser River net fisheries which is used to assess Treaty compliance.
- Assist in run timing and abundance estimation of the chinook stock groups.
- The Albion test fishery provides essential data to forecast the Fraser Late Chinook salmon stock abundance: a direct input to the PSC coast wide Chinook model used to implement Annex IV Chapter 3 of the Pacific Salmon Treaty. Any compromise to the quality of the Fraser Late Chinook forecast will directly affect the quality of the WCVI AABM index, and associated TAC.

- The Albion test fishery is the only dependable means of collecting essential biological data to represent catches in the commercial, sport, and First Nation fisheries and for all Chinook salmon returning to the Fraser River between April and October. The Albion test fishery also provides critical information to monitor the terminal run abundance and estimate the fishing impacts on Chinook salmon stocks, including stocks of concern.
- Efforts are made to reduce mortality of incidental catch of all stocks of concern

Rationale:

The collection of data from this test fishery will be used in the management of Fraser River chinook salmon both domestically and internationally (PST).

Appendix 4. Additional detail on conditions/ actions/ results (if necessary)

Not applicable.

Appendix 5. Revised Surveillance Program

It is not proposed at this Year 1 audit that the surveillance program be changed from that announced in the PCR (Blyth-Skyrme *et al*. 2017). As such, the surveillance program continues to be proposed as follows:

Table 12: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
All	On-site surveillance audit	Three Expert Principle Leads to cover each UoC, plus the Team Leader/Lead Assessor, continue to be proposed in the event that the existing team is used for future surveillance audits.	There are conditions across all three Principles, and in all three UoCs. As such, it will be important to ensure three team members are present to enable the team to cover the audit requirements.

Table 13: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	28th April 2018	1st October 2019	At the present time, it is assumed that the second surveillance audit will be held at a similar point in the year (2019) as this first surveillance audit. It is noted that surveillance audits are permitted to be up to six months earlier or later than the anniversary date, where this deviation is appropriate given the circumstances of the fishery (CR 7.23.6, MSC 2014).

Table 14: Fishery surveillance program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 6	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & re-certification site visit