



To: Jeff Grout
Kelly Binning
From: Pacific Marine Conservation Caucus, Salmon Sub-committee
Date: February 6, 2017
Subject: Comments to DFO on Section 13 of the 2017/2018 Salmon IFMP for North and South Coasts.

The salmon subcommittee of the Pacific Marine Conservation Caucus is comprised of six conservation groups including the David Suzuki Foundation, Pacific Streamkeepers Federation, Raincoast Conservation Foundation, SkeenaWild Conservation Trust, Steelhead Society of BC, and Watershed Watch Salmon Society.

This document was prepared by the Salmon subcommittee members Poul Bech (Steelhead Society), Misty MacDuffee (Raincoast), Greg Knox (Skeena Wild) and Greg Taylor (Watershed Watch).

1. Monitoring and Compliance

We recommend DFO incorporate the following language and information into the indicated sections for each fishery:

- Each fishery should have an additional section titled **Compliance Monitoring and Enforcement Plan**. It should be written by Conservation & Protection and describe the compliance, monitoring and enforcement plan for the fishery. The plan should include fishery specific performance measures.
- In the section of each fishery titled **Fishery Monitoring and Catch Reporting**, it should state, 'this fishery is currently not in compliance with the **Framework for Fishery Monitoring and Catch Reporting**. The Framework involves the implementation of six strategies. The first strategy requires each fishery to complete a risk assessment to determine fishery-specific monitoring and reporting requirements. Work is underway to identify priority salmon fisheries and complete their risk assessments. Future IFMPS will describe the fishery's progress relative to implementing the six strategies.'
- The IFMP should state all fisheries requiring non-retention of species/stocks with a 'poor' outlook will require enhanced monitoring. This may be adjusted once a fishery competes Strategy One of the Framework.

- DFO Science has released the Science Advisory Report Review and Evaluation of Fishing-related Incidental Mortality for Pacific Salmon http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2016/2016_049-eng.pdf Fisheries Management will consider the information and guidance provided by the SAR in the management of salmon fisheries.

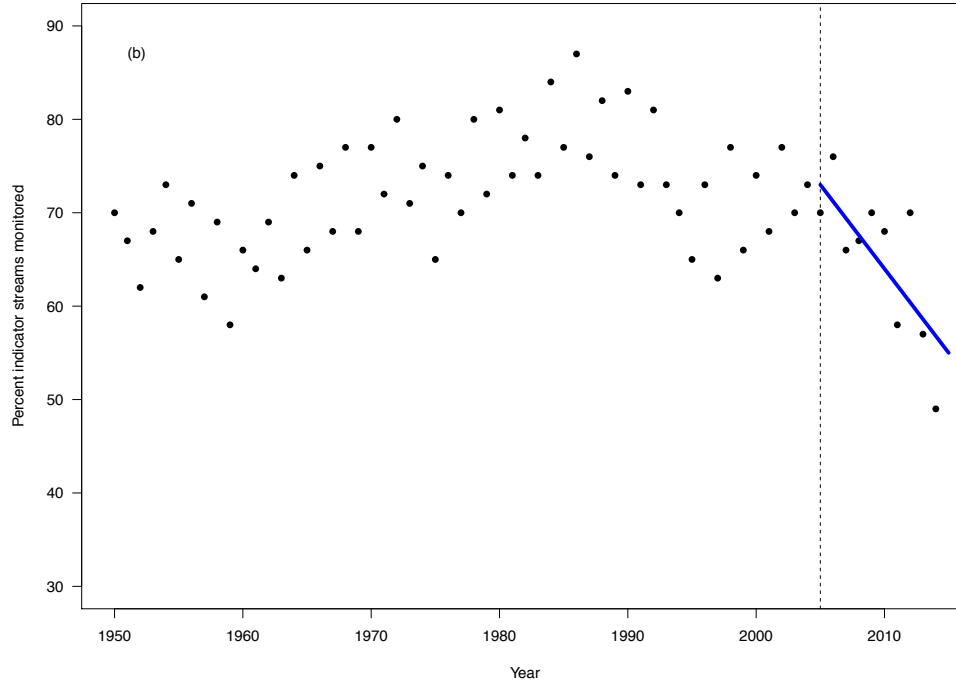
2. Stock Assessment

Salmon Stock assessment on the West Coast of Canada is at a historic low. Cuts to DFO since 2012 (\$100 million nationally) have meant hundreds of salmon populations across the coast are no longer being counted (20% cut to stock assessment in 2016 alone).

Cuts to stock assessment have resulted in a lack of fundamental scientific information on which to base commercial and recreational fisheries. The situation has become so critical that DFO managers and stock assessment contractors are expressing growing concern with the MCC and interest groups.

Figure 1a. Unprecedented reduction in survey coverage of indicator and non-indicator streams on BC's North and Central Coast. Poor monitoring translates to the inability to assess the conservation status of 49% of all CUs on BC's central and north coasts. Dark line represents all counted streams, light grey line represents counted indicator streams. Vertical dashed line is the 2005 inception of the Wild Salmon Policy. Figure 1 b is the percent of indicator streams monitored on the North and Central coast (Figures: M. Price)





This leaves the question: If DFO does not have sufficient information on how many salmon are returning to local rivers, how can they justify opening fisheries?

The dismal coverage of streams being assessed also raises the question: Is Canada meeting its commitments under the Pacific Salmon Treaty?

2.1 Recommendations

The MCC understands that the federal government has committed new funding to DFO.

- We urge the department to provide significant new resources to stock assessment staff and contractors for the 2017 season.
- We request that the MCC and user groups are provided with information on how these cuts have impacted stock assessment across the coast over the last 4 years, and what DFO's plan is to alleviate the situation.
- We request DFO provide a record of stock assessment reductions in recent years, and the steps it will take in the next year to address the situation.

2.2 References

English, K.K., Review of Escapement Indicator Streams for the North and Central Coast Salmon Monitoring Program: Final Report, 2016

Fishery or Species Specific Recommendations

3. Southern BC Chinook

The MCC reiterates previous calls on DFO to implement recovery plans for red listed and depressed southern BC Chinook CUs. There are two fundamental reasons rebuilding plans need to be implemented.

- Lack of meaningful effort to rebuild red-listed CUs. Chronic over-fishing on red listed CUs need to be stopped so populations can rebuild. Fishing on depressed or declining CUs need to be greatly reduced.
- Recognize that Chinook recovery efforts are a mandated part of DFO's and SARA's legal obligations to implement recovery actions for critically endangered Southern Resident killer whales.

Such recovery plans require moving/closing fisheries that intercept or target CUs that are red listed, data deficient or show depressed productivity. This category applies to 83% of southern BC CUs that were evaluated by the CSAS Assessment Team, and to 75% of CUs with an assessed status (Table 1). The goal of recovery plans must be to maximize Chinook recruitment by managing to MSY at Smax and minimize direct and indirect mortality.

Table 1. Status (as assessed by CSAS 2016) and 2017 outlook for 33 Southern BC CUs that are red, data deficient or undetermined.

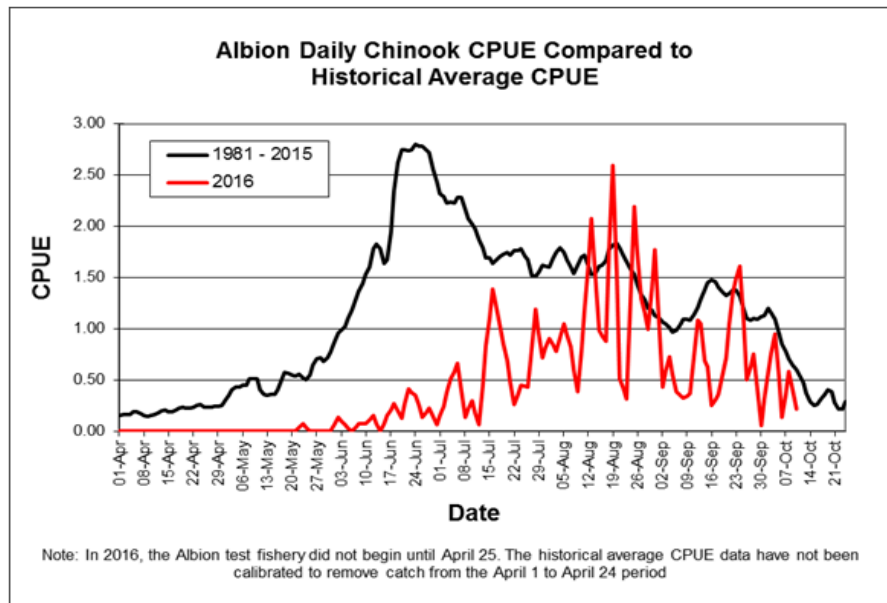
CU #	Conservation Unit	Status	Outlook
1	Okanagan	RED	
2	Boundary Bay- fall	TBD	LOW
4	Lower Fraser-spring 5 ₂	TBD	LOW
5	Lower Fraser-Upper Pitt –Summer 5 ₂	DD	LOW
6	Lower Fraser-summer 5 ₂	DD	LOW
7	Maria Slough 4 ₁	TBD	
8	Fraser Canyon-Nahatlatch Spring 5 ₂	DD	LOW
9	Middle Fraser – Portage- Fall 5 ₂	RED	
10	Middle Fraser- spring 5 ₂	RED	LOW
12	Upper Fraser -spring 5 ₂	RED	LOW
14	South Thompson-summer - 5 ₂	RED-AMBER	LOW
15	Shuswap -summer 4 ₁	TBD	NEAR TARGET
16	South Thompson-Bessette Summer 4 ₂	RED	LOW
17	Lower Thompson-spring - 4 ₂	RED	LOW
18	North Thompson-spring -5 ₂	RED	LOW
19	North Thompson-summer 5 ₂	RED	LOW
20	South Coast-Georgia Strait	DD	LOW
21	ECVI-Goldstream	TBD	LOW
22	ECVI-Cowichan & Koksilah	TBD	LOW/REBUILDING

23	ECVI-Nanaimo-Spring	DD	
25	ECVI-Nanaimo & Chemainus-fall	TBD	LOW
27	ECVI-Qualicum & Puntledge-fall	TBD	LOW
28	SC-southern fjords	DD	
29	NEVI - Fall	RED	LOW/NEAR TARGET
31	SWVI -Fall	RED	
32	Nootka & Kyuquot - Fall	RED	
33	NWVI - Fall	TBD	
34	Homathko - summer	DD	LOW - WILD
35	Klinaklini – summer 4 ₂	DD	LOW - WILD
82	Adams River-Upper -summer	DD	
83	ECVI - Georgia St-Summer 4 ₁	TBD	LOW
9008	Harrison Transplant –Chilliwack -fall	TBD	LOW

Table 2. Status and 2017 outlook for the 3 Southern BC CUs that are green or amber. Only 2 CUs have been identified as meeting their MSY escapement targets and the outlook for these CUs is low to precautionary.

CU #	Conservation Unit	Status	2017 Outlook
3	Lower Fraser Fall 4 ₁	GREEN	LOW /stock of concern
13	South Thompson Summer 4 ₁	GREEN	NEAR TARGET /POOR
11	Middle Fraser -summer 5 ₂	AMBER	LOW

Figure 2. 2016 and historical Albion Chinook CPUE reinforcing the critical decline in abundance of early Fraser stream type.



Chronic fishing pressure on depressed Chinook populations is failing to allow red listed CUs to rebuild. The most recent exploitation rates available on Fraser spring and summer stream-type chinook indicate total ERs of over 40%. In 2015, the MCC proposed that management reference points for Fraser Spring and Summer stream-type be changed to reflect rebuilding objectives. This should be done by increasing escapement targets and the terminal run size. Ongoing low escapements show that the lower benchmark at 40% MSY is not being met.

We recommend the IFMP adopt sustainable and aggressive targets that require harvest restrictions. Such a move would demonstrate that the management priority for these populations is minimizing direct or indirect impacts.

Table 3. MCC proposed Management Objectives for Fraser Spring and Summer 5₂stream types

MSY Escapement goal Spring & Summer 5 ₂ Chinook	Zone	Predicted Return	MCC proposed Actions
S MSY = ~138,000 Smax MSY = ~150,000 (~ 80,000 Spring 5 ₂ ~ 57,000 Summer 5 ₂)	3	Greater than 150,000 ----- Likely spawners over 100,000	Managed to meet MSY Smax ~ 150,000 ----- Still below MSY and S Max • Directed FN fisheries allowed • Rec fishery in Areas 18-20 and 29: retention of 1 chinook per day
138,000	2	75,000 to 150,000 ----- Likely spawners above 40% Smsy (55,000)	Spawners below Smsy but above 40% Smsy. ----- Below 100,000: • FN FSC directed fisheries managed to total mortality of 10% .
138,000	1	Below 75,000, Spawners likely below 40% Smsy (55,000)	Populations well below MSY levels. Aggressive harvest restrictions required. Total mortality managed to less than 5%

3.1 Red listed Fraser spring and summer stream types: Recommendations

1. As an Interim **Performance Measure**, total mortality on Fraser Spring and Summer stream-types should be managed to **less than 5%**.

2. Recreational fishing on marine approaches for Chinook should be closed in Areas 18 -20, and 29 from April to July in both Zones 1 and 2. This should be extended to late July in Area 29.
3. Time and Area closures in Zone 1 and 2 must also apply to WCVI commercial fisheries until all Fraser spring and summer run timing groups have migrated through.

3.2 Georgia Strait, WCVI, and other Salish Sea CUs of concern: Recommendations

Because of the growing concern for Lower Fraser late CUs and the red listed or depressed state of other fall- timed Lower Georgia Strait CUs, conversation measures need to be implemented on the fall run-timing of red listed CUs.

1. Daily recreational catch limits need to be reduced by 50%
2. WCVI troll fisheries need to be restricted
3. Total mortality limits need to be put in place including on the Northern BC troll and recreation fisheries that intercept Salish Sea migrating chinook. Total mortality performance measures that restrict harvest to a maximum mortality of less than 20% should be implemented as a start.
4. To further harmonize Chinook recovery with SRKW recovery (see 2.4), we recommend DFO set a Salish Sea terminal abundance target that maximizes recruitment of Fraser River, Georgia Strait and Puget Sound Chinook populations to the Salish Sea.

This should be done in cooperation with NOAA and be further developed through the Pacific Salmon Treaty negotiations to address interception of Salish Sea stocks caught in South East Alaska recreation and troll fisheries, Gulf of Alaska troll fisheries, and bycatch in Gulf of Alaska and Berring Sea ground fisheries.

3.3 Harvest Rules Recommendations

1. Discarding, including slot limits, cannot be employed as an ongoing management tools until more knowledge on encounter and mortality rates is available for released stocks of concern.
2. The IFMP should describe total mortalities from all known fisheries that encounter stocks of concern. Total mortalities include some combination of mortality associated with release, injury, drop-offs, drop-outs, depredation, predation of disoriented or injured fish, and pre-spawn mortality.

3.4 Southern Resident killer whales

DFO, in cooperation with NOAA, needs to set a terminal abundance target for Salish Sea bound Chinook to facilitate Chinook recovery and SRKW recovery in their critical habitat.

The US/ Canada transboundary population of SRKW is a federally designated endangered population listed under Canada's Species at Risk Act (2003). Chinook salmon has been identified as the preferred prey item of SRKW (COSEWIC 2008, Ford et al. 2010, Ford et al. 2016) and the majority of Chinook salmon stocks eaten by SRKW in their summer range and critical habitat originate mainly from the Fraser River and Puget Sound (Hanson et al. 2010, also see DFO 2017).

The strong positive correlation between high mortality in resident killer whales and low abundance of Chinook salmon has been established to the extent that Chinook availability is considered the primary factor limiting Southern Resident killer whale survival (Ayers et al. 2012, Vélez-Espino et al. 2013, Vélez-Espino et al. 2014, Lacy et al. in review, Ward et al. 2009, Ford et al. 2010). Population trends are driven largely by changes in survival (Ford et al. 2010). Survival rates are strongly correlated with the PSC's Chinook index, indicating the relative availability of their principal prey (Ward et al. 2009, Ford et al. 2010, Lacy et al. 2015, Lacy et al. in review). 30 years of resident killer whale demographic data indicates that periods of unusually high mortality have followed periods of reduced or low Chinook abundance (Ford et al. 2010, Vélez-Espino et al. 2015).

3.4.1 Recommendations

To facilitate the recovery of Chinook as food availability in critical habitat,

1. Set a Salish Sea terminal abundance target that maximizes recruitment of Fraser River, Georgia Strait and Puget Sound Chinook populations to the Salish Sea.
2. Restrict marine harvest in recreational and commercial fisheries on migrating and immature populations of Salish Sea bound Chinook that are below their MSY Smax escapement targets.
3. These efforts should be coordinated with NOAA and be further developed through the Pacific Salmon Treaty negotiations to address interception of Salish Sea stocks caught in Northern BC, South East Alaska recreation and troll fisheries, Gulf of Alaska troll fisheries, and bycatch in Gulf of Alaska and Bering Sea ground fisheries.

3.5 References

Fisheries and Oceans Canada. 2016. Integrated Biological Status of Southern British Columbia Chinook Salmon (*Oncorhynchus Tshawytscha*) under the wild salmon policy. Canadian Science Advisory Secretariat Science Pacific Region. Advisory Report 2016/042

Fisheries and Oceans Canada. 2017. Technical Review of Roberts Bank Terminal 2

Environmental Impact Statement and Marine Shipping Supplemental Report: Effects on Marine Mammals. Submitted to CEAA Review Panel Secretariat, Roberts Bank Terminal 2 Project
January 24, 2017

Ford, M J., Hempelmann, J., Hanson, MB., Ayres, KL., & Park, LK. 2016. Estimation of a Killer Whale (*Orcinus orca*) Population's Diet Using Sequencing Analysis of DNA from Feces. PLoS one, 11(1), e0144956.

Ford, JK., Ellis, GM., Olesiuk, PF., and Balcomb, KC. 2010. Linking killer whale survival and prey abundance: food limitation in the oceans' apex predator? Biol. Lett. 6, 139–142.

Hanson, MB., Baird, RW., Ford, JK., Hempelmann-Halos, J. ... & Wasser, SK. 2010. Species and stock identification of prey consumed by endangered southern resident killer whales in their summer range. Endangered Species Research, 11(1), 69-82.

Lacy, RC, Williams, R. Croft, DP., Clark, CW.,..... & Paquet, PC. 2017. *in review*. Evaluating anthropogenic threats to endangered killer whales to inform effective recovery plans.

Ward, EJ., Holmes, EE., and Balcomb, KC. 2009. Quantifying the effects of prey abundance on killer whale reproduction. J.Appl.Ecol. 46, 632–640.

Ayres, K.L., Booth, RK.,. Hempelmann, JA.,and S. K. Wasser (2012). "Distinguishing the impacts of inadequate prey and vessel traffic on an endangered killer whale (*Orcinus orca*) population." PLoS One 7(6): e36842.

Vélez-Espino, LA., JKB. Ford, CK. Parken, ... & Rishi Sharma. 2013. Sensitivity of resident killer whale population dynamics to Chinook salmon abundance. Pacific Salmon Commission Southern Boundary Restoration and Enhancement Fund 600-1155 Robson Street Vancouver, BC V6E 1B5

Vélez-Espino, L. A., John K. B. Ford, H. Andres Araujo, Graeme Ellis, Charles K. Parken, and Rishi Sharma 2014. Relative importance of chinook salmon abundance on resident killer whale population growth and viability. Aquatic Conservation: Marine and Freshwater Ecosystems 25(6): 756-780.

4. South Coast Chum Salmon

4.1 Steelhead By-catch

In 2015 and 2016, interior Fraser steelhead were in the extreme conservation zone: in the fall of 2015, 430 steelhead returned to the Thompson and 120 to the Chilcotin; in the fall of 2016, 325 steelhead returned to the Thompson and 120 to the Chilcotin. These are record low returns (all from Bison, November 2016). While steelhead escapements decrease, total by-catch mortality has increased in recent years (Bison, June 2016 and November 2016). By-catch

interceptions are a main factor affecting returns of steelhead (Levi and Parkinson, 2008). The current range of measures used to reduce steelhead by-catch mortality in chum salmon fisheries are clearly insufficient to allow steelhead populations to recover.

The strategy to protect 80% of interior Fraser steelhead run with a high degree of certainty appears insufficient to recover steelhead. . Although significant interior Fraser steelhead by-catch mortality occurs in other south coast chum fisheries (Bison, June 2016), the 80% protection strategy **only** applies to Fraser River commercial gillnet fisheries and **there is actually no exploitation limit for steelhead by-catch in any other south coast net fishery, nor an overall total mortality or exploitation limit.** This is in stark contrast to the much stricter protection goals for interior coho which limits the total Canadian exploitation rate to 3-5% (South Coast IFMP 2016).

Prior to 2014, there was a steelhead conservation restriction on the timing and frequency of Area 29 chum fisheries that set out an option for either a single fishery in October or two fisheries in November. Since the removal of this conservation restriction, steelhead mortality has increased (Bison 2016).

4.2 Changes to Fraser Chum Salmon Run Timing

DFO currently recognizes two broad chum salmon run timings, summer runs and fall runs. Most if not all Fraser chums are considered to be fall runs. Prior to the 1980s Fraser River chum salmon had a bi-modal run timing with a gap in October (Levy et al 2008)). In the 1960s most Fraser River chum fisheries were in November with some openings in December (Palmer 1972). Prior to the 1970s the bulk of Area 29 chum salmon was taken in November (Palmer 1972). Fishing was generally closed during the run timing gap in both the Fraser and Johnston Strait (Palmer 1972).

Minimum escapement goals were set in the 1970s for the Fraser chum early return run at 365,000 and the late run group at 335,000 (Grant and Prestal 2009). That there was no escapement set for a mid-timing component shows, *prima facie*, that in the 1970s there was no such component. As part of the Salmonid Enhancement Program (SEP), hatcheries at Chehalis, Chilliwack and Inch Creek came into production the early 1980s (DFO website). In 1985 SEP was asked by DFO's Fraser River Management Group to concentrate enhancement on the gap between early and late fall chum runs (Levi et al 2008). Migration timing in chum salmon is highly heritable (Levi et al 2008).

In 1986, over 30 million chum fry were released in Fraser tributaries (DFO release database). Also in 1986, Chehalis hatchery switched to using a single hatchery chum brood stock, initially consisting of transplants mixed from several Harrison tributaries (Levi et al 2008). Hatchery returns were lightly fished because of interior coho and steelhead by-catch concerns, and most hatchery chums spawned (Levi et al 2008), apparently creating a large feral mid timing chum population. In 1999 the escapement target was changed to 800,000 overall, with no mention of timing components (Grant and Pestal 2009). Late run chums are now depressed (Levi et al

2008). Fraser chum migrations no longer show bi-modal run timing and now peak in early October (chums peaked October 9th in 2012)(see “Albion daily chum cpue compared to historical average daily cpue” at <http://www.pac.dfo-mpo.gc.ca/fm-gp/fraser/docs/commercial/albionchumdailytotal-eng.htm>). The peak of the chum run now coincides with interior steelhead, which usually peak October 10th (Bison, 2016). **The current interior steelhead by-catch issue seems to be a direct result of the management decision in 1985 to concentrate enhancement on October-timing chum salmon.** We note that if the peak of the chum salmon run could be returned to November via a combination of management and enhancement techniques, more chum salmon could be harvested with less steelhead by-catch, a win-win result.

4.3 Compliance and Enforcement

Fisheries Officers monitored both Area E Fraser River chum salmon commercial gillnet openings that occurred in October, 2016. Officers characterized compliance as **poor**: 69 vessels were checked and 32 violations found, including keeping illegal species, no revival tank and fishing after closed time (from a December 9, 2016, presentation of Pacific Region Conservation and Protection to the Salmon Working Group).

4.4 Recommendations for south coast chum:

Considering the above, we recommend that:

1. Overall total by-catch mortality/exploitation of interior Fraser steelhead in all Canadian net fisheries be limited to 3%;
2. A steelhead conservation measure restricting Fraser River gillnet fisheries to after November 1st be implemented in 2017;
3. DFO consider additional or alternative measures to reduce steelhead by-catch, including more selective fishing methods;
4. DFO investigate the possibility of returning the peak of the Fraser chum salmon migration to November via management and enhancement techniques; and
5. No Area 29 chum salmon gillnet openings should proceed without a compliance, monitoring and enforcement plan in place to ensure a high level of compliance.

Additionally, for south coast chum;

6. Include a description of management unit structure, conservation units and population structure for wild component populations.
7. Describe indicator populations, including how they are consistent with CU structure

4.5 List of references

Bison, Robert, June 2016. Fishing mortality trends for Thompson River steelhead from 1991 to 2015. BC Fish and Wildlife Branch: 30p.

Bison, Robert, November 2, 2016. Status update for Fraser River late-run summer steelhead. BC Fish and Wildlife Branch: 5p.

Grant, S. and G. Pestal. 2009. Certification Unit Profile: Fraser River Chum Salmon. Can. Man. Rep. Aquat. Sci. 2874: vii + 40p.

Levy, D., D. Moore and K. Charlie. 2008. Review of Fraser River Chum Salmon Fisheries Management and Enhancement with Specific Reference to the Harrison River Populations. Prepared for Chehalis First Nation: 34 p.

Levy, D. and E. Parkinson. 2014. Independent review of the science and management of Thompson River steelhead. Prepared for Thompson Steelhead Technical Subcommittee c/o Cook's Ferry Indian Band, Spences Bridge, B.C. 104p.

Palmer, R.N., 1972. Fraser River Chum Salmon. Technical Report 1972-1, Canada, Department of the Environment, Fisheries Service, Pacific Region: 296 p.

Ryall, P, Murray, C., V. Palermo, D. Bailey, and D. Chen. 1999. Status of Clockwork Chum Salmon stock and Review of the Clockwork Management Strategy. Fisheries and Oceans Canada ISSN 1480-4883:134 p.

5. Skeena-Nass

5.1 Skeena-Nass chums:

- Annual exploitation rates for Nass chum should be included for the most recent 10-year period
- It is recommended the IFMP state that years of higher pink catch and effort are associated with higher chum exploitation rates in Area 3. In years with above average pink catch or effort, additional management actions may be required to minimize total mortalities of Nass chums
- SEGs should be provided for Skeena and Nass chums
- A summary of recent escapements relative to SEGs should be provided for Skeena and Nass chums

5.2 Skeena-Nass Pinks

- At-sea observers need to be present in all openings sub-areas
- DFO should provide a detailed plan for fishery independent monitoring of the pink fishery. The plan should relate how the plan is consistent with a fishery requiring enhanced monitoring

- DFO should state at-sea observer information will be made available each week during the season
- The IFMP should declare that if the lack of compliance observed in 2016, is seen again in 2017, fishery closures can be anticipated
- SEGs for Skeena and Nass pinks should be provided
- If the Skeena sockeye return is below 900,000, and a pink fishery is held, 100% observer coverage will be required.

5.3 Skeena Chinook

- The IFMP should recognize expected poor sockeye returns may place greater demands on chinook to provide First Nations with access to food. This require additional chinook management actions
- The IFMP should record First Nations have expressed concerns about poor returns of chinooks, including limited access to chinooks for food, in some areas of the middle and upper Skeena. The IFMP should provide additional information on the populations of concern

5.4 Skeena Sockeye

Alaskan exploitation rates on late timing Skeena sockeye populations have been increasing in recent years. This is associated with higher catches and effort in District 104 after week 30.

- The IFMP should state "protections for late-timing Skeena sockeye and chums will take into account catches and effort in District 104 after week 30. Higher catches and effort may require additional management actions in domestic fisheries."

6. Area 6 Pinks and Chums

- SEGs for pinks and chums should be provided
- At-sea observers need to be present in all openings, and efforts made to ensure observer presence in all sub-areas
- C&P should provide a compliance monitoring plan with performance measures
- At-sea observer information will be made available each week

7. Central Coast Chum

7.1 Area 7 chum

Existing harvest tools are failing to meet rebuilding objectives and escapement targets. Harvest need to be managed by ensuring that escapement goals are met before fisheries are opened.

- Assessment fisheries need to be eliminated until a review of the 2016 harvest rules is completed.
- Fisheries cannot open until escapement targets have been met, and then small terminal fisheries can occur on identified surpluses.

Achieving stream escapement goals of pink and chum in this region must be managements top priority. High spawning salmon densities in Area 6, 7 and 8 are critical to healthy grizzly populations on BC’s coast (Levi et al. 2012; Artell et al. 2016). Low salmon abundance in the mainland valleys of Areas 6 and 7 has been proposed as a reason for the recent migration of grizzlies to coastal islands - islands not previously considered grizzly habitat (Service et al. 2014).

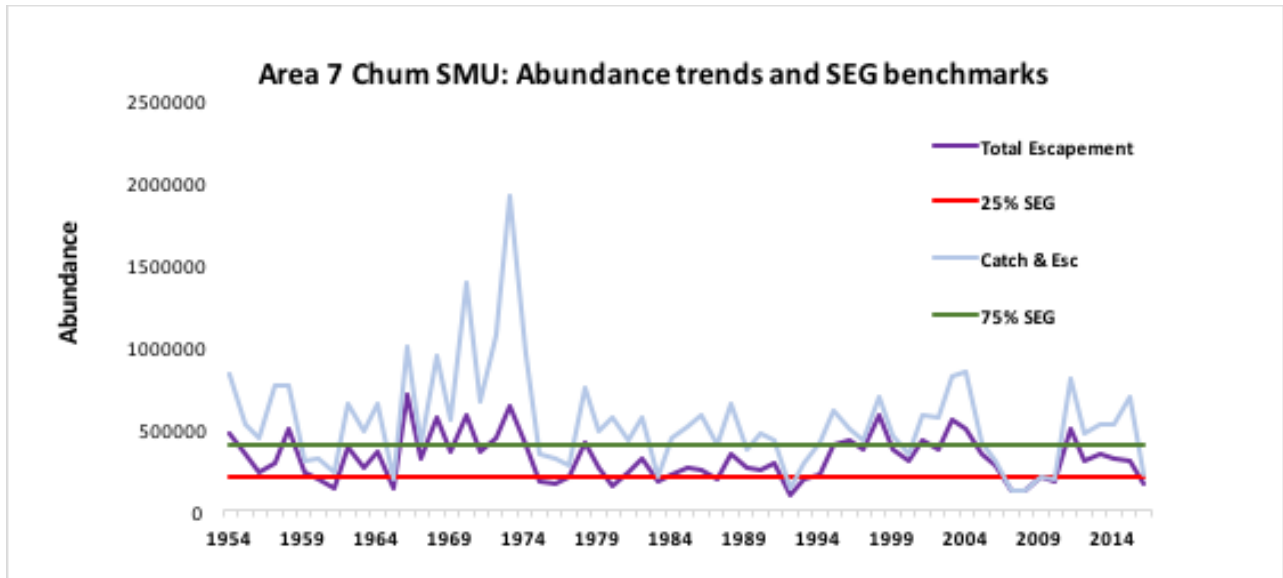
Table 4 shows recent exploitation rates on Area 7 chum since 2012. These ERs have increased in recent years without evidence that wild stocks are stronger. Recent ERs are not always low and are the cause of failure to meet 75% SEGs (i.e. SEG75% would often be met at low harvest).

Table 4. Recent Exploitation Rates and target SEG for chum salmon in Area 7, 2012 -2016. 2015 & 2016 ERs based on reconstructed total escapement to Area 7 and Commercial Hails from net fisheries.

	2012	2013	2014	2015	2016
ER	34.93%	35.06%	38.68%	56.76%	27.85%
Meet 75% SEG	No	No	No	No	No

Figure 3 shows the reconstructed abundance trends in chum salmon in the Area 7. Commercial net fisheries in Area 7 have been conducted in the last several years targeting wild chum populations as they return through Sheep Passage, Finlayson Channel, Mathieson Channel, Spiller Channel, Roscoe Inlet and Johnson Channel. These fisheries are often a gamble - being opened prior to creek surveys indicating that escapements are being achieved or opened without adequate information that fisheries can be prosecuted without shortfalls to MEG targets. As a result, ERs can exceed 40% and streams fail to meet their targets at 75% SEG. (Table 4, Figure 3). For harvest strategies to be considered sustainable and consistent with MSY, these escapements need to meet a 75% SEG.

Figure 3. Trends in total (reconstructed) escapement and total abundance 1954 -2016 with performance metrics at the SEG 25% and SEG 75% levels.



7.2 Area 8 Chum

- There is growing concern about the effect of hatchery enhanced chum runs may be having on wild chum populations in Area 8.
- Exploitation rates are not specific to enhanced stocks and recent escapements of wild runs have been declining.
- Proportion of catch derived from hatchery production must be identified in-season. Indications of poor wild returns should lead to closures in mixed stock fishing areas.

Table 5 shows that Exploitation rates on Area 8 chum salmon have met or exceeded 40% in 4 of the last 5 years.

Table 5. Recent Exploitation Rates and target SEG for chum salmon in Area 8 2012 -2016. 2015 & 2016 ERs based on reconstructed total escapement to Area 8 and Commercial Hails from net fisheries.

	2012	2013	2014	2015	2016
ER	40%	48.74%	23.76%	59.34%	49.89%
Meets 75% SEG	No	YES *	No	No	YES *

* strong escapement to enhanced indicator streams; meets at 95% of SEG target

Figure 4a & 4b show the recent performance of enhanced and wild indicator returning to Area 8 in 2016 and 2015. In the last 2 years, escapement to wild indicators has been substantially below targets while escapement to enhanced indicators has met or exceeded targets. While

other central coast chum populations might have relatively low harvests, this is not true of exploitation rates in Area 8, which typically exceed 40% (Table 5).

Figure 4a. The differences in the percent of enhanced streams that met their escapement targets in 2016, compared to the percent of wild streams that met their escapement targets in 2016. Observed escapement in two enhanced Indicators streams in Area 8 (Bella Coola River and Kimsquit River) was 154,000 (110% of stream escapement target). Observed escapement to 5 wild Indicators streams in Area 8 (Dean, Cascade, Hooknose, Jenny Bay and Elcho) was 12,560 (26% of stream escapement target).

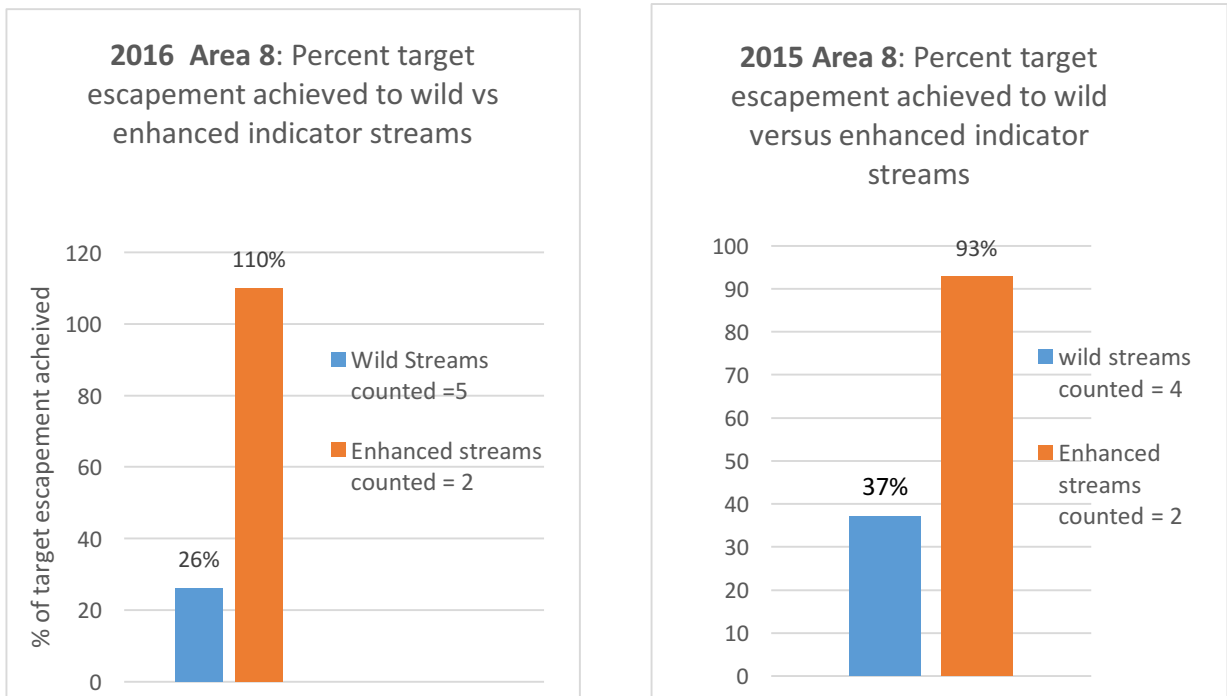


Figure 4b. The differences in the percent of enhanced streams that met their escapement targets in 2015, compared to the percent of wild streams that met their escapement targets in 2015. Observed escapement in two enhanced Indicators streams in Area 8 (Bella Coola River and Kimsquit River) was 130,000 (93% of stream escapement target). Observed escapement to 4 wild streams (3 were indicators) in Area 8 (Dean, Hooknose, Jenny Bay and Salamoot) was 12,560 (26% of stream escapement target).

Figure 5. Trend in wild and enhanced indicator streams from 1950-2016 measured as a percentage of their individual stream escapement target achieved. Target escapement was based on the number of streams counted annually. After 1980, enhanced streams routinely exceed their targets, wild stream rarely meet theirs.

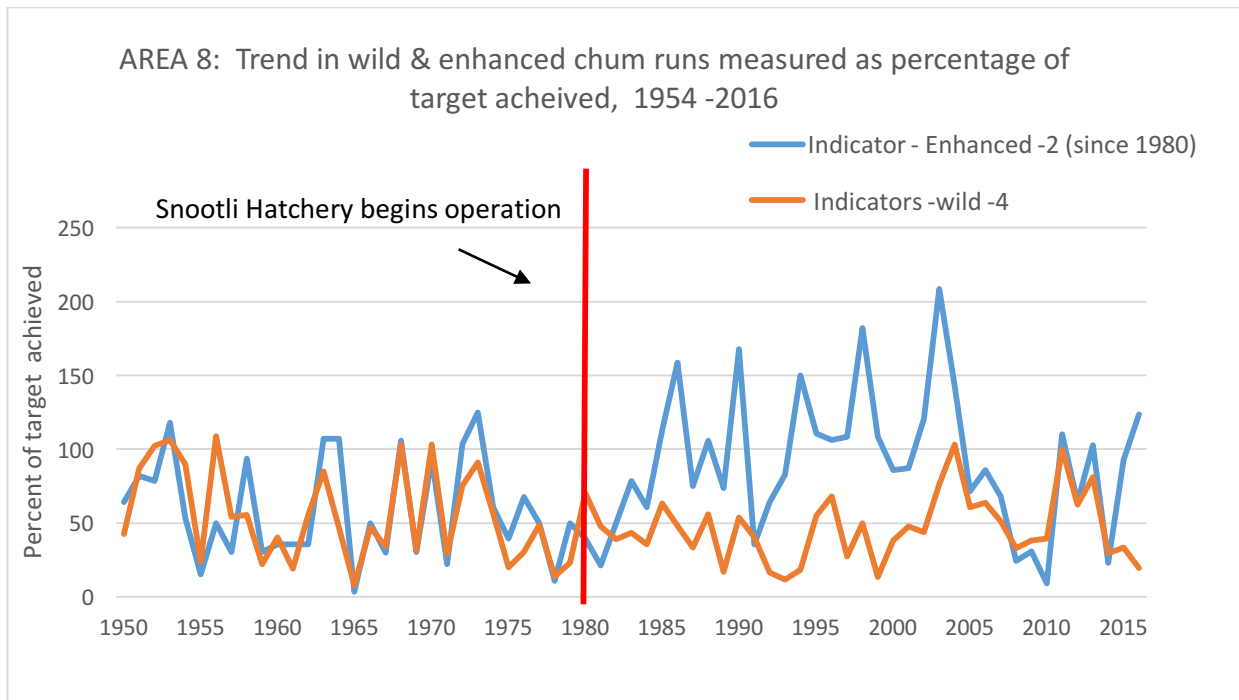


Figure 5 provides a further look at the trend between wild and enhanced streams in Area 8. This figure considers the ability of individual streams to meet their escapement goals as a percentage of the target. Prior to the start of enhancement initiatives in 1980, both groups fluctuated in a similar pattern. After enhancement began around 1980, two distinct trends are evident, with enhanced streams generally exceeding their target and wild streams generally failing to meet their targets.

While other factors may also influence stream productivity, the role of enhancement cannot be dismissed as playing a role. Escapements to wild streams in this region are important to wildlife health, particularly grizzlies, as well as the diversity of Conservation Units within this region. Maintaining the diversity and abundance of wild salmon populations is a top priority of Canada’s Wild Salmon Policy.

7.2.1 Recommendations

- The proportion of catch derived from hatchery production must be identified in-season. Indications of poor wild returns should lead to closures in mixed stock fishing areas.