

Executive Secretary's Summary of Decisions 2020 Post-Season Meeting

The Pacific Salmon Commission held its Post-Season Meeting from January 13-17, 2020 at the Embassy Suites Downtown (Portland, OR), and discussed a number of topics (see attached agenda).

The Commission AGREED:

- 1. The minutes from October 2019 are approved.
- 2. The report from the Chinook Interface Group (CIG) is adopted, noting:
 - a. The revised versions of Table 1, Table 2, and Appendix C for Annex IV, Chapter 3 and associated footnote language are ready for publication in an updated version of the Treaty.
 - b. The CTC work plan for 2019/2020 is adopted with the following instructions:
 - i. The CTC ensures that Calendar Year Exploitation Rate (CYER) work plan items are integrated into the relevant CTC work plan items.
 - ii. Ad hoc tasks in the CTC work plan are prioritized as: 1) timely documentation, 2) standards for incidental mortality data, and 3) CYER projects linked to the CTC. Mark-selective fishery (MSF) algorithms work may begin in late spring 2020
 - iii. The Jan 14, 2020 memo from the CTC to the CIG regarding incidental mortality precision and accuracy is adopted, and the February 2020 deadline to develop standards will need to be delayed.
 - c. The CIG will provide an update at the 35th annual meeting (February 2020) on these ongoing issues:
 - i. The Okanagan Chinook Work Group work plan
 - ii. The CWT&R/CEII work group, including any guidance from the former Coded-Wire Tag Improvement Program and Sentinel Stocks Program.
 - iii. Literature review on the recommended standards for precision and accuracy in estimating incidental mortality
 - iv. The CYER working group structure and relation to CTC and other committees.
 - v. Implementation of the future Mark-Selective Fishery (MSF) Fund
- 3. The October 2019 report from the Fraser Strategic Review Committee (FSRC) is final as submitted, noting associated input from technical experts in January 2020. The FSRC has concluded its assignment and is dissolved.

- 4. The preliminary 2019 post-season reports are accepted as submitted with a view to discussing revised future report formats at the 35th annual meeting.
- 5. The revised 2019/2020 work plans from the Southern Panel and the Technical Committee on Data Sharing are accepted.
- 6. The working group on the Committee on Scientific Cooperation (CSC) will continue its deliberations at the 35th annual meeting, in conjunction with CSC members.

ATTENDANCE

PACIFIC SALMON COMMISSION POST SEASON MEETING JANUARY 13-17, 2020 EMBASSY SUITES DOWNTOWN PORTLAND, OREGON

COMMISSIONERS

UNITED STATES

P. Anderson (Chair)

W.R. Allen
W. Auger
R. Klumph
S. MacCorkle
M. Oatman
R. Turner

D. Vincent-Lang

CANADA

R. Reid (Vice Chair)

R. Jones J. McCulloch M. Ned B. Riddell P. Sprout A. Thomson



Draft Agenda Post-Season Meeting January 13-17, 2020 Portland, OR

- 1. Adoption of agenda
- 2. Approval of minutes: 2019 Fall Meeting
- 3. Executive Secretary's report

Chinook issues

- 4. CIG report
 - a. Okanagan Chinook Work Group: work plan for January October 2020
 - b. 2019/2020 CTC work plan
 - c. CWT&R/CEII program development
 - d. Recommended standards for the desired level of precision and accuracy of data for estimating incidental mortality
 - e. CYER work
- 5. Mark-selective fishery fund

Other action items pending

- 6. Fraser Strategic Review Committee final report
- 7. Adoption of national post-season reports
 - a. Preliminary 2019 data
 - b. National reports on 2019 Chinook fisheries
 - c. Potential revised post-season report format
- 8. Annual work plans for 2019/2020
 - a. Revised plans from Southern Panel and Technical Committee on Data Sharing
- 9. Committee on Scientific Cooperation
- 10. Public comment

Annotated agenda

January 2020 Post-Season Meeting

(Executive Secretary's annotations in *italics*)

1. Adoption of Agenda

• Consistent with PSC bylaws, an agenda shall be adopted by the Commission at the start of each meeting. The Commission shall not ordinarily take a decision on any item that has not been included in the draft agenda for the meeting. Where circumstances warrant, supplementary decision items may be added to the agenda with the concurrence of each National Section.

2. Approval of minutes

• The Parties received draft minutes from the October 2019 Fall Meeting on December 2, 2019

3. Executive Secretary's Report

• The Executive Secretary will provide a short report on significant events since the last Commission meeting, "housekeeping" items for the current meeting, and other issues needing attention.

Chinook issues

4. CIG report

- a) Okanagan Work Group work plan: At the 2019 Fall Meeting, the Commission agreed to maintain the Okanagan Work Group indefinitely. The Work Group was directed to prepare annual work plans, with the first due in January 2020 and subsequent iterations due each October.
- b) 2019/2020 CTC work plan: At the 2019 Fall Meeting, the Commission agreed to stepwise review and approval of the CTC annual work plan. Beginning in January 2020, the CIG will engage with the CTC to review Chapter 3 implementation tasks and make final recommendations for the Committee's work plan at the Post-Season meeting. Going forward, the CIG will review the CTC's October work plan draft, recommend adoption of near-term meetings as appropriate, then provide final work plan recommendations each January.
- c) CWT&R/CEII program development: Chapter 3, para 2(e) states that the Parties shall by 2020 create and maintain a work group to discuss the CWT&R and CEII programs. The Commission directed the CIG to consider this task after the October 2019 Fall Meeting and report in January 2020.
- d) Recommended standards for precision and accuracy in estimating incidental mortality: Chapter 3, paragraph 4(c)(i) states "The CTC shall recommend standards for the desired level of precision and accuracy of data required to estimate incidental fishing mortality by February 2020. The Commission will consider the recommendation of the CTC regarding standards for the desired level of precision and accuracy of data required to estimate incidental fishing

- mortality." Accordingly, the Commission is invited to discuss the status of this work and plans for reporting in February 2020.
- 5. Mark-selective fishery fund: Annex IV, Chapter 3, paragraph 4(g)(v) states "subject to the availability of funds, the U.S. shall establish a Mark-Selective Fishery Fund (Fund). [...] The Commission shall adopt procedures to solicit proposal from U.S. and Canadian management entities for the use of the Fund, be advised on the merits of proposals by specialists as it determines appropriate, and make funding decisions." At the 2019 Fall Meeting, the Commission agreed the Executive Secretary would provide a list of guidance questions to each section regarding the future Mark Selective Fishery Fund, ahead of bilateral discussion of the issue in January 2020. The Executive Secretary provided such guidance questions via email to the PSC Chair and Vice-Chair on October 30, 2019.

Other action items pending

- 6. Fraser Strategic Review Committee final report: At the 2019 Fall Meeting, the Commission agreed that the Fraser Strategic Review Committee (FSRC) report is accepted for work planning by the Fraser River Panel, the Fraser River Technical Committee, and the Secretariat. The relevant experts in those bodies were directed to review the report, plan the recommended work to clarify proposed transition to Qualark, and make their recommendations ahead of the January 2020 Post Season Meeting. The Secretariat coordinated the collection of expert input and will transmit that (as per instructions from the PSC Chair and Vice-Chair) to the Commission and the FSRC simultaneously. The Commission is invited to consider this input and make decisions on next steps as appropriate, including any dissolving of the FSRC itself.
- 7. Adoption of national post-season reports
 - Preliminary 2019 data: Based on a January 2018 precedent, the Parties have agreed to review preliminary post-season reports each January with final reports/final data accepted the following October.
 - National reports on 2019 Chinook fisheries: In October 2019, the Commission agreed the Parties will provide presentations on the preliminary 2019 post-season reports on the Treaty area Chinook Fisheries at the January 2020 Post-Season meeting. This repeats a process begun in January 2019.
 - Potential revised format for post-season reports: In October 2019, the Commission agreed Canada would draft a revised outline for national post-season reports ahead of the January 2020 Post-Season meeting, with a view to improve report readability, efficiency, and usefulness. The Commission will review the Canadian draft and confirm a process in January 2020 to consider or further revise the outcome for review at the February 2020 Annual Meeting as appropriate.
- 8. Annual work plans for 2019/2020
 - a. Revised plans for Southern Panel and TCDS: At the 2019 Fall Meeting, the Commission agreed the work plans from the Technical Committee on Data

- Sharing and the Southern Panel need revision for specificity on dates, times, and participation for the proposed meetings. The Commission is invited to consider any resubmissions and take action as appropriate.
- 9. Committee on Scientific Cooperation: At the 2019 Fall Meeting, the PSC Chair and Vice Chair (with others as appropriate) wished to discuss timelines and desired deliverables for the CSC ahead of the January 2020 Post Season meeting. Those conversations occurred intersessionally via email, yielding an agreement to form a small group of Commissioners and the Executive Secretary to discuss future expectations of the CSC. That small group is slated to convene early in the January 2020 meeting week, and will report on its deliberations.

10. Public comments as needed

• When appropriate, and with the concurrence of the Vice-Chair, the chair may provide time for public visitors to speak during the meeting.

PACIFIC SALMON COMMISSION WORK PLAN 2019-20

Panel / Committee:

- Southern Panel; reports to the Pacific Salmon Commission.
 - o Coho Technical Committee (CoTC); reports to the Southern Panel.
 - o Chum Technical Committee (ChumTC); reports to the Southern Panel.

This work plan includes a summary of the work plans submitted by both the Coho and Chum technical committees, and as such does not include all of the detail in those work plans. This is not intended to deny the importance of that detail, only to provide a high level summary of it for Commissioners.

Date: October 15-18, 2019 -- PSC Executive Session, Spokane, WA, USA

Update on Bi-lateral Tasks Assigned Under Current PSC Agreement:

Southern Panel:

- Annual Post Season Review A detailed bilateral review of the 2019 coho, chum and chinook salmon abundances, fishery performances, and preliminary estimates of escapement levels will be conducted at the January 2020 PSC post-season meeting through presentations from each Party to the bilateral Southern Panel. Additionally, draft Post-Season Reports from each party for the 2019 fishing season will be provided at this meeting.
- The Southern Panel will review and refine draft ten-year Implementation Plans for Chapters 5 and 6.
- The Southern Panel will receive updates on the development of management objectives/breakpoints for Coho management units for the Southern Coho Management Plan of Chapter 5 from the Coho Technical Committee.
- Pre-season data exchanges will take place among the Technical Committees and the Southern Panel.
- The Southern Panel and the Coho TC will continue work on developing a bilateral process to implement provisions of the new Southern Coho Agreement (Chapter 5, Paragraph 11b and 11c new language)
- The Southern Panel will review and recommend priorities for Southern Endowment Fund Committee consideration.
- The Southern Panel will update reporting requirements, and assign work to the Technical Committees as required for completion.

Coho Technical Committee:

The following list includes updates on the status of ongoing tasks from previous work plans, as well as descriptions of bilateral tasks planned for 2019-20:

• Post Season ER Estimates for Coho Management Units. In 2019, the CoTC completed the annual post-season report for the 2017 fishing season.

- Work to update a periodic report to cover the years 2010-2017 continued; progress with the Coho Workgroup and Southern Panel on producing an electronic form of the Periodic report. Programs were developed to facilitate generation of tabular summaries of data for the Periodic Report.
- The annual information exchange for fishery planning was performed.
- Regional fishery planning model development. Bilateral interaction for the CoTC was centered on model improvements to improve efficiencies in production of estimates of post-season exploitation rates provided to the Southern Panel.
- CoTC provided informational presentations on Ocean conditions, electronic hosting of the periodic report, and ideas for assessing environmental change at the February 2019 PSC meeting.
- Documentation and development of reference points for determining status and associated exploitation rate caps for individual management units Canadian (MUs) is proceeding in coordination with implementation of the Wild Salmon Policy (WSP) (in progress) and CSAP review.
- Develop agreed upon criteria and procedures for determining MU status. A common approach to data collection and parameter estimation, where feasible and appropriate, will facilitate implementation, but has not been developed.
- Complete MU descriptions. An outline of requirements was developed in 2003 and reviewed in 2009. A Coho database has been developed for U.S. stocks. Draft descriptions were prepared for Canadian MUs and will be finalized once reference points are determined. Draft descriptions for most US MUs were completed in 2012, reviewed by local fishery managers, and are currently being finalized.
- Criteria for defining MUs: A draft discussion paper has been prepared and is available as a publication from the PSC. No further work on MU delineation is anticipated for the foreseeable future.
- Assessment Framework. A presentation was made to the Southern Panel at the February 2012 Annual Meeting in Vancouver describing a draft framework to identify the biological and fishery assessments required for implementation of the Treaty provisions for Coho. No subsequent modifications have been made. The framework provides guidelines or criteria to help evaluate the adequacy of available information and the capacity of assessment programs to produce information required to implement the current Southern Coho Agreement and develop a new Southern Coho Agreement, highlights issues relating to CWT data for coho, and presents information needs within a decision-theoretic framework to help inform policy deliberations of relationships between uncertainty, risk, and potential requirements for assessment programs. Criteria discussed include: 1) conservation risk and stock outlook; 2) loss of fishing opportunity; and 3) costs for monitoring and assessment.
- The CoTC and CoWG met in Nanaimo in June to work on the implementation plan for the 2019 Southern Coho Agreement. Reports were provided by three subgroups dealing with Data and Analytical Tools, Environmental Change, and

Management Unit Description. A revised implementation plan for consideration by the PSC is anticipated to be presented at the October 2019 Executive Session.

Chum Technical Committee:

The following list includes updates on the status of ongoing tasks from previous work plans, as well as descriptions of bilateral tasks planned for 2019-20:

- Begin working on the draft report covering 2017 fisheries and research as a principal focus during the PSC meetings in January 2019.
- Review of new treaty language to evaluate data and analysis needs to conform to the information required.
 - o Determine actual assessment program needs to effectively implement the Chapter 6 language.
 - Describe assessment program coverage needed by region/country to effectively implement the Chapter
 - o Create a table and narrative of what is actually being implemented by region/country.
 - o Summarize significant gaps
 - O Develop an annual reporting tool to provide a summary of the activities and identified gaps.
- The committee's other focus will be to continue developing the following aspects of the strategic plan (see attached Figure).
- To provide updates on any status of approved 2019 SEF projects: Currently Four Chum salmon projects are being conducted in 2019:
 - Further development of the run reconstruction module for Southern BC and Washington State Chum (ChumGEM model) (Year 2)
 - o Sampling program in the Strait of Juan de Fuca (Year 4)
 - Estimate of total Fraser River escapement using GSI information at Albion Test Fishery and enumeration of Chilliwack River escapement (Year 4)
 - o Mixed stock GSI in Southern BC and Puget Sound (Year 4)
- Work on 2019 reports associated with SEF projects for later submission
- Review of SEF priorities and ensure projects are ready for 2020 implementation should funding materializes.
- Identify additional sampling requirements to complete and/or update the existing baseline collections seeking other funding opportunities or resources to help with the database development, and other priority items such as the Escapement Reference Point development (Update on Holt et al. work).

Obstacles to Completing above Bi-lateral Tasks:

Southern Panel:

• To accomplish the above bi-lateral tasks, we will need the Commissioners' support to hold the requested number of meetings during 2020 that are noted below in the subsection, "Proposed Meeting Dates and Draft Agendas."

Coho Technical Committee:

- A draft replacement for the Southern Coho Agreement has been completed. Once adopted, the Agreement will redirect efforts of the CoTC away from routine reporting and toward improving CoTC efficiencies, stock and fishery assessments, and proactively dealing with uncertainties relating to environmental change.
- The basic structure of fishery regimes under the new Coho Agreement remains unchanged from the current CoABM in that status-dependent ER constraints on interceptions of naturally spawning MUs are established. However, the revised CoABM will presume that the status of the Interior Fraser Management Unit will remain "low" until methods to determine MU status and allowable ERs are completed. In addition, the new Agreement also contains a provision requiring the Parties to bilaterally exchange projected ERs upon completion of their respective domestic preseason fishery planning processes. Canada needs to complete two domestic approval processes for implementation of the new Coho Agreement. First, a domestic consultation process for establishing a framework for determining the status and allowable ERs for its Coho MUs is currently underway and it is expected to be completed and the framework approved for implementation during the 2019-2020 cycle. Second, Canada must determine the technical and policy details for exchanging projected ERs on Coho MUs and obtain administrative approval; the timeframe for completion of this process has not yet been established.
- Staffing and funding levels to support implementation of the new Coho Agreement are uncertain. The CoTC is concerned about: (1) the capacity of both Parties to maintain catch sampling and stock monitoring programs, and to provide required inputs into joint management planning models; (2) the need for additional dedicated staff to participate in activities of the CoTC; (3) the need to improve information exchange on preseason FRAM runs for impact projections (preseason model runs from Canada are needed to provide projections of planned fishery impacts on MUs); and (4) the lack of established monitoring and reporting systems to assess impacts of environmental change.

Chum Technical Committee:

• While support from the Southern Endowment Fund has facilitated our efforts to implement the ChumTC strategic plan, time constraints for committee members remain a challenge for task completion.

Outline of Other Panel / Committee Tasks or Emerging Issues:

Coho Technical Committee:

Budget availability and timing remain of concern. The capacity of the Parties to undertake assignments is being challenged by agency staffing and budget constraints and limitations of funding to support PSC related activities. The PSC and domestic management entities should be made aware of the need to address workforce and budgetary shortfalls reported by the three sub-groups that convened at the CoTC/CoWG meetig in Nanaimo in June 2019. Uncertain appropriations and budget allocation decisions for both the U.S. and Canada impede the capacity of the CoTC to plan its

schedule and complete tasks. The CoTC and CoWG may need to revise the workplan once budgetary and staffing limitations and requirements are clarified.

i. Big Bar Slide

The Big Bar landslide occurred in the upper Fraser River in the vicinity of Lillooet, resulting in a 5 meter high blockage that obstructed passage of several species of salmon, including Interior Fraser Coho. The slide was reported to DFO in late June of 2019, but may have occurred in late October 2018. Substantial numbers of staff from DFO, First Nations, the Province of BC, and partners and funding has been devoted to transporting fish above the slide and re-establishing natural passage past the slide. Natural passage was re-established in early September and by the end of September approximately 60,000 fish had been transported above the slide and 210,000 fish swam passed the slide. The transported fish were largely Chinook and sockeye salmon; there is no information on the composition of fish that swam past the slide. Some observations for consideration include:

- Spawning ground reports are showing that escapement to spawning grounds above the slide are much lower than average, thus substantial reductions in the productivity of 2019 cycle lines can be expected. For fish that were blocked by the slide, some redistribution and spawning in systems below the slide might occur, resulting in productivity increases in those systems and potential impacts on productivity across cycle lines. Redistribution of Chinook and sockeye is less likely than it is for coho, chum and pink salmon.
- Estimation of the proportion of coho salmon returning to areas upstream of the slide. A preliminary estimate is that about 12% of the spawning area utilized by Interior Fraser Coho (Middle Fraser CU) occurs upstream of the <u>Big Bar slide</u>. Escapement estimates for populations in this CU are not available at present so whether (and how) the slide may have impacted the status of IF coho is unknown.
- Continuing to monitor fish passage past the slide site hydroacoustically and sampling fish for GSI into December will help with evaluations of slide impacts on coho and chum salmon in the upper Fraser River.
- Improving the coho genetic baseline (sampling, collection, and processing of tissue samples for populations spawning upstream of the slide) could help quantify the origin of individual fish above and below the slide site.
- Increasing escapement monitoring for coho in areas above the slide beyond core habitat surveys in major systems in the upper watershed would be beneficial in assessing potential slide impacts, particularly with respect to loss of genetic diversity in small systems that also may support coho but are not surveyed regularly. Spawning ground surveys and sampling of coho is especially important because of the paucity of information for context (no coho hatchery programs upstream of the slide for disease monitoring).
- The additional stress and physical injuries of fish that are being affected by the slide are likely to lead to higher rates of diseases, such as bacterial kidney disease, but these diseases are only monitored at hatcheries and not in the wild populations. Such diseases could affect productivity. For Chilko Chinook, DFO

has reported that 12% of females did not spawn in 2019 (100% egg retention). Also, information about the condition of Chinook at the spawning grounds suggests that the injured fish died en route and did not make it to the spawning grounds; virtually 100% of the Chinook during the last part of August had injuries and secondary infections (bacterial/fungal).

ii Increasing frequency and intensity of extreme environmental events.

The new Southern Coho Agreement recognizes the importance of monitoring and adjusting to changing environmental conditions. Severe warming of a large area from Alaska to California in 2014-2015 resulted in substantial disruption to marine food webs and fishery economies. In mid June, a new marine heat wave was reported and has been developing into one of the largest of its kind in the last four decades; the U.S. National Ocean and Atmospheric Administration has reported the 2019 event is already the second-largest experts have seen since 1981 — the first year for which satellite data used to track marine heat waves is available. A marine heat wave happens when sea surface temperatures are higher than normal for at least five consecutive days.

The small CoTC/CoWG subgroup on Environmental Change developed recommendations for near term (1-2 years) and intermediate term (5-10 years) actions and measures that should be reviewed in conjunction with the Committee on Scientific Cooperation.

Potential Issues for Commissioners

Coho Technical Committee:

• Transition to a new Southern Coho Agreement. The Southern Coho Agreement contains provisions that differ significantly from those in the current Agreement. This proposed workplan anticipates that CoTC efforts during this cycle reflect a transition and redirection of some old assignments and redirection of resources to new tasks in anticipation that measures to begin work under the PSC annex will be put in place within the current cycle. Additional resources will be required for address requirements under the new Agreement. In June the CoTC and CoWG met to continue development of an implementation plan for the 2019 Southern Coho Agreement. It is anticipated that the implementation plan will be provided to the PSC for consideration at its October 2019 Executive Session. Continued deliberation with the Coho Workgroup and Commissioners will be needed regarding CoTC priorities.

Coho and Chum Technical Committees:

Guidance will be needed regarding establishment of a process to provide the CoTC
and the Chum TC with the opportunity to review relevant proposals that are
submitted for Southern Endowment Fund support. In addition, progress and final
reports for Southern Endowment Fund projects involving Coho and Chum should be
routinely provided to CoTC and Chum TC respectively, for information.

Potential Issues for Committee on Scientific Cooperation

The PSC should consider establishing a coast-wide, multi-species forum under the oversight of the Committee on Scientific Cooperation to share developments and advice regarding adaptation of Pacific salmon management approaches to environmental change.

There is strong evidence that environmental change is occurring and accelerating to a degree such that past experience cannot be expected to serve as a reliable basis to forecast the future. Increases in uncertainty, variability, and directional change are expected to alter hydrologic, precipitation, and temperature patterns which, in turn, are likely to affect the productivity, abundance, distribution, and migration patterns of Pacific salmon. The forum should provide reporting of significant developments in the knowledge base as well as vetting of recommendations for monitoring and reporting systems, and potential adaptation strategies. A meeting between the CoTC and CSC is recommended to discuss and review recommendations for addressing environmental change in management of Pacific Salmon.

Proposed Meeting Dates and Draft Agendas

Proposed meeting dates and key activities planned for Southern Panel, Coho Technical Committee (CoTC), Coho Working Group (CoWG), and Chum Technical Committee (ChumTC) are listed in the following section. Additionally, a summary table by meeting date in the 2019-20 work cycle is provided below. Attendance of panel and committee members may be dependent on available resources.

Southern Panel Meeting Schedule:

- January 13-17, 2020 PSC Post Season Meeting, Portland, OR.
- February 17-21, 2020 PSC Annual Meeting, Vancouver, BC
- Also, see Coho Working Group meeting schedule in the table below, which will include a subset of Southern Panel members.

<u>Coho Technical Committee (CoTC) and Coho Working Group Proposed Meeting</u> Schedule:

- November, 2019 CoTC meeting, Olympia, WA. [NOTE on December 17 2019: This did NOT take place.]
- Continue preparation of mock-up of Periodic Report and electronic hosting system. Review status of Coho DIT report January 13-17, 2020 PSC Post Season Meeting, Portland, OR.
 - O Continue work on assignments. Main task will focus on repairing for estimation of 2018 exploitation rates and work with CoWG to revise workplan in light of instructions from PSC Executive Session
- February 17-21, 2020 PSC Annual Meeting, Vancouver, BC.
 - *Use Coho Model to perform 2018 post-season assessment of impacts.*
 - o Present annual review of exploitation rates to Southern Panel.
 - o Briefing on ocean environmental conditions to Southern Panel.
 - o Briefing on Periodic Report (years 2010-2017) to Southern Panel.
- March 2020 Coho Working Group; Panel chairs and select members. (Location Arlington, WA) – $\frac{1}{2}$ day meeting, $\frac{1}{2}$ day travel = $\frac{2}{2}$ days
 - Annual manager-manager information exchange. Exchange preseason stock forecasts and fishery plans.

- July 2020 CoTC, SFEC, and Coho Working Group, Bellingham, WA (CoTC 1 week, including travel days; CoWG 2 days)
 - o Review draft strategic plan for Southern Coho.
 - Review methods for determining status of Canadian MUs, bilateral exchange of projected ER caps upon completion of domestic preseason fishery planning processes, and stock and fishery assessment programs for implementation of the new Coho Agreement.
 - Review estimates of ERs for MUs resulting from domestic planning processes.
 - Review Periodic Report and CoTC priorities. Initiate discussion of implications environmental change for Southern Coho Management.
 - Joint CoTC/SFEC discussion of Coho DIT report (SFEC meeting 1 day)
- Sept 2020 CoTC/CSC meeting, Seattle, WA (3 days)
 - Initiate deliberations between the CoTC and CSC on recommended actions for implementing the Environmental Change provisions of the new Southern Coho Agreement and to further explore alternative approaches for monitoring, evaluating, and addressing environmental change for management of Southern Coho and other species of Pacific salmon.

Chum Technical Committee Proposed Meeting Schedule:

- January 13-17, 2020 PSC Post Season Meeting, Portland, OR.
 - Review and discuss preliminary post-season 2019 fisheries information.
 - o Collate and review report items for 2017 final post-season report.
 - Continue work on Southern Chum genetic baseline inventory and expansion for adequately identifying stock origin of fish in mixed stock fisheries on both sides of the border.
 - Continue to evaluate and test the ChumGEM model; presentation on ChumGEM progress, issues and next steps.
 - Updates on any completed SEF programs related to Chum.
 - Review and discuss research and analysis activities essential to the Committee tasks.
 - o Review Chum Strategic plan and update.
 - o Provide any bilateral analyses, as requested by the Southern Panel.
- February 17-21, 2020 PSC Annual Meeting, Vancouver, BC
 - o Continue work on 2017 annual report.
 - Address any specific tasks assigned to the Committee by the Southern Panel at the January meeting.
 - o Continue work on tasks not completed at the January meeting.
 - Assign workgroups and workgroup tasks for items still pending at the end of the February meeting.
 - SEF projects for 2020-2021 should be identified and program planning initiated.
 - o Start to develop new SEF priorities document for upcoming call

- o Initiate 2018 annual report
- May 4-8 2020 PSC Chum TC Spring Meeting, Nanaimo, BC
 - Finalize 2017 annual report for submittal.
 - Continue to define and develop Tier 2 components of the Southern Chum Strategic Plan.
 - Review status of all SEF related projects and develop plan for new submission following identified priorities.

Proposed Schedule of Meetings for 2019-20: PSC Southern Panel, CoTC, CohoWG, ChumTC						
When	Who	Location	Purpose/ Primary Tasks			
November 2019 (dates TBD; 4 days)	CoTC	Olympia, WA	Initiate preparation of mock-up of Periodic Report and electronic hosting system. Discuss Coho DIT report with SFEC.			
Jan 13-17, 2020 PSC Post Season Meeting	Southern Panel CoTC ChumTC	Portland, OR	Southern Panel Annual Post Season Review Work on developing a bilateral process per the new Southern Coho Agreement (Chapter 5, Paragraph 11b and 11c new language). Present updates on the development of management objectives/breakpoints for Coho management units for the current Southern Coho Management Plan of Chapter 5. Plan priority activities for future work. Coho Tech Committee Continue work on assignments, specifically preparing for estimation of 2018 exploitation rates and work with CoWG to revise workplan in light of instructions from PSC Executive Session.			
			Chum Tech Committee Review and discuss preliminary post-season 2019 fisheries information Collate and review report items for 2017 final post-season report Continue work on Southern Chum genetic baseline inventory and expansion for adequately identifying stock origin of fish in mixed stock fisheries on both sides of the border. Continue to evaluate and test the ChumGEM model Presentation on ChumGEM progress, issues and next steps. Updates on any completed SEF programs related to Chum Review and discuss research and analysis activities essential to the Committee tasks Review Chum Strategic plan and update Provide any bilateral analyses, as requested by the Southern Panel.			
Feb 17-21, 2020 PSC Annual Meeting	Southern Panel CoTC ChumTC	Vancouver, BC	 Southern Panel: Pre-season data exchanges. SEF priorities developed and presented by technical committees and endorsed by Panel. Ocean Indicators presentation. Update reporting requirements, and assign work as required for completion. Coho Tech Committee: Use Coho Model to perform 2018 post-season assessment of impacts. Present annual review of exploitation rates to Southern Panel. Briefing on ocean environmental conditions and progress on Periodic Report. SEF projects for 2020-2021 should be identified and program planning initiated Start to develop new SEF priorities document for upcoming call Chum Tech Committee: Continue work on 2017 annual report. Address any specific tasks assigned to the ChumTC by the Southern Panel at the January meeting Continue work on tasks not completed at the January meeting Assign workgroups and workgroup tasks for items still pending at the end of the February meeting SEF projects for 2020-2021 should be identified and program planning initiated Start to develop new SEF priorities document for upcoming call 			

Proposed Schedule of Meetings for 2019-20: PSC Southern Panel, CoTC, CohoWG, ChumTC							
When	Who	Location	Purpose/ Primary Tasks				
March 2020 (1 day, 1 day travel; date TBD)	Coho Working Group (CoWG); Panel chairs, select members	Arlington, WA	Annual manager-manager information exchange. Exchange preseason stock forecasts and fishery plans.				
May 4-8 2020	ChumTC	Nanaimo, BC	 Finalize 2017 annual report for submittal Continue to define and develop Tier 2 components of the Southern Chum Strategic Plan Review status of all SEF related projects and develop plan for new submission following identified priorities 				
July 2020 (4 days, Dates TBD)	Coho Working Group + CoTC + SFEC	Bellingham, WA	 Review draft strategic plan for Southern Coho. Review methods for determining status of Canadian MUs, bilateral exchange of projected ER caps upon completion of domestic preseason fishery planning processes, and stock and fishery assessment programs for implementation of the new Coho Agreement. Review estimates of ERs for MUs resulting from domestic planning processes. Review Periodic Report and CoTC priorities. Initiate discussion of implications environmental change for Southern Coho Management. Review Coho DIT report with SFEC 				
Sept 2020 (3 days, dates TBD)	CoTC & CSC	Seattle, WA	Initiate exploration of alternative approaches for addressing environmental change for management of Southern Coho.				

Status of Technical or Annual Reports:

Southern Panel:

• To be reviewed at the January 2020 Post Season meeting, with a plan developed to complete outstanding reporting requirements.

Coho Technical Committee:

- Work plans and status were reviewed through presentations at the 2019 PSC meetings.
- Tools were developed to improve report generation capabilities using data generated by Backwards FRAM. 2017 post-season estimates of exploitation rates were presented to the Southern Panel at the February 2019 meeting in Portland.
- Efforts to update the periodic report and transition to electronic hosting were initiated.
- Draft descriptions for most U.S. MUs undergoing review. Completion of Canadian MU descriptions are pending determination of MU reference points anticipated in 2019.
- Annual report on CoTC priorities were developed for the Southern Fund Committee.

Chum Technical Committee:

• The committee anticipates having the 2017 Annual Report complete at the May 2020 ChumTC meeting.

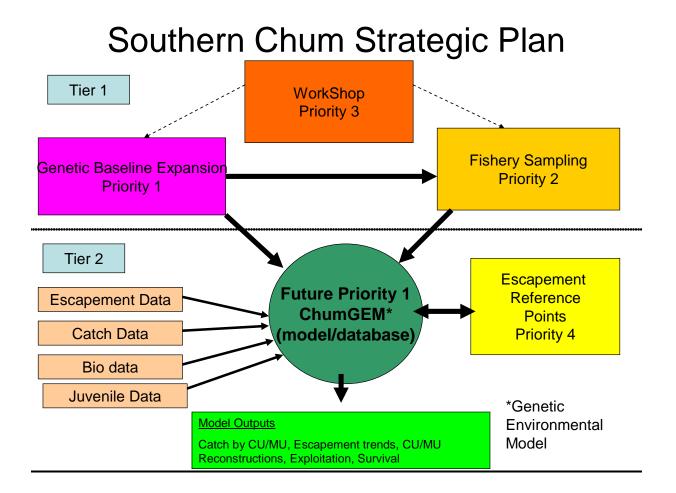
• The committee anticipates having the 2018 Annual Report complete by the end of the February meeting in 2020.

Comments:

Coho Technical Committee:

The CoTC workplan reflects redirection of efforts to support emphasis areas anticipated under the Southern Coho Agreement. The proposed priority list for CoTC during the 2019-20 cycle follows (high to low): (1) Generate estimates of 2018 ERs for MUs; (2) Informational outlook for 2019 ocean conditions; (3) Information exchange for 2020 preseason fishery planning; (4) Update periodic report; (5) Evaluate and improve performance of Coho FRAM; (6) explore alternative approaches for addressing environmental change and management of Southern Coho; (7) initiate deliberations regarding status determinations for Canadian MUs; (8) Review Coho DIT report; (9) all other assignments to be undertaken on time available basis.

Chum Technical Committee:



PACIFIC SALMON COMMISSION WORK PLAN 2019-2020

Panel / Committee:

Joint Technical Committee on Data Sharing (TCDS) and its subcommittee Data Standards Work Group (DSWG).

The Joint Technical Committee on Data Sharing functions as a steering committee for Coded Wire Tag (CWT) data sharing issues and liaises with the Chinook Technical Committee (CTC), Selective Fishery Evaluation Committee (SFEC), and Coho Technical Committee (CoTC) to improve CWT data to better support their analytical work to meet Treaty obligations. This Committee defines requirements needed for bilateral CWT data exchange and additional verification rules that would improve the integrity of the data.

The Data Standards Working Group (DSWG) sub-committee reviews requirements established by the TCDS, makes recommendations on how to implement them, and does the work of modifying the bi-lateral data exchange standards and verification process.

Data Sharing reports directly to the Commissioners.

Date:

This work plan will be presented to the commission during the 2019 Fall Session October 14-18, 2019 in Spokane, WA.

Update on Bi-lateral Tasks Assigned Under Current PSC Agreement:

There were no specific bi-lateral tasks for this committee under the 1999 or 2008 PSC agreement other than the general agreement as described in the 1985 Memorandum of Understanding to maintain and make improvements to the CWT system. Since 1985, TCDS and DSWG have been maintaining and updating the CWT data exchange standards and verification process.

Following the work of the CWT Expert Panel, the CWT Workgroup and the CWT Improvement Team, we understand that the Commissioners want the TCDS to continue in the role of examining issues pertaining to CWT data. The new data specification standards that the committee may complete in 2019/20 will support analytical work of the joint committees and improve confidence levels, quality and accuracy of the data.

Obstacles to Completing above Bi-lateral Tasks:

1) Data Sharing Committee Membership

Participation at meetings and progress on addressing data sharing issues may be

a low priority for members with other competing PSC Committee activities or the PST negotiations workload.

No work was accomplished and no meetings occurred by the Data Sharing Committee this past year (2018/2019).

Outline of Other Panel / Committee Tasks or Emerging Issues:

None

<u>Potential Issues for Commissioners, including enhancement activities reported</u> under Article V:

None

Potential Issues for Committee on Scientific Cooperation

None

Proposed Meeting Dates and Draft Agendas:

When	Who	Location	Purpose			
February	TCDS	Conference	Review and approve DSWG recommendations			
25, 2020		call	and timelines for implementation of updates to			
			CWT data exchange specifications.			
March 24,	TCDS	Portland, OR	Review and approve DSWG recommendations			
25 & 26,			and timelines for implementation of updates to			
2020			CWT data exchange specifications. An in-			
			person meeting will occur only if there are			
			significant issues to resolve that cannot be			
			effectively addressed by the January 2020			
			conference call.			
May 20 &	DSWG	Vancouver,	Finalize documentation of updates to CWT			
21, 2020		BC	data exchange specifications. Review new			
			proposals for changes/improvements for data			
			exchange.			
September	TCDS	Conference	Complete CWT data sharing report containing			
15, 2020		call	new data exchange specifications. Review new			
			requirements for changes/improvements for			
			data exchange.			

Status of Technical or Annual Reports:

DSWG has developed a standard formal process for documentation and review of proposals for change. By Sept 2020, TCDS will complete a report containing updated data exchange standards and an implementation plan for improvements to CWT data sharing.

Comments:

No additional comments.

2019 POST SEASON REPORT UNITED STATES SALMON FISHERIES OF RELEVANCE TO THE PACIFIC SALMON TREATY

Report Submitted to the Pacific Salmon Commission By the United States Section

January 2, 2020

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POST SEASON REPORT

I. PRELIMINARY 2019 SOUTHEAST ALASKA FISHERIES

NORTHERN BOUNDARY AREA FISHERIES

District 104 Purse Seine Fishery

The 2019 revision of the Pacific Salmon Treaty (PST) Agreement calls for abundance-based management of the District 104 purse seine fishery. The agreement allows the District 104 purse seine fishery to harvest 2.45 percent of the Annual Allowable Harvest (AAH) of Nass and Skeena sockeye salmon prior to Alaska Department of Fish and Game (ADFG) statistical week 31 (referred to as the treaty period). The AAH is calculated as the total run of Nass and Skeena sockeye salmon minus either the escapement requirement of 1.1 million (200,000 Nass and 900,000 Skeena) or the actual in-river escapement, whichever is less.

The District 104 purse seine fishery opens by regulation on the first Sunday in July. In 2019, the first potential opening was July 7 (week 28). The pre-week 31 fishing plan for District 104 was based on the preseason Canadian Department of Fisheries and Oceans (DFO) forecast runs of approximately 2.33 million Nass and Skeena sockeye salmon. In the 2019 Treaty period (Alaska statistical weeks 28-30), 9,399 sockeye salmon were harvested during a 12-hour opening in Week 28 and a 12-hour and a 10-hour opening in week 29 (Table 1). The fishery closed in week 30 due to low Skeena River sockeye salmon abundance. A total of 36 purse seine vessels fished at some time in the district during the Treaty period. In past years 60% to 80% of Treaty-period sockeye salmon have been of Nass and Skeena origin, therefore we would anticipate between 5,600 and 7,500 Nass and Skeena sockeye salmon may have been harvested in the District 104 purse seine fishery during the 2019 Treaty period. The final number of Nass and Skeena sockeye salmon harvested, and the actual harvest by stock, will not be available until harvest, escapement, and stock composition estimates are finalized for the year.

In 2019, a total of 3,528,011 pink salmon, 270,993 sockeye salmon, 175,212 chum salmon, 77,593 coho salmon, and 7,174 Chinook salmon were harvested in the District 104 purse seine fishery (Table 1). The number of days that the fishery was open, and the number of boats fishing were both below the 1985–2018 average (Figure 1 and 2). Purse seine fisheries were on non-retention for Chinook salmon throughout most the season, except for weeks 30 and 31. Sockeye salmon harvests were below average in all weeks except 33 (Figure 4) and the treaty period (week 28–30) harvest of 9,399 was only 10% of the 1985–2018 average. The total sockeye salmon harvest of 270,993 was 59% of the 1985–2018 average of 458,000 fish. Harvests of coho salmon were also below average in all weeks except 33 (Figures 5) and the overall harvest of 77,593 was 70% of the long-term average. The overall pink salmon harvest of 3,528,011 was only 44% of the long-term average (Figure 6) and the chum salmon harvest of 175,212 was 60% of the long-term average (Figure 7).

Since the PST was signed in 1985, the number of hours open, boats fished, and boat-days fished in the pre-Week 31 annex period in District 104 are down 56%, 62% and 85% respectively compared to the averages in the pre-treaty 1980-1984 period (Table 2). The total pre-week 31

Treaty-period sockeye salmon harvest is also down 49%. The seine fleet moves freely between districts as various species are harvested, so seining opportunities elsewhere affect the effort and catch in District 104.

Table 1. Catch and effort in the Alaska District 104 purse seine fishery, 2019.

Week/	Start							
Opening	Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Hours
28	7/7	0	959	2,229	6,420	1,995	26	12
29	7/14	0	2,679	2,935	19,209	5,962	11	12
29B	7/18	0	5,761	3,201	71,108	6,975	17	10
31	7/28	1,429	22,124	5,224	598,209	14,619	48	15
31B	7/31	5,745	52,441	13,036	983,188	29,762	88	39
32	8/4	0	30,516	4,340	500,532	26,588	56	39
32B	8/8	0	29,974	8,231	447,968	23,701	39	39
33	8/12	0	69,430	19,347	515,787	31,174	56	39
33B	8/16	0	30,100	8,584	245,664	17,699	41	39
34	8/20	0	23,355	8,346	104,688	12,138	22	39
34B	8/24	0	3,654	2,120	35,238	4,599	13	39
							Permits	
							Fished	
Weeks 28-30		0	9,399	8,365	96,737	14,932	55	34
Weeks 31-34		7,174	261,594	69,228	3,431,274	160,280	109	288
Total		7,174	270,993	77,593	3,528,011	175,212	112	322

Table 2. Fishing opportunity, effort, and sockeye salmon harvest prior to week 31 in the District 104 purse seine fishery, 1980–2019.

		Individual	Days			Sockeye
	Hours	Permits	Fished	Approximate	Sockeye	Catch per
Year	Fished	Fished	(1d=15hrs)	Boat-Days	Harvest	Boat-Day
1980	207	244	13.8	2,877	266,273	93
1981	132	212	8.8	1,108	185,188	167
1982	117	255	7.8	1,435	213,150	149
1983	108	241	7.2	1,211	170,306	141
1984	132	174	8.8	805	103,319	128
1985	84	141	5.6	502	100,590	200
1986	108	194	7.2	968	91,320	94
1987	90	134	6	457	72,385	158
1988	108	210	7.2	994	248,789	250
1989	84	135	5.6	438	157,566	360
1990	42	171	2.8	276	169,943	615
1991	41	134	2.7	243	98,583	406
1992	29	108	1.9	142	79,643	561
1993	45	171	3	343	163,189	476
1994	55	84	3.7	202	158,524	783
1995	58	109	3.9	218	71,376	328
1996	31	113	2.1	128	215,144	1,684
1997	56	159	3.7	409	572,942	1,402
1998	32	78	2.1	89	17,394	196
1999	30	38	2	44	7,664	174
2000	81	66	5.4	192	48,969	255
2001	50	95	3.3	182	203,090	1,115
2002	72	44	4.8	124	26,554	215
2003	52	40	3.5	97	84,742	875
2004	107	24	7.1	102	30,758	302
2005	68	38	4.5	93	35,690	382
2006	95	39	6.3	117	89,615	766
2007	50	68	3.3	136	112,135	824
2008	33	17	2.2	22	6,262	281
2009	72	38	4.8	95	15,971	168
2010	55	21	3.7	39	4,617	118
2011	84	29	5.6	77	25,280	329
2012	87	30	5.0	93	18,300	196
2013	46	36	3.1	59	13,102	222
2014	60	101	4	260	115,015	442
2015	70	39	4.7	100	43,873	439
2016	60	106	3.8	332	110,346	332
2017	20	24	1.3	20	12,036	602
2018	48	55	3.2	122	19,743	128
2019	34	36	2.3	50	9,399	188
Avg. 80-84	139	225	9	1,487	187,647	136
Avg. 85-18	62	85	4	227	95,328	462
% Change	-56%	-62%	-56%	-85%	-49%	241%
		-				

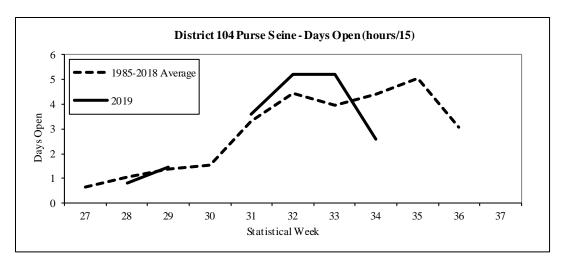


Figure 1. Days open by week in the District 104 purse seine fishery, 2019.

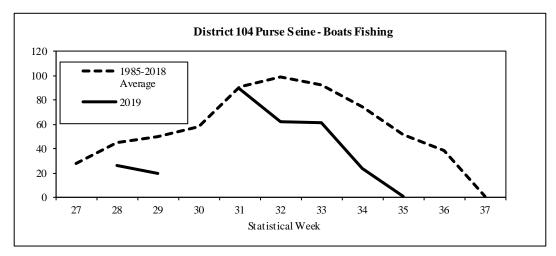


Figure 2. Number of boats fishing by week in the District 104 purse seine fishery, 2019.

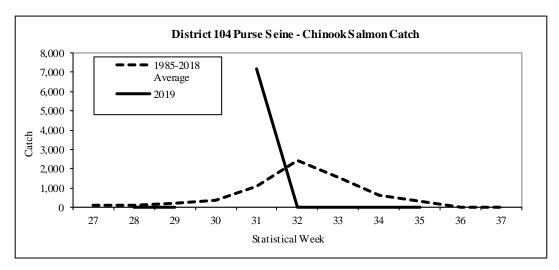


Figure 3. Chinook salmon harvest by week in the District 104 purse seine fishery, 2019.

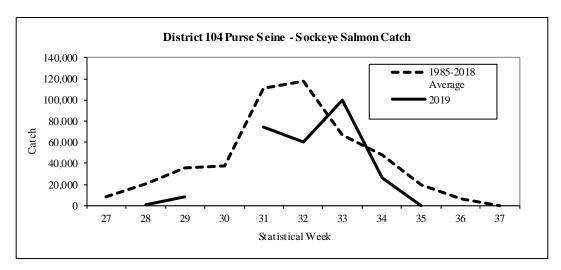


Figure 4. Sockeye salmon harvest by week in the District 104 purse seine fishery, 2019.

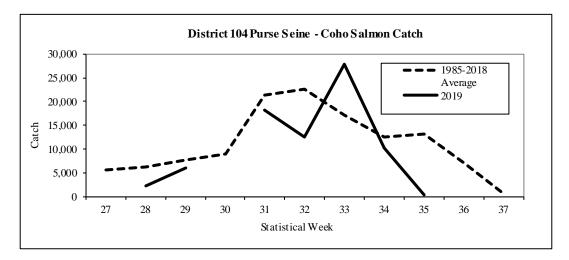


Figure 5. Coho salmon harvest by week in the District 104 purse seine fishery, 2019.

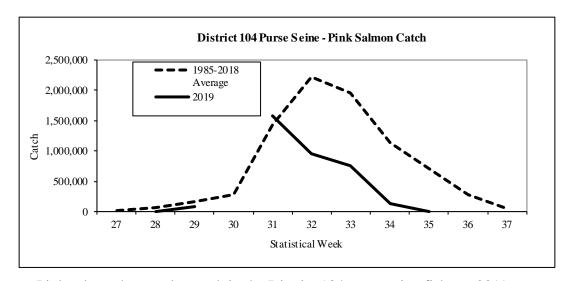


Figure 6. Pink salmon harvest by week in the District 104 purse seine fishery, 2019.

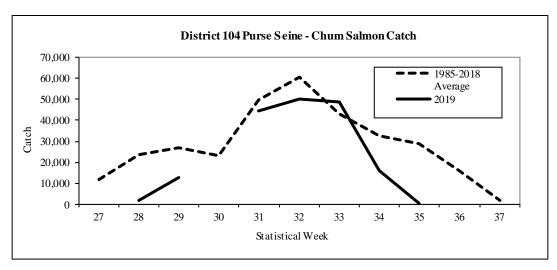


Figure 7. Chum salmon harvest by week in the District 104 purse seine fishery, 2019.

District 101 Drift Gillnet Fishery

The 2019 PST agreement calls for abundance-based management of the District 101 (Tree Point) drift gillnet fishery. The agreement specifies a harvest of 13.8 percent of the AAH of the Nass River sockeye salmon run. The AAH is calculated as the total run of Nass sockeye salmon minus either the escapement requirement of 200,000 or the actual in-river escapement, whichever is less. The run of Nass sockeye salmon was forecasted at 620,000 in 2019 which, minus an escapement goal of 200,000, would result in an AAH of about 420,000. Using this forecast, the 2019 allowable harvest in the District 101 drift gillnet fishery was approximately 58,000 Nass River sockeye salmon.

The District 101 drift gillnet fishery opens by regulation on the third Sunday in June, which was June 16 (week 25) in 2019. During the early weeks of the fishery, management is based on the run strength of Alaska wild stock chum and sockeye salmon and on the run strength of Nass River sockeye salmon. Beginning in the third week of July, when pink salmon stocks begin to enter the fishery in large numbers, management emphasis shifts by regulation to that species. By regulation, the District 101 Pink Salmon Management Plan (PSMP) begins the third Sunday in July and sets gillnet fishing time in this district in relation to the District 101 purse seine fishing time. Beginning in Week 36 (September 1) management was based on the strength of wild stock fall chum and coho salmon.

The District 101 drift gillnet fishery opened Sunday June 16 (week 25) in 2019. The number of days the fishery was open was near average all season (Figure 8), but the number of boats fishing during weekly openings was below average throughout the season (Figure 9). The total number of individual boats fishing during the season was 57, which was approximately 54% of the 1985-2018 average of 105 boats. A total of 15,986 sockeye salmon were harvested, which was only 14% of the 1985–2018 average of 111,870 fish and the lowest harvest since the inception of the PST (Tables 3 and 4). Harvests of sockeye salmon were well below treaty period averages throughout the season (Figure 10). The cumulative sockeye salmon harvest prior to the initiation of the PSMP in Week 30 was 5,962 fish, or about 37% of the season's total sockeye salmon harvest. The final number of Nass River sockeye salmon harvested at Tree Point will not be available until catch, escapement, and stock composition estimates are finalized for the 2019 season. In past years approximately 65% of the District 101 gillnet sockeye salmon harvest has

been of Nass River origin, therefore we would anticipate that approximately 10,400 Nass River sockeye salmon may have been harvested in the District 101 gillnet fishery in 2019.

Coho salmon harvests were below average throughout the season and the total harvest of 28,800 fish was 59% of the treaty period average (Figure 11). Pink salmon harvests were below average most of the season and the total harvest of 204,971 fish was 42% of average (Figure 12). Chum salmon harvests were near or below average in most weeks of the fishery and the total harvest of 182,457 fish was 61% of average (Figure 13). Chinook salmon harvests were near average throughout the season (Figure 14).

Table 3. Weekly harvest and effort in the Alaska District 101 commercial drift gillnet fishery, 2019.

	Start							
Week	Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Hours
25	6/16	262	512	361	582	771	30	95.98
26	6/23	428	1,466	269	3,481	2,899	33	96
27	6/30	327	1,508	175	10,463	5,911	38	96
28	7/7	98	1,486	363	25,954	19,666	41	96
29	7/14	41	990	232	22,670	17,140	44	96
30	7/21	57	2,347	438	30,715	20,593	38	96
31	7/28	61	3,779	1,595	35,060	28,600	39	120
32	8/4	22	2,098	1,243	34,883	23,559	35	120
33	8/11	6	964	1,295	30,866	12,069	32	120
34	8/18	1	193	1,592	8,045	22,854	20	120
35	8/25	3	504	4,134	2,132	20,318	35	120
36	9/1	2	102	2,665	90	4,462	33	96
37	9/8	4	32	5,049	26	2,634	29	96
38	9/15	1	4	5,640	4	830	24	96
39	9/22	0	0	2,758	0	142	13	96
40	9/29	0	1	991	0	9	7	96
Total		1,313	15,986	28,800	204,971	182,457	57	1,656
1985-201	8 Avg.	1,484	111,870	48,608	490,021	298,202	106	1,371

Table 4. Sockeye salmon harvest in the Alaska District 101 gillnet fishery, 1985 to 2019, and comparison of harvest and effort (boats, hours, and boat-hours) between weeks 26 and 35 when sockeye salmon are most abundant in this district.

	Total	Catch and Effort between Weeks 26-35			
	Sockeye	Sockeye	Individual	Total	Boat-
Year	Harvest	Harvest	Permits Fished	Hours Open	Hours ¹
1985	173,100	159,021	155	1,032	106,209
1986	145,699	143,286	201	960	109,490
1987	107,503	106,638	178	615	64,104
1988	116,115	115,888	192	756	93,072
1989	144,936	130,024	178	1,023	117,465
1990	85,691	78,131	159	840	70,421
1991	131,492	123,508	136	984	80,064
1992	244,649	243,878	118	1,080	94,159
1993	394,098	390,299	149	1,032	102,814
1994	100,377	98,725	144	984	74,408
1995	164,294	151,131	140	1,008	82,512
1996	212,403	175,569	130	1,104	86,108
1997	169,474	152,662	138	1,008	81,672
1998	160,506	159,307	124	1,044	87,358
1999	160,028	158,268	118	1,032	80,424
2000	94,651	94,399	95	912	49,488
2001	80,041	62,129	76	1,020	46,874
2002	120,353	106,360	76	1,008	42,528
2003	105,263	96,921	71	1,104	44,008
2004	142,357	141,395	61	1,104	42,400
2005	79,725	75,875	70	1,104	40,864
2006	62,770	53,048	48	840	28,265
2007	66,822	50,642	56	1,032	33,713
2008	34,113	30,672	54	936	31,961
2009	69,859	69,325	65	1,080	43,432
2010	62,680	61,987	68	1,008	45,135
2011	88,618	87,744	87	840	47,627
2012	62,506	40,518	85	1,008	43,695
2013	54,575	45,413	92	1,104	59,437
2014	55,828	49,722	73	1,095	44,551
2015	28,155	27,365	71	912	35,946
2016	39,912	38,078	71	1,008	44,640
2017	25,073	19,702	68	984	39,672
2018	19,920	18,540	54	1,296	30,960
2019	15,986	15,335	51	1,080	37,944
Average 1985-2018	109,131	102,043	106	999	61,812

¹Boat-hours equals the sum of all weekly estimates of boat-hours: boats fished multiplied by open hours. Boat-hours does not equal individual permits fished multiplied by total open hours.

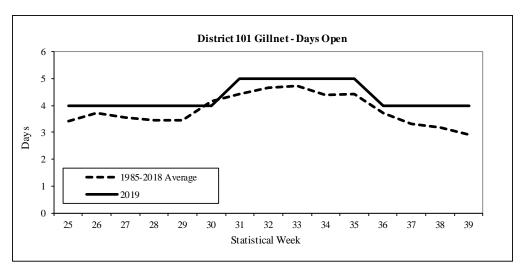


Figure 8. Days open by week in the District 101 drift gillnet fishery, 2019.

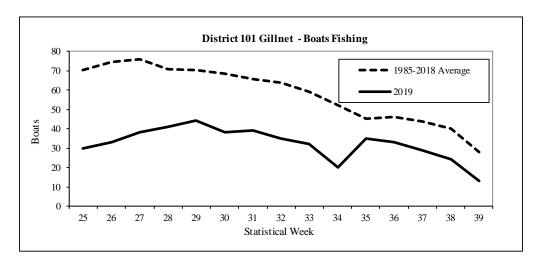


Figure 9. Number of boats fishing by week in the District 101 drift gillnet fishery, 2019.

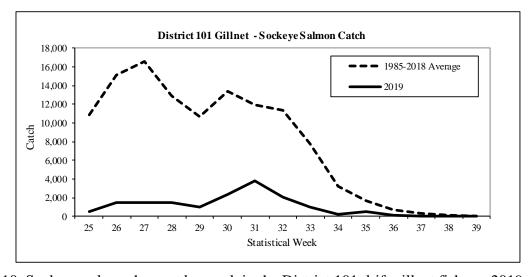


Figure 10. Sockeye salmon harvest by week in the District 101 drift gillnet fishery, 2019.

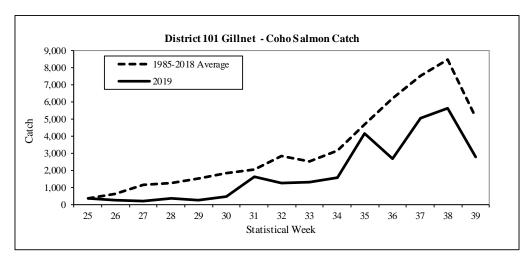


Figure 11. Coho salmon harvest by week in the District 101 drift gillnet fishery, 2019.

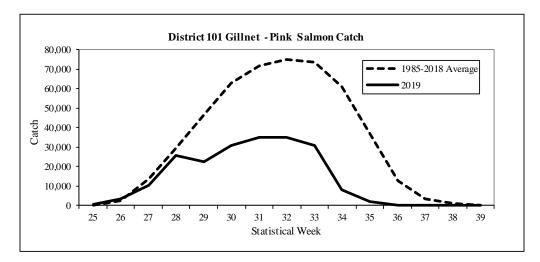


Figure 12. Pink salmon harvest by week in the District 101 drift gillnet fishery, 2019.

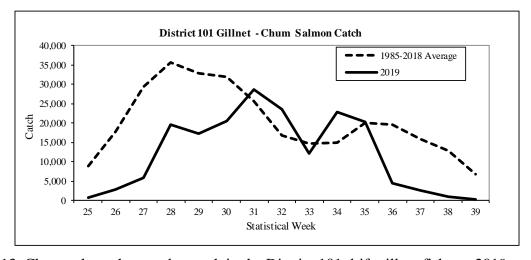


Figure 13. Chum salmon harvest by week in the District 101 drift gillnet fishery, 2019.

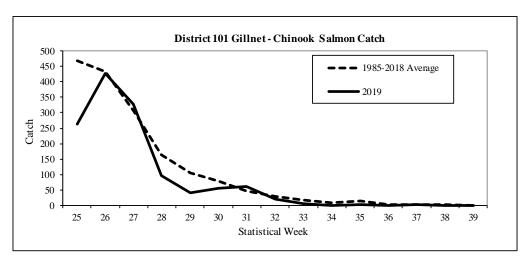


Figure 14. Chinook salmon harvest by week in the District 101 drift gillnet fishery, 2019.

Pink, Sockeye, and Chum Salmon Escapements

Escapements of pink salmon were generally strong in southern Southeast Alaska and poor to average throughout the northern half of the region. The total 2019 Southeast Alaska pink salmon escapement index of 8.81 million index fish ranked 33rd since 1960. Biological escapement goals were met in the Southern Southeast and Northern Southeast Outside subregions, but escapement to the Northern Southeast Inside Subregion was below goal in 2019 (Table 5). On a finer scale, escapements were within or above management targets for 9 of 15 districts in the region and for 27 of the 46 pink salmon stock groups in Southeast Alaska. The Southern Southeast Subregion includes all of the area from Sumner Strait south to Dixon Entrance (Districts 101–108). The escapement index value of 5.63 million was within the escapement goal range of 3.0 to 8.0 million index fish. The pink salmon harvest of 18.0 million in the Southern Southeast Subregion was below the recent 10-year average of 20 million fish. The overall Southeast Alaska pink salmon harvest of 21.1 million fish was approximately 58% of the 2009–2018 average of 36.1 million.

Table 5. Southeast Alaska 2019 pink salmon escapement indices and biological escapement goals by subregion (in millions).

	2019 Pink	Biological Escapem	ent Goal
Subregion	Salmon Index	Lower Bound	Upper Bound
Southern Southeast	5.63	3.0	8.0
Northern Southeast Inside	1.65	2.5	6.0
Northern Southeast Outside	1.53	0.75	2.50
Total	8.81		

Sockeye salmon runs throughout Southeast Alaska were mixed in 2019, and escapement targets were met for 10 of the 12 sockeye salmon systems with formal escapement goals. Sockeye runs were very good for many northern stocks but were generally poor in southern Southeast Alaska. The Hugh Smith Lake adult sockeye salmon escapement was 2,040, which was well below the optimal escapement goal range of 8,000 to 18,000 adult sockeye salmon. Based on the expanded peak foot survey count, the escapement of sockeye salmon into McDonald Lake was only 24,200 fish, which was below the sustainable escapement goal range of 55,000 to 120,000.

For summer-run chum salmon, lower bound sustainable escapement goals were met for all three subregions in Southeast Alaska. Runs are divided into summer and fall stocks. The Southern Southeast summer-run chum salmon stock group is composed of an aggregate of 15 summer-run chum salmon streams on the inner islands and mainland of southern Southeast Alaska, from Sumner Strait south to Dixon entrance, with a sustainable escapement goal of 62,000 index spawners (based on the aggregate peak survey to all 15 streams). Summer chum salmon escapements were near or above average at most index streams in southern Southeast Alaska, and the index of 105,000 in 2019 was well above the escapement goal (Figure 15).

Cholmondeley Sound is the only area in southern Southeast Alaska with a formal escapement goal for fall chum salmon. Fall chum salmon runs are monitored in Cholmondeley Sound through aerial surveys at Disappearance and Lagoon creeks. The escapement index of 20,000 was below the lower bound of the sustainable escapement goal range of 30,000 to 48,000 index spawners (based on the aggregate peak survey to both streams; Figure 16).

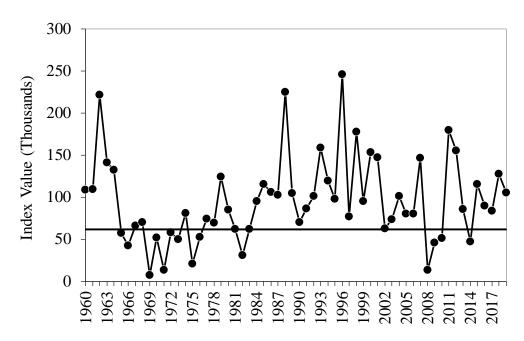


Figure 15. Observed escapement index value by year (solid circles) and the sustainable escapement goal threshold of 62,000 index spawners (horizontal line) for wild summer-run chum salmon in the Southern Southeast Subregion, 1960–2019.

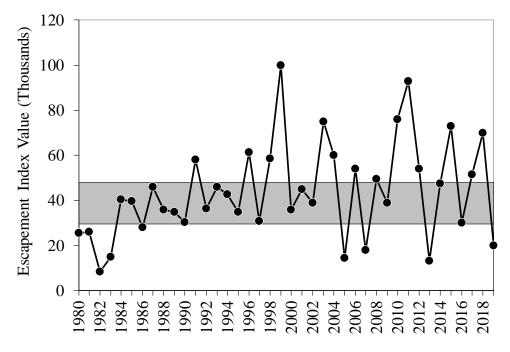


Figure 16. Observed escapement index value by year (solid circles) and the sustainable escapement goal range of 30,000 to 48,000 index spawners (shaded area) for Cholmondeley Sound fall-run chum salmon, 1980–2019.

TRANSBOUNDARY AREA FISHERIES

Stikine River Area Fisheries

The 2019 preseason forecast for large Chinook salmon returning to the Stikine River was approximately 8,250 fish, which did not allow for directed Chinook salmon fisheries in District 108. The standard mark-recapture program was not operated this year due to the low forecasted run and the desire by both countries to reduce mortality associated with the program. Inseason estimates produced by the Stikine Chinook Management Model (SCMM) indicated an escapement of 13,600 fish, which is near the lower end of the goal range of 14,000 fish. The final run size was estimated to be 14,400 fish.

The 2019 preseason forecast for sockeye salmon returning to the Stikine River was 90,000 fish, which was well below the recent 10-year average of 153,000 fish. The 2019 forecast included approximately 29,000 wild Tahltan (32%), 36,000 enhanced Tahltan (40%), and 24,000 mainstem (27%) sockeye salmon. During the first half of the sockeye salmon management period, fishing periods in District 108, and to a lesser extent in District 106, were determined by the inseason abundance estimate of the Tahltan Lake run. Management actions during the second half of the sockeye fishery became focused on the mainstem component of the Stikine River sockeye salmon run in District 8, while returns to local area systems were the focus in District 6. Typically, Tahltan Lake sockeye salmon stocks exhibit peak run timing in District 106 and 108 fisheries during statistical week 26 (June 24–June 30). During an average Tahltan Lake run, significant numbers of sockeye salmon could be present as early as statistical week 24 (June 10–16) and as late as statistical week 31 (July 29–August 4). The actual 2019 runs of local area sockeye salmon stocks were average to below average.

Due to the poor performance of Chinook salmon stocks in SE Alaska, restrictions were implemented in the Districts 106 and 108 gillnet fisheries to conserve Chinook salmon. In District 106, the initial opening was delayed by one week and a six-inch maximum mesh restriction was in place for the first three openings. In District 108, the initial opening was delayed until week 26. Additionally, time, area, and mesh restrictions were implemented through statistical week 29 (July 14–July 20). Estimated harvest of large Stikine River Chinook salmon by the District 108 drift gillnet fishery during the sockeye salmon directed fishery period (weeks 27–29) was 113 fish based on GSI. The District 108 Spring Troll hatchery access fishery was closed for 2019. Commercial trolling remained closed to Chinook salmon retention in District 108 until the second opening of the Summer Troll fishery. U.S. harvest of large Stikine River Chinook salmon in all District 108 fisheries was estimated to be 134 fish; well below the U.S. base level catch (BLC) of 3,400 fish.

The District 106 drift gillnet sockeye salmon fishery opened Sunday, June 16 (week 25) and the District 108 drift gillnet fishery opened Sunday, June 23 (week 26). The initial openings in District 106 were limited to two days in week 25 and 26. The following week, both districts were opened for three days with mesh and area restrictions in place. The mesh restriction was lifted from District 6 in week 28, but mesh and area restrictions continued to be in place for District 108. Given the below average forecast of sockeye salmon runs returning to the Stikine River and local area stocks, fishing time was limited to two days for most weeks. Fishing time peaked with three days in week 27 to harvest the surplus Tahltan Lake component of the Stikine River sockeye salmon run. By week 29, it became apparent that the mainstem portion of the Stikine River sockeye run was coming in below average and open time in District 108 was limited to

two days before closing for two weeks during weeks 30 and 31. Open time in District 106 also experienced weekly reductions and was limited to two days per week in weeks 29 through 31 for McDonald Lake sockeye conservation (Tables 6 and 7). The preliminary postseason assessment for Stikine River sockeye salmon was 85,500 fish and included 26,900 wild Tahltan (23%), 29,800 enhanced Tahltan (24%), and 28,800 Mainstem (41%) fish.

Districts 106 and 108 were managed based on pink salmon abundance during the month of August and three or four-day openings occurred in weeks 32 through 34 (Figures 17 and 24). In late August, management focus switched to coho salmon and the fisheries continued to be open for two to four days weekly through the remainder of the season. The number of boats participating in the District 106 fishery was below average early and late in the season, and slightly above average from weeks 33 to 36 (Figure 18). The seasonal number of permits fished was 87% of average (Table 6). The number of boats participating in the District 108 fishery was below average in nearly all weeks of the fishery and the 78 permits fished was 60% of the average of 130 permits (Figure 25; Table 7).

During the 2019 season, 424,495 pink salmon, 23,844 sockeye salmon, 113,152 chum salmon, 59,208 coho salmon, and 1,073 Chinook salmon were harvested in the District 106 drift gillnet fishery (Table 6). Chinook salmon harvests were below average from mid-June through late August, but were well above average in week 36 (Figure 19); the harvest was comprised of 43% Alaska hatchery origin fish. Sockeye salmon harvests were below average all season (Figure 20), and the total sockeye salmon harvest of 23,844 fish was 29% of the recent 10-year average; 4,300 were estimated to be of Stikine River origin. Harvests of coho salmon were also below average in most weeks of the season and the overall harvest of 59,208 coho salmon was 41% of the recent 10-year average of 145,300 fish (Figure 21). Pink salmon harvests were above average most of the season (Figure 22), and the overall harvest of 424,495 fish was 139% of the recent 10-year average. Chum salmon harvests were well below average through mid-July, above average from mid-to-late August, and then dropped back below average throughout the remainder of the season. The overall harvest of 113,152 chum salmon was 70% of average (Figure 23).

During the 2019 season, 10,884 pink salmon, 6,591 sockeye salmon, 50,653 chum salmon, 9,478 coho salmon, and 4,253 Chinook salmon were harvested in the District 108 drift gillnet fishery (Table 7). The harvest of Chinook salmon was well below average in the first week of the fishery in week 26, well above average in week 27, and was near or below average until late July (Figure 26). An estimated 134 Stikine River large Chinook salmon were harvested in District 108 from weeks 25 through 29 by subsistence, sport, troll, and drift gillnet fisheries. District 108 gill net sockeye salmon harvests were below average throughout the season (Figure 27) and the harvest of 6,591 fish was only 22% of the recent 10-year average. An estimated 3,700 fish, or 57% of the harvest, were estimated to be Stikine River sockeye salmon. The overall coho salmon harvest of 9,478 fish was also well below the recent 10-year average of 26,300 fish (Table 7, Figure 28). Pink salmon harvests were below average throughout the season and the overall harvest was 24% of the recent 10-year average (Figure 29). The overall harvest of 50,653 chum salmon was 34% of the recent 10-year average (Figure 30).

Table 6. Weekly salmon harvest in the Alaskan District 106 commercial drift gillnet fisheries, 2019.

									Boat
Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Days
25	16-Jun	66	309	191	542	147	32	2	64
26	23-Jun	109	1,028	376	4,546	1,349	40	2	80
27	30-Jun	191	3,157	1,054	14,202	8,232	42	3	126
28	7-Jul	75	2,933	1,437	17,856	6,350	42	2	84
29	14-Jul	125	3,399	1,726	42,209	8,927	47	2	94
30	21-Jul	60	3,045	1,056	48,534	9,187	47	2	94
31	28-Jul	54	3,284	2,036	45,276	14,046	48	2	96
32	4-Aug	72	2,522	1,912	65,957	10,640	63	3	189
33	11-Aug	62	2,417	7,429	111,893	11,583	74	4	296
34	18-Aug	15	1,380	7,027	50,430	18,130	65	4	260
35	25-Aug	29	266	8,866	17,647	13,255	75	3	225
36	1-Sep	151	86	7,704	4,631	6,567	80	3	240
37	8-Sep	28	18	8,485	736	3,340	70	2	140
38	15-Sep	16	0	5,766	34	1,048	46	3	138
39	22-Sep	10	0	2,743	2	255	13	3	39
40-41	29-Sep	10	0	1,400	0	96	18	5	90
Total		1,073	23,844	59,208	424,495	113,152	131	45	2,254
2009-201	8 Average	2,335	82,240	145,292	304,358	162,255	150	47	2,751
2019 as %	6 of Average	46%	29%	41%	139%	70%	87%	100%	82%

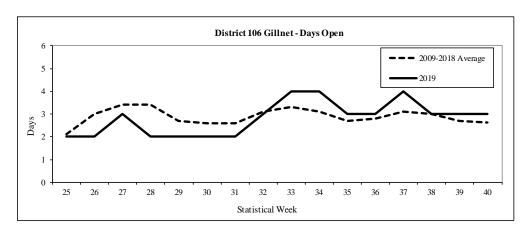


Figure 17. Days open by week in the District 106 drift gillnet fishery, 2019.

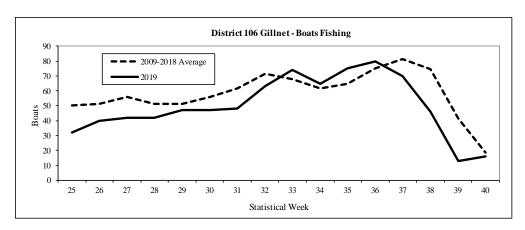


Figure 18. Number of boats fishing by week in the District 106 drift gillnet fishery, 2019.

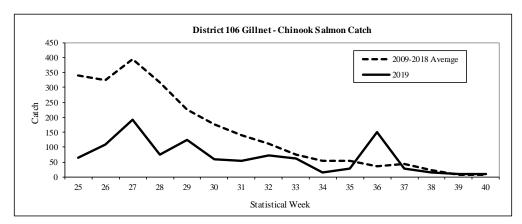


Figure 19. Chinook salmon harvest by week in the District 106 drift gillnet fishery, 2019.

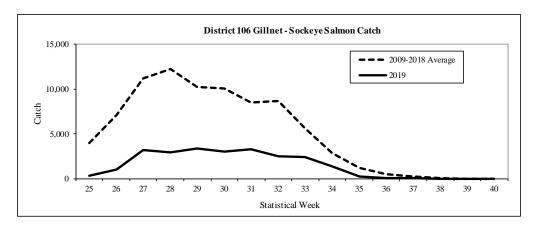


Figure 20. Sockeye salmon harvest by week in the District 106 drift gillnet fishery, 2019.

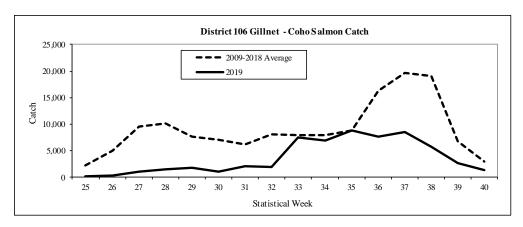


Figure 21. Coho salmon harvest by week in the District 106 drift gillnet fishery, 2019.

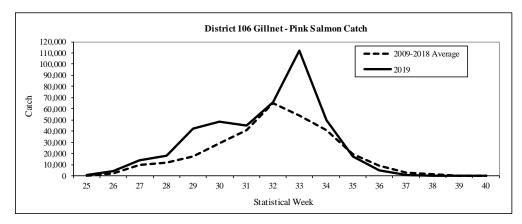


Figure 22. Pink salmon harvest by week in the District 106 drift gillnet fishery, 2019.

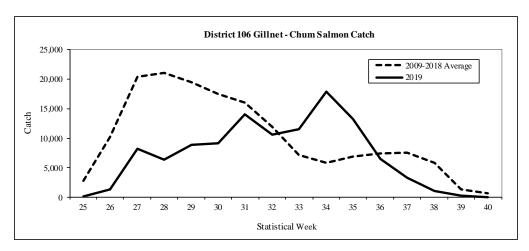


Figure 23. Chum salmon harvest by week in the District 106 drift gillnet fishery, 2019.

Table 7. Weekly salmon harvest and effort in the Alaskan District 108 traditional commercial drift gillnet fishery, 2019.

									Boat
Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Days
26	23-Jun	139	1,329	9	26	68	12	2	24
27	30-Jun	2,609	2,001	41	258	985	35	3	105
28	7-Jul	792	1,219	37	602	3,150	28	2	56
29	14-Jul	536	1,232	76	1,843	3,851	20	2	40
32	4-Aug	110	566	597	4,864	26,639	51	3	153
33	11-Aug	44	156	1,073	1,679	9,690	31	4	120
34	18-Aug	10	69	1,863	1,126	5,382	30	4	120
35	25-Aug	2	15	1,297	444	745	13	3	39
36	1-Sep	1	1	549	35	28	9	3	27
37	8-Sep	9	3	1,792	6	33	14	2	28
38	15-Sep	1	0	1,563	1	74	13	3	39
39-41	22-Sep	0	0	581	0	8	8	8	24
Total		4,253	6,591	9,478	10,884	50,653	78	39	775
2009-2018	3 Average	6,771	29,636	26,292	45,272	149,031	130	49	1,735
2019 as %	of Average	63%	22%	36%	24%	34%	60%	80%	45%

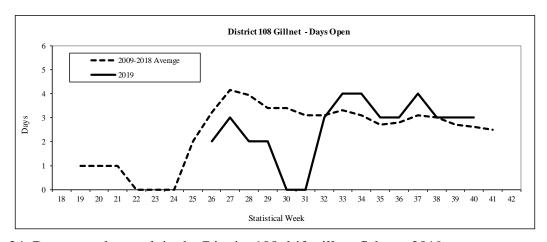


Figure 24. Days open by week in the District 108 drift gillnet fishery, 2019.

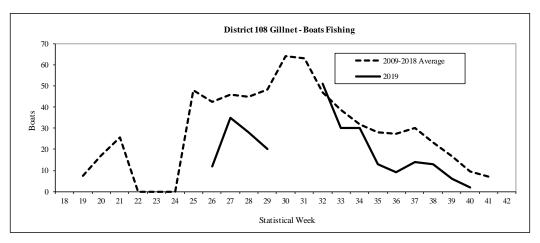


Figure 25. Number of boats fishing by week in the District 108 drift gillnet fishery, 2019.

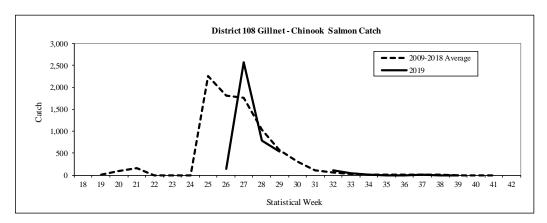


Figure 26. Chinook salmon harvest by week in the District 108 drift gillnet fishery, 2019.

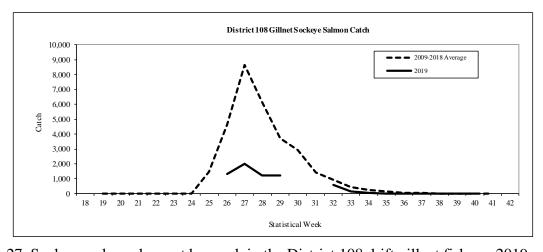


Figure 27. Sockeye salmon harvest by week in the District 108 drift gillnet fishery, 2019.

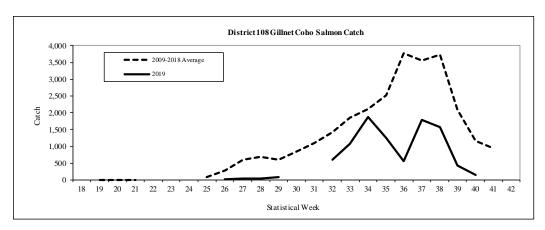


Figure 28. Coho salmon harvest by week in the District 108 drift gillnet fishery, 2019.

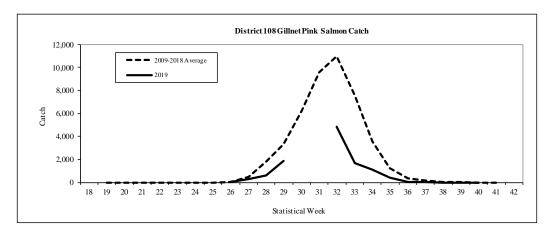


Figure 29. Pink salmon harvest by week in the District 108 drift gillnet fishery, 2019.

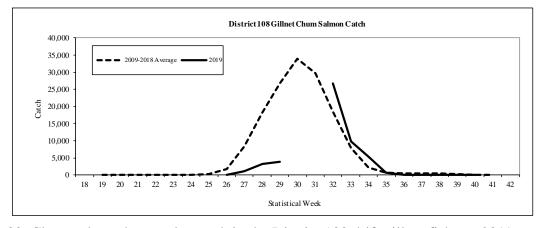


Figure 30. Chum salmon harvest by week in the District 108 drift gillnet fishery, 2019.

Taku River Area Fisheries

The traditional drift gillnet fishery in District 111 targets salmon stocks bound for the transboundary Taku River. This fishery is managed for Chinook salmon from week 18 to week 24 when there are sufficient fish surplus to escapement needs to provide for a fishery. From week

25 to week 33 the fishery is managed for Taku River sockeye salmon, and from week 34 to week 42 for Taku River coho salmon. Also harvested in this fishery are salmon bound for Stephens Passage and Port Snettisham streams as well as enhanced Chinook, sockeye, coho and chum salmon from Douglas Island Pink and Chum, Inc. (DIPAC) hatchery releases. The traditional fishery does not include harvests from the Speel Arm Special Harvest Area (SHA) inside Port Snettisham.

The escapement goal range for Taku River large Chinook salmon is 19,000 to 36,000 fish with a point goal of 25,500 fish. In years of high abundance, directed Chinook salmon fisheries can be implemented to harvest fish in excess of escapement needs. The 2019 preseason terminal run forecast for the Taku River of 9,050 large Chinook salmon did not allow for any directed Chinook salmon fisheries in District 111 and significant restrictions in time, area, and gear were implemented in the first three directed sockeye salmon openings (weeks 25–27) to minimize Chinook salmon harvest.

The traditional spawning objective for Taku River sockeye salmon was a range of 71,000 to 80,000 fish, with a point goal of 75,000 fish. This was established in 1985 based on the professional judgement of U.S. and Canadian biologists during initial PST negotiations to be used until a scientifically based goal was developed. Historically, the total allowable catch associated with this goal has been based on an inriver run size estimate inflated by not accounting for tag dropout rates that more recent radio telemetry studies have documented in the mark/recapture experiment. Concurrent with the adoption of an adjusted inriver run estimate to account for these dropouts, an interim spawning objective for the 2019 season was agreed to by the TBR Panel in February of 2019. This arrangement incorporated a 22% adjustment to the inseason inriver run estimates, and a corresponding interim spawning objective range of 55,000 to 62,000 fish with a management target of 59,000 fish. A bilaterally approved MSY goal for Taku River sockeye salmon will be in place prior to the 2020 fishing season. The original 2019 Taku River wild sockeye salmon terminal run forecast of 154,000 fish was based on Canadian stock-recruit and sibling forecasts was below the average of 180,000 fish. For early season management purposes before an inseason estimate was available, this forecast was adjusted by the observed dropout rate to 120,000 fish. DIPAC forecasted 230,000 enhanced sockeye salmon returning through District 111 waters to Snettisham Hatchery.

An escapement goal range of 50,000 to 90,000 Taku River coho salmon with a point goal of 70,000 fish was adopted in early 2015. New harvest sharing provisions between the U.S. District 111 drift gillnet fishery and the Canada inriver fisheries are in place, specified in the PST, and the U.S. management intent in 2019 was to achieve the AC and spawning objective. The 2019 preseason Taku River forecast was for a below average terminal run of 73,000 coho salmon, and DIPAC forecast a run of 62,000 enhanced coho salmon from releases in Gastineau Channel. DIPAC forecasted runs totaling 1,400,000 enhanced chum salmon to Gastineau Channel and Limestone Inlet, which was near the recent average.

The traditional drift gillnet fishery in District 111 began on Sunday, June 16, 2019 (week 25). The initial drift gillnet opening of the season in District 111 was for two days, with a significant area restriction, six inch maximum mesh size restriction, and night closures in place, intended to minimize harvest of Taku River Chinook salmon. Effort for the opening was 35 boats, which was above the ten-year average of 28 boats. Only 191 sockeye salmon were harvested during the opening, and the chum salmon harvest of 628 fish was only 9% of the average week 25 harvest

for the district (Figures 34 and 37). A total of 83 Chinook salmon were harvested, which was well below average for week 25 (Figure 33).

From late June through late July (weeks 26–31) effort in the District 111 drift gillnet fishery was generally below average, with a peak of 108 boats fishing in week 31 (Figure 32). From early August through early October (weeks 32–41), overall effort in the fishery was well below average in most weeks (Figure 32). Harvests of sockeye salmon were near or above average through early August, but then dropped to below average for the rest of the season (Figure 34). Weekly chum salmon catches were well below average and approximately 245,000 fish were harvested from mid-June to mid-August (Figure 37). The vast majority of the summer-run chum salmon harvest in District 111 consists of DIPAC hatchery fish returning to release sites in Gastineau Channel and Limestone Inlet. The Chinook salmon harvest of 1,201 fish was near average for years with no directed Chinook salmon fishery (Figure 33). Pink salmon harvests built to above average in the weeks prior to mid-July, then dropped below average for the remainder of the season. The pink salmon harvest of 69,137 fish was only 47% of average (Figure 36). The overall coho salmon harvest of 23,235 fish was below average and the peak weekly harvest of 7,048 fish occurred in week 37 (Figure 35). Fall chum salmon harvests were well below average from week 34 through 40 (Figure 37).

A number of Chinook salmon stocks are known to contribute to the Juneau area sport fishery, including those from the Taku, Chilkat, and King Salmon rivers, and local hatchery stocks, but the major contributor of mature wild fish is believed to be the Taku River. Non-retention of Chinook salmon in District 111, 112, 115, and parts of District 113 and 114, from April 1 through June 14, resulted in minimal harvest of wild fish in the sport fishery. The GSI-based District 111 harvest estimates of Taku River large Chinook salmon during the accounting period is 124 fish in the drift gillnet fishery, 94 fish in the sport fishery, and an estimated 10 fish in the personal use fishery, for a total of 228 fish. Harvests of Taku River large Chinook salmon in these fisheries from week 30 onwards were minimal and resulted in a total harvest well below the U.S. base level catch of 3,500 fish. The preliminary escapement estimate of Taku River large Chinook salmon is approximately 10,000 to 12,000 fish, which is well below the escapement goal range of 19,000 to 36,000 fish.

The 2019 traditional District 111 sockeye salmon harvest of 95,421 fish was 97% of average. Peak catches of sockeye salmon occurred in weeks 29 through 31 (mid-July to early August; Figure 34). The Speel Arm SHA was opened from week 32 to 37 and 9,605 sockeye salmon were harvested in the common property fishery. The lower bound of the Speel Lake sustainable escapement goal range of 4,000 to 9,000 fish was reached with 6,440 fish counted through the weir through September 20. DIPAC sockeye salmon returning to the Snettisham Hatchery contributed a minimum of 21,000 fish to the traditional District 111 harvest. The preliminary escapement estimate of Taku River sockeye salmon is 77,000 fish, which was above the interim escapement goal range of 55,000 to 62,000 fish.

The 2019 traditional District 111 coho salmon harvest of 23,235 fish was 64% of the recent tenyear average (Figure 35). Approximately 88% of the coho salmon were harvested in Taku Inlet, which was above the ten-year average of 82%, and 12% were harvested from Stephens Passage and Port Snettisham. Coho salmon stocks harvested in District 111 include runs to the Taku River, Port Snettisham, Stephens Passage, and local Juneau area streams as well as Alaskan hatcheries. This was the fifth year of full production for DIPAC's revitalized enhanced coho salmon program. Alaska hatchery (nearly entirely DIPAC) coho salmon first appeared in the District 111 harvest in week 32, and comprised substantial proportions of the harvest each remaining week of the fishery. Alaska hatchery coho salmon contributed 35% of the 2019 District 111 traditional drift gillnet harvest. The preliminary escapement estimate of Taku River coho salmon is 82,700 fish, which was towards the upper end of the escapement goal range of 50,000 to 90,000 fish.

The 2019 District 111 traditional pink salmon harvest of 69,137 fish was 47% of average (Figure 36). Pink salmon escapements were very poor in the Northern Southeast Inside subregion of Southeast Alaska and the District 111 escapement index was approximately 37% of the lower end of the management target range. The 2019 District 111 traditional fishery chum salmon harvest of 245,962 fish was 41% of average and was comprised almost entirely of summer run fish (Figure 37). The summer chum salmon run continues through mid-August (week 33) and is mostly comprised of domestic hatchery fish and small numbers of wild stocks. Chum salmon returning to DIPAC release sites in Gastineau Channel and Limestone Inlet contributed a major portion of the harvest, but quantitative contribution estimates are not available. Approximately 54% of the District 111 chum harvest was taken in Taku Inlet, and 47% in Stephens Passage. The harvest of 1,181 fall-run chum salmon (i.e. chum salmon caught after week 33) was 42% of average. Most of these fall-run chum salmon are probably wild fish of Taku and Whiting River origin.

Table 8. Weekly salmon harvest in the Alaskan District 111 traditional commercial drift gillnet fishery, 2019^a.

									Boat
Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Days
25	16-Jun	83	191	1	2	628	35	2	70
26	23-Jun	133	988	6	102	2,530	41	2	82
27	30-Jun	304	2,363	39	2,328	17,677	59	2	118
28	7-Jul	272	7,914	75	20,125	46,322	99	3	297
29	14-Jul	144	17,694	155	17,752	84,049	87	4	348
30	21-Jul	117	27,574	637	10,133	66,058	96	4	384
31	28-Jul	92	21,400	1,900	7,407	22,397	108	4	432
32	4-Aug	31	9,888	1,105	6,505	3,911	56	5	280
33	12-Aug	14	5,530	1,206	3,775	1,209	23	4	92
34	18-Aug	2	1,705	1,941	948	542	19	3	57
35	26-Aug	1	113	2,563	59	292	22	2	44
36	1-Sep	5	54	2,120	1	129	20	3	60
37	8-Sep	2	7	7,048	0	147	25	4	100
38	15-Sep	1	0	4,041	0	67	26	5	130
39	22-Sep	0	0	264	0	4	8	5	40
40	27-Sep	0	0	134	0	0	2	5	10
41	10/6	0	0	0	0	0	0	5	0
Total		1,201	95,421	23,235	69,137	245,962	183	62	2,544
2009–2018	Average	1,836	98,333	36,418	145,906	598,379	195	51	2,947
2019 as % of	f Average	65%	97%	64%	47%	41%	94%	122%	86%

^a There was no directed fishery for Chinook salmon in District 111 in 2019 due to a low Taku River preseason abundance forecast.

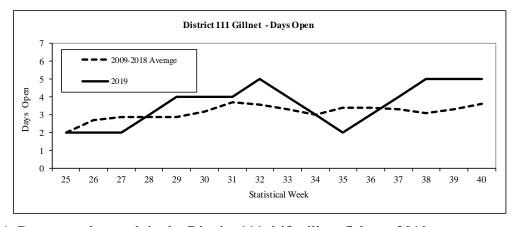


Figure 31. Days open by week in the District 111 drift gillnet fishery, 2019.

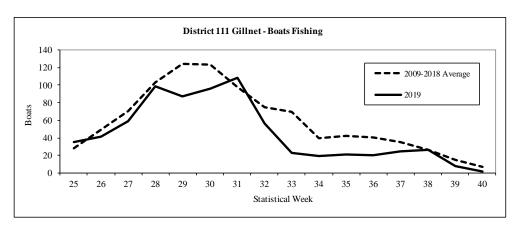


Figure 32. Number of boats fishing by week in the District 111 drift gillnet fishery, 2019.

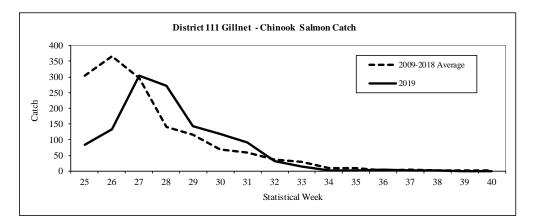


Figure 33. Chinook salmon harvest by week in the District 111 drift gillnet fishery, 2019.

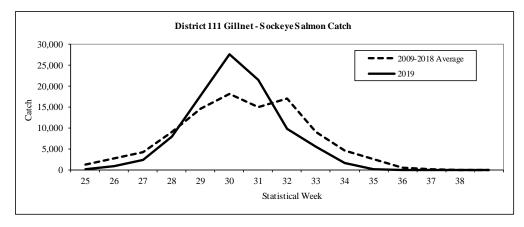


Figure 34. Sockeye salmon harvest by week in the District 111 drift gillnet fishery, 2019.

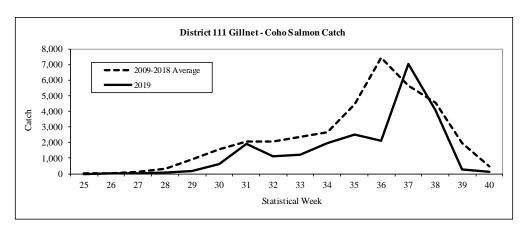


Figure 35. Coho salmon harvest by week in the District 111 drift gillnet fishery, 2019.

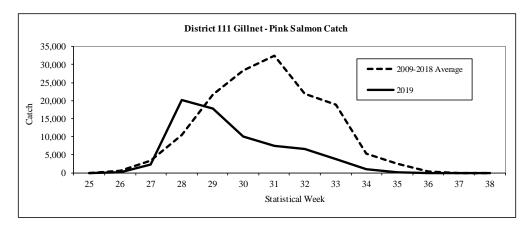


Figure 36. Pink salmon harvest by week in the District 111 drift gillnet fishery, 2019.

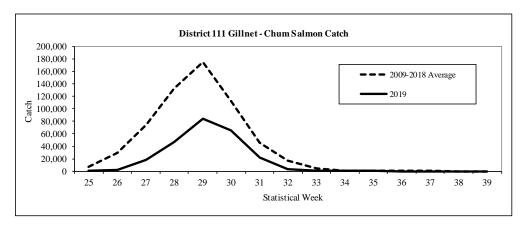


Figure 37. Chum salmon harvest by week in the District 111 drift gillnet fishery, 2019.

Transboundary River Joint Enhancement

The transport of sockeye salmon fry from the Snettisham Hatchery facility back to the Canadian lakes was complete on June 14, 2019. Approximately 6.32 million fry were released in Tahltan and Tatsamenie lakes in Canada. The overall green egg to fry survival for brood year (BY) 2018 releases was 79% (Table 9). After transporting BY18 fry back to their respective lakes, all TBR modules, incubators, and short-term fry rearing containers were broken down, cleaned, and disinfected prior to setting up to receive green eggs from BY19 egg-takes.

Brood year 2019 egg-takes began on August 31st at Tahltan Lake, September 4th at Trapper Lake, and September 17th at Tatsamenie Lake. An estimated total of 7.5 million green eggs were collected from the three donor lakes. Tahltan Lake egg-takes were completed on September 25th after collecting an estimated 4.5 million eggs in 10 egg lots. Tatsamenie Lake egg-takes were completed on October 12th after collecting 2.6 million eggs in 6 lots. Trapper Lake egg-takes were completed on September 6th after collecting 429,000 eggs in 2 lots. DFO contractors collected adult sockeye salmon tissues on the spawning grounds and shipped them to the ADF&G Juneau Fish Pathology laboratory via Snettisham Hatchery per the treaty agreement.

Table 9. Summary of numbers and survival rates of brood year 2018 sockeye salmon fry released May and June 2019. Fish were raised at Snettisham Hatchery as part of the Transboundary River Salmon Enhancement Project.

		Number of	Survival rate	Survival rate	Number
Brood stock	Release site	trips	to eyed stage	to release	released
Tahltan	Tahltan Lk	4	93.8%	82.5%	1,858,000
Tatsamenie	Upper Tatsamenie Lk	3	81.3%	75.5%	1,389,600
Tatsamenie	Upper Tatsamenie Lk	4	81.6%	79.9%	378,700
	Lk, Extended Rearing				
	Average/Totals	11	87.5%	79.4%	3,618,500

During the 2019 season, the ADF&G Thermal Mark Lab processed 10,652 sockeye salmon otoliths collected by ADF&G and DFO staff as part of the U.S./Canada fry-planting evaluation program. These collections came from commercial and test fisheries in both U.S. and Canadian waters on the Taku and Stikine Rivers over a 13-week period. The laboratory provided estimates on hatchery contributions for 58 distinct sample collections. Estimates of the percentage of hatchery fish contributed to commercial fishery catches were provided to ADF&G and DFO fishery managers 24 to 48 hours after samples arrived at the lab.

Alsek River Area Fisheries

Although harvest sharing arrangements of Alsek salmon stocks between Canada and the U.S. have not been specified, Annex IV of the Pacific Salmon Treaty calls for the development and implementation of cooperative abundance-based management plans and programs for Alsek River Chinook and sockeye salmon. Escapement goals are in place for Chinook and sockeye salmon stocks spawning at the Klukshu River, a tributary that flows into the Tatshenshini River, approximately 80 km northeast of its junction with the Alsek River. The principal escapement-monitoring tool for Chinook, sockeye, and coho salmon stocks on the Alsek River is the Klukshu River weir, operated by Fisheries and Oceans Canada in cooperation with the Champagne-Aishihik First Nation since 1976. In 2013, Canadian and U.S. biologists adopted a new biological escapement goal range of 7,500 to 11,000 sockeye salmon through the Klukshu River weir. The current biological escapement goal range for Klukshu River Chinook salmon, adopted in February 2013, is a range of 800 to 1,200 fish.

ADF&G manages the Alsek River commercial set gillnet fishery to achieve the agreed upon escapement goal ranges. Time and area openings are adjusted by monitoring fishery performance data and comparing it to historical CPUE. The duration of weekly fishing periods is based on fishery performance data (CPUE) and Klukshu River weir data. Historically, gillnets have often been restricted to a maximum mesh size of 6 inches through July 1 to minimize Chinook salmon

harvest. The U.S. commercial set gillnet sockeye salmon fishery was delayed two weeks in 2019 and a 6-inch maximum mesh restriction was in effect through July 18 as a Chinook salmon conservation measure.

Preseason expectations were for below average Chinook and sockeye salmon runs in 2019. The overall Alsek drainage sockeye salmon run was expected to be approximately 45,000 fish; which was near the recent 10-year average run size of approximately 46,700 sockeye salmon. The preseason outlook for 2019 was based on a predicted run of 10,400 Klukshu River sockeye salmon derived from a Klukshu River stock-recruitment model and an assumed Klukshu River contribution rate of 23% to the total run (based on mark-recapture results from 2000–2004 and run size estimates using GSI from 2005–2006 and 2011–2014). Principal contributing brood years for the 2019 run were 2014 and 2015. The Klukshu River escapements in 2014 and 2015 were 12,100 and 11,400 sockeye salmon respectively; both below the 10-year average of 14,700 fish.

The 2019 Alsek River set gillnet fishery opened Sunday June 16 (week 25). The total number of individual permits fished during the season was 12, which was below the 2009–2018 average of 16 permits. The commercial fishery was opened for a total of 40 days which was near the tenyear average of 46 days. The overall effort in boat-days was 58% of the average due to low or no effort in many weeks late in the season (Table 10). Harvests of Chinook salmon through late June were below the recent ten-year average (Table 10). Harvests of sockeye salmon were near average from weeks 26 to 29 and then dropped to well below average from week 30 on. The total harvest of 9,787 fish was 71% of the 2009–2018 average of 13,820 fish (Table 10). There was little effort after late July. In the past several years there has been reduced fishing effort during the coho salmon season due to economic struggles and lack of pilots to transport fish to town. In 2019, only 1 coho salmon was harvested (Table 10).

The Klukshu River weir count of 19,073 sockeye salmon was above the upper bound of the 7,500 to 11,000 fish escapement goal range. The count of 4,274 early run sockeye salmon (count through August 15) and the late run count of 14,799 were both above average. The Alsek River drainage estimate of 114,000 fish is above the escapement goal of 24,000 to 33,500 sockeye salmon. The Klukshu River weir count of 1,589 Chinook salmon was above the upper bound of the 800 to 1,200 fish escapement goal range. Alsek River drainage escapement estimate of 3,400 to 6,400 Chinook salmon encompasses the escapement goal range of 3,500 to 5,300 fish.

Table 10. Weekly fishing effort and salmon harvest for Alsek River, 2019.

						_		Effort	
Statistical	Start			Catch					Boat
Week	Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Days
25	16-Jun	26	509	0	0	0	11	1	11
26	23-Jun	36	2,108	0	0	0	11	1	16
27	30-Jun	10	1,613	0	0	0	9	2	18
28	7-Jul	5	2,739	1	0	0	10	2	20
29	14-Jul	2	2,422	0	0	0	8	2	16
30-32 ^a	21-Jul	0	396	0	0	0	10	5	14
33-40 ^b	11-Aug	0	0	0	0	0	0	27	0
Total		79	9,787	1	0	0	12	40	95
2009-2018 A	vg.	406	13,820	829	0	6	16	46	165
2019 as % of	f Avg.	19%	71%	0%		0%	75%	87%	58%

^a Includes weeks with fewer than three permits, confidential information so data combined in catch table.

SOUTHEAST ALASKA CHINOOK SALMON FISHERY

All Gear Harvest

The Southeast Alaska/Yakutat (SEAK) Chinook salmon fishery is managed to stay within the annual all-gear PST total allowable catch limit determined by the SEAK early winter District 113 Troll fishery catch-per-unit-effort (CPUE) metric estimated from data collected in statistical weeks 41–48. Management of the 2019 SEAK Chinook salmon fishery was configured based on a preseason winter power troll CPUE metric of 3.38 for the 2019 fishing season. This CPUE translated into an all-gear PST allowable catch limit of 140,323 Treaty Chinook salmon. Management plans established by the Alaska Board of Fisheries allocate the CPUE-based Treaty catch limit among gear types and prescribe management measures for both commercial and sport fisheries [5AAC 29.060(b) and 47.055].

During the 2018 Alaska Board of Fisheries meeting held in Sitka, action plans for Chilkat, King Salmon, and Unuk river stocks of Chinook salmon were adopted, giving the ADF&G direction, through emergency order authority, to conserve these stocks along with other wild SEAK and TBR stocks. Therefore, management actions were taken by all gear types in 2019 to lower calendar year exploitation rates and pass as many SEAK and TBR Chinook stocks to escapement as possible. The winter troll fishery closed early on March 15, spring troll fisheries were restricted to near terminal areas or areas on the outside coast, and in the summer troll fishery the primary corridors and waters directly adjacent to the terminus of the Unuk, Chilkat and Stikine rivers were closed to the retention of Chinook salmon in the troll fishery. Retention of Chinook salmon in the purse seine fishery was delayed until July 20. The purse seine fishery had three 15hour and one 39-hour period of Chinook retention then went back to Chinook non-retention for the remainder of the season after August 1. Gillnet fisheries in districts 6 and 8 (near the mouth of the Stikine river) were delayed to the latter part of June. Gillnet fisheries in districts 11 and 15 (near the mouths of the Taku and Chilkat rivers) were subject to time and area restrictions through mid-July, with gear restrictions in place through early July. Openings in terminal harvest areas were delayed into June. Similarly, sport fisheries outside of terminal areas were delayed until mid-June or early July and were closed to non-residents during the first half of August.

^b Weeks 33-40 opened to fishing but not fished.

The total Chinook salmon harvest by all SEAK commercial fisheries was 145,396 fish and the sport fish harvest was 29,700, for a total all-gear harvest of 175,096 (Table 11). This includes an all-gear harvest of 1,309 in the Annette Island Metlakatla Indian Community tribal fishery that is not directly managed by the State of Alaska. The all-gear harvest of Treaty Chinook salmon was 140,307 fish including 1,053 fish from the Metlakatla Indian Community tribal fishery (Table 12).

Table 11. Estimated all-gear Chinook salmon harvests in 2019.

Coon	Total	AK Hatchery	Wild Terminal	Alaska Hatchery	Treaty
Gear	Harvest	Harvest	Exclusion	Addon	Harvest
Troll	109,364	8,841	211	5,909	103,067
Sport	29,700	6,600	0	5,104	24,596
Drift Gillnet	14,419	12,773	0	11,377	3,042
Purse Seine	21,367	12,506	0	12,011	9,356
Set Gillnet	246	0	0	0	246
Total Net	36,032	25,280	0	23,387	12,644
Total All Gear	175,096	40,721	211	34,578	140,307

Note: Annette Island Metlakatla Indian Community tribal harvest of 1,309 Chinook salmon are included of which 1,053 were Treaty fish. This includes a total tribal harvest of 736 troll, 385 drift gillnet, 188 purse seine fish of which 599 troll, 306 drift gillnet, and 188 purse seine Treaty fish.

Note: Terminal area harvests are included.

Table 12. Southeast Alaska Chinook salmon all-gear harvests (1987–2019) and deviation from the harvest ceiling limit (1987-1998) and postseason allowable catch (1999-2018). Harvests are in thousands.

			Postseason			
		Add-on and	Target			
	Total	Exclusion	Treaty	Treaty	Deviation	Deviation
Year	Harvest	Harvest	Harvest	Harvest	Number	Percent
1987	282.4	17.1	263.0	265.3	2.3	0.9%
1988	279.3	22.5	263.0	256.8	-6.2	-2.4%
1989	291.0	21.5	263.0	269.5	6.5	2.5%
1990	366.9	45.9	302.0	321.0	19.0	6.3%
1991	359.5	61.5	273.0	298.0	25.0	9.2%
1992	258.8	36.8	243.0	222.0	-21.0	-8.7%
1993	304.1	32.9	263.0	271.2	8.2	3.1%
1994	264.4	29.2	240.0	235.2	-4.8	-2.0%
1995	235.7	58.8		176.9		
1996	236.3	81.3		155.0		
1997	343.0	56.3		286.7		
1998	270.6	27.4	260.0	243.2	-16.8	-6.5%
1999	251.0	52.2	184.2	198.8	14.6	7.9%
2000	263.3	76.8	178.5	186.5	8.0	4.5%
2001	265.7	78.8	250.3	186.9	-63.4	-25.3%
2002	426.5	69.4	371.9	357.1	-14.8	-4.0%
2003	439.4	59.3	439.6	380.2	-59.4	-13.5%
2004	499.3	82.2	418.3	417.0	-1.3	-0.3%
2005	493.2	104.6	387.4	388.6	1.2	0.3%
2006	435.5	75.5	354.5	360.1	5.6	1.6%
2007	404.7	76.4	259.2	328.3	69.1	26.6%
2008	244.3	71.4	152.9	172.9	20.0	13.1%
2009	293.6	65.7	176.0	228.0	52.0	29.5%
2010	284.8	54.1	215.8	230.6	14.8	6.9%
2011	357.4	66.2	283.3	291.2	7.9	2.8%
2012	295.3	52.5	205.1	242.8	37.7	18.4%
2013	257.3	65.9	284.9	191.4	-93.5	-32.8%
2014	492.5	57.3	378.6	435.2	56.6	14.9%
2015	403.3	68.3	337.5	335.0	-2.5	-0.7%
2016	387.0	36.3	288.2	350.7	62.5	21.7%
2017	207.1	31.6	215.8	175.4	-40.4	-18.7%
2018	164.7	37.0	118.7	127.8	9.1	7.6%
2019 ¹	175.1	34.8	*	140.3	*	*

¹ Preliminary.

Troll Fishery

The accounting of Treaty Chinook salmon harvested by trollers begins with the winter fishery and ends with the summer fishery. The winter troll fishery is managed for a guideline harvest level (GHL) of 45,000 non-Alaska hatchery-produced Chinook salmon, with a guideline harvest range of 43,000–47,000 non-Alaska hatchery-produced fish, plus the number of Alaska hatchery-produced Chinook salmon harvested during the winter fishery. The 2018–2019 winter

^{*}Not available until 2020 model calibration is complete and postseason AI is generated.

troll fishery was open from October 11, 2018 through March 15, 2019. To help reduce encounters of wild SEAK and TBR Chinook salmon, the winter season the fishery was closed from March 16 through April 30, prior to reaching the GHL. A total of 12,366 Chinook salmon were harvested. Of these, 1,647 (13%) were of Alaska hatchery origin, of which 1,087 counted toward the Alaska hatchery add-on, resulting in a Treaty harvest of 11,279 (Table 13).

The spring troll fisheries target Alaskan hatchery-produced Chinook salmon and are conducted along migration routes or close to hatchery release sites. Terminal area fisheries, which begin during the spring, occur directly in front of hatcheries or at remote release sites. While there is no ceiling on the number of Chinook salmon harvested in the spring fisheries, the take of Treaty Chinook salmon is limited according to the percentage of the Alaskan hatchery fish taken in the fishery. Non-Alaska hatchery fish are counted towards the annual Treaty catch limit of Chinook salmon, while most of the Alaska hatchery (add-on) fish are not.

In 2019, spring troll fisheries were conducted between May 1 and June 30. To help reduce encounters of wild SEAK and TBR Chinook salmon during May and June, spring troll fisheries located in known wild Chinook salmon migration corridors did not open. A total of 17 fisheries opened during spring in 2019, which is a 66% reduction from the recent 10-year average. The combined harvest for spring troll fisheries was 12,325 Chinook salmon, of which 5,398 (44%) were of Alaska hatchery origin and 3,814 counted toward the Alaska hatchery add-on, resulting in a Treaty harvest of 8,511.

The 2019 summer troll fishery included two Chinook salmon retention periods, from July 1–5 and August 13–14. Following the two traditional summer retention periods, an allocated noncompetitive limited harvest fishery was conducted from September 1–10 during the second summer coho-directed fishery to harvest the remaining portion of the annual troll Treaty Chinook salmon allocation. Alaska regulations state that if the number of Chinook salmon remaining on the annual troll allocation, following the second traditional summer retention period, is insufficient to prosecute a competitive fishery, the troll fishery may reopen to the harvest of Chinook salmon in a limited harvest fishery. In 2019, a maximum of two Chinook salmon per permit could be retained over the 10-day limited harvest fishery period. A total of 83,721 Chinook salmon were harvested during summer, of which 1,528 (2%) were of Alaskan hatchery origin and 1,008 counted toward the Alaska hatchery add-on. The resulting Treaty Chinook salmon harvest was 82,713 fish.

The total harvest for all troll fisheries in the 2019 accounting year was 109,364 Chinook salmon, of which 103,067 were Treaty Chinook salmon. This includes a total harvest of 736 in the Annette Island Metlakatla Indian Community tribal troll fishery of which 559 were Treaty Chinook salmon.

Table 13. Troll fishery Chinook salmon harvest by season, 2019.

					Total	
					Term.	
				Terminal	Exclusion/	
		Alaska	Alaska	Exclusio	Alaska	
	Total	Hatchery	Hatchery	n	Hatchery	Treaty
Gear/Fishery	Harvest	Harvest	Add-on	Harvest	Add-on	Harvest
Winter Troll	12,366	1,647	1,087	0	1,087	11,279
Spring Troll ^a	12,325	5,398	3,814	211	4,025	8,511
Summer Troll						
First Period ^b	58,347	1,050	693	0	693	57,654
Second Period	24,699	478	315	0	315	24,384
LHF^{c}	675	0	0	0	0	675
Total Summer	83,726	1,528	1,008	0	1,008	82,718
Total Traditional Troll	108,628	8,573	5,909	211	6,120	102,508
Annette Is. Troll	736	268	177	0	177	559
Total Troll Harvest	109,364	8,841	6,087	211	6,297	103,067

^a Spring troll harvest includes all terminal and Wild Terminal Exclusion harvests for year.

Net Fisheries

A total of 14,419 Chinook salmon were harvested in the drift gillnet fisheries in 2019, of which 12,773 (89%) were of Alaska hatchery origin and 11,377 counted toward the Alaska hatchery add-on, resulting in a Treaty harvest of 3,042 fish (Table 11). This includes a harvest of 385 in the Metlakatla Indian Community tribal drift gillnet fishery of which 306 were Treaty Chinook salmon. A total of 21,367 Chinook salmon were harvested in the purse seine fisheries, of which 12,506 (59%) were of Alaska hatchery origin and 12,011 counted toward the Alaska hatchery add-on, resulting in a Treaty harvest of 9,356 fish. This includes a harvest of 188 in the Metlakatla Indian Community tribal purse seine fishery; all 188 were Treaty Chinook salmon. A total of 246 Chinook salmon were harvested in the set gillnet fisheries, none of which were of Alaska hatchery origin, resulting in a Treaty harvest of 246 fish (Table 11).

With the exception of directed gillnet harvests of Chinook salmon in SEAK terminal area regulatory Districts 108 and 111, as provided in the Transboundary River chapter of the PST (Chapter 1), harvests of Chinook salmon in net fisheries are primarily incidental to the harvest of other species, and in 2019 only constituted a small fraction (<1.0%) of the total net harvest of all species.

Recreational Fisheries

The Southeast Alaska Chinook salmon sport fishery is managed under the directives of the *Southeast Alaska King Salmon Management Plan* (5 AAC 47.055). This plan prescribes management measures based upon the SEAK early winter troll CPUE metric and the harvest management plan adopted by the Alaska Board of Fisheries. In 2019, 25,844 Treaty Chinook salmon were allocated to the sport fishery. To avoid implementation of the payback provisions in

^b Total summer harvest includes confiscated harvest for year.

^c The limited harvest fishery (LHF) occurred during the second Chinook Non-Retention coho-directed fishery.

the new PST agreement which requires the payback of any overages to the Alaska all-gear catch limit the following year, the sport fishery was managed conservatively with a harvest target of 25,300 treaty Chinook salmon in 2019. As directed by the Southeast Alaska King Salmon Management Plan, if restrictions are necessary to keep the sport fishery within its harvest allocation, nonresident anglers will be restricted first, and the department shall only restrict resident anglers if nonresident angler restrictions are insufficient to keep the sport harvest within the sport harvest allocation.

The following regulations applied during the 2019 sport fishery as dictated by the *Southeast Alaska King Salmon Management Plan:*

Alaskan Resident

- The resident bag and possession limit was one Chinook salmon, 28 inches or greater in length.
- In those inside waters where the sport fishery for Chinook salmon was closed to retention during the spring and early summer (Juneau area, Petersburg/Wrangell area, Ketchikan area), when those waters reopen the resident bag and possession limit was two Chinook salmon 28 inches or greater in length through December 31, 2019.

Nonresident

- The nonresident bag and possession limit was one Chinook salmon, 28 inches or greater in length;
- From January 1 through June 30, a nonresident's annual catch limit was three Chinook salmon, 28 inches or greater in length;
- From July 1 through December 31, a nonresident's annual catch limit was one Chinook salmon, 28 inches or greater in length, and any Chinook salmon 28 inches or greater in length harvested by a nonresident from January 1 through June 30 applied toward the one fish annual catch limit;

The sport fishery was monitored closely throughout the season to ensure it stayed below the PST catch limit and the conservative harvest target. In mid-July, the sport fishery was projected to exceed the harvest target and PST allocation unless restrictive action was taken. Following directives of the Southeast Alaska King Salmon Management Plan, restrictions specific to nonresident anglers were announced in late July, which included a period of non-retention of Chinook salmon, August 1 – September 15th. As monitoring of the sport fishery continued, and harvest levels dropped due to Chinook salmon non-retention by nonresidents, updated PST harvest projections confirmed that a non-retention period could be rescinded August 16th for nonresident anglers while still ensuring the sport fishery stayed within its allocation. The 2019 sport fishery had an estimated total harvest of 29,700 Chinook salmon, of which 24,596 counted as PST or treaty harvest (Table 11).

SOUTHEAST ALASKA COHO SALMON FISHERIES

Attachment B of the June 30, 1999 U.S.-Canada Agreement relating to the Pacific Salmon Treaty specifies provisions for inseason conservation and information sharing for northern boundary coho salmon. In 2019, troll CPUE in Area 6 in the early weeks of the fishery averaged 16 coho/day, which was within the boundary area conservation trigger range of 15–22 coho/day. Accordingly, as provided for in paragraph 3 (section c), both parties agreed to a 10-day conservation closure, from July 28 through August 6. The mid-July projection of region-wide

total commercial harvest of 1.70 million was greater than the 1.1 million trigger for an early region-wide troll closure, specified in Alaska Board of Fisheries regulation and the PST conservation agreement.

The 2019 region-wide summer troll coho salmon fishery began by regulation on June 1, and with a 10-day seasonal fishery extension, continued in all waters of SEAK through September 30. All waters of SEAK were open to troll gear during the September 21–30 extension. The 2019 all-gear catch of coho salmon totaled 1.72 million fish, of which 1.54 million (89%) were taken in commercial fisheries (Table 14). The troll harvest of 975,000 coho salmon was 40% below the 10-year average of 1.58 million fish and accounted for 63% of the commercial catch. Power troll wild coho salmon CPUEs were below the 20-year average for the majority of the summer season. The overall wild stock abundance (wild troll catch divided by an index of the troll exploitation rate) was estimated at 4.12 million fish and was 3% above the 20-year average. With pink salmon abundance down throughout much of SEAK in 2019, purse seine opportunities were reduced. Consequently, the purse seine coho salmon harvest of 249,800 fish was 19% below the 10-year average, while the drift gillnet harvest of 210,500 fish was 42% below the 10-year average. The set gillnet harvest of 100,500 fish in the Yakutat area was 26% below the 10-year average, with 71% of the catch taken in the Situk-Ahrnklin Lagoon. A very preliminary estimate of the Southeast Alaska sport catch (185,400) is 29% below the 10-year average (261,400 fish).

Wild production accounted for 1.12 million fish (73%) in the commercial catch compared with a recent 10-year average of 1.83 million fish (77% wild). The hatchery percentage of the commercial catch was 27%. Of the estimated hatchery contribution of 410,800 fish, over 99% originated from facilities in Southeast Alaska, with facilities on or near the outer coast accounting for an estimated 65% of the return while inside hatchery returns contributed to the remaining 35%.

Preliminary all-fishery coho salmon exploitation rate estimates were low for all three wild indicator stocks, at 29% for Auke Creek, 22% for Berners River, and 54% for Hugh Smith Lake. The all-fishery exploitation rate for the Hugh Smith Lake stock was below the long-term average of 61%. Most of the reduction in the all-fishery exploitation rate was driven by decreases in the Alaska troll fleet. The Alaska troll fishery exploitation rate on the Hugh Smith Lake stock (23.4%) was below the 25-year (1994–2018) average of 30%. Alaska troll fishery exploitation rates on northern inside stocks were record lows, estimated at only 5.7% for Auke Creek and 6.7% for the Berners River compared with 25-year averages of 25% and 26%, respectively. While Alaska troll exploitation rates were below average, drift gillnet exploitation rates were within ranges of previously observed values. Compared with 25-year averages, Alaska drift gillnet fisheries accounted for an estimated 22% of the Auke Creek return (average 7%), 14% of the Berners River return (average 23%), and 11% of the Hugh Smith Lake return (average 13%).

Escapement counts and estimates were within or above goals for most coho salmon stocks. The total escapement of 1,239 adult coho salmon to Hugh Smith Lake was within the biological escapement goal of 500–1,600 spawners. Despite a 2018 smolt migration that was 59% above the long-term average, the estimated total run size of 2,678 adults was 32% below the 1983–2018 average. This disparity was likely caused by a marine survival rate (9.0%) that was slightly below the long-term average (12.2%). The Hugh Smith Lake marine survival of coho salmon is slightly higher than the recent five-year average (7.6%) and much higher than the record low of 2018 (2.7%).

Coho salmon escapements were within the respective goal ranges for three northern Southeast inside stocks (Chilkat River, Taku River, Auke Creek), above the goal for Berners River, and below the goal for Montana Creek. Survey estimates were not able to be collected on Peterson Creek due to high water condition and turbidity during peak abundance timing. The combined peak count of 7,916 coho salmon in the 14 surveyed streams in the Ketchikan area was slightly below the 1987–2017 average yet within the goal of 4,250–8,500 spawners. The combined peak count of spawners in five streams in the Sitka area (1,480 spawners) was approximately equal to the long-term average and exceed the escapement goal of 400–800 spawners.

Similar to Hugh Smith Lake, coho salmon marine survival for the northern inside stocks was above the five-year average yet still below the long-term average. Smolt-to-adult survival rates of 11.4% for the Berners River and 10.0% for Auke Creek represented a slight improvement over the five-year mean survival rates of 8.3% (Berners River) and 9.6% (Auke Creek). However, the marine survival estimates were far below historical averages of 15.0% for the Berners River (1990–2018) and 18.1% for Auke Creek (1980–2018). In 2019, the proportion of jack to adult coho salmon at Auke Creek (20%) was approximately the same as the long-term median (21%), indicating that marine survival will likely continue to improve compared to the recent poor conditions of 2016–2018.

Table 14. Coho salmon harvest in Southeast Alaska in 2019 by gear type (preliminary).

Gear Type	Harvest
Troll	975,000
Purse Seine	249,800
Drift Gillnet	211,000
Set Gillnet	100,500
Sport (marine and freshwater)	185,400
Total	1,721,700

II. PRELIMINARY 2019 CHINOOK AND COHO SALMON FISHERIES IN WASHINGTON AND OREGON

INTRODUCTION

This report describes the conduct of United States (U.S.) fisheries of interest to the Pacific Salmon Commission (PSC) that occurred during 2019 in the area north of Cape Falcon, Oregon and south of the U.S./Canada border. These fisheries were conducted under pre-season management plans that were consistent with Annex IV of the Pacific Salmon Treaty (PST 2019) including obligations defined within Chapter 3 for Chinook individual stock based management regimes (ISBM) and Chapter 5 for Southern Coho Management.

An overview of the Chinook (*Oncorhynchus tshawytscha*) and Coho (*Oncorhynchus kisutch*) salmon conservation challenges facing managers during the 2019 pre-season planning process in this region is provided in the following section. The conduct of major fisheries described, and estimates of landed catch, where available, are compared to pre-season catch limits or expectations for Chinook (Table 15) and Coho (Table 16). For perspective, landed catches for those fisheries since 2014 are also presented. Where available, preliminary estimates of the number of Chinook or Coho salmon released by anglers in 2019 mark-selective fisheries are also presented (Table 17). All estimates for the 2019 fisheries are preliminary and subject to change. Estimates of spawning escapements and abundance of Coho and Chinook stocks are not available at this time.

PRE-SEASON PLANNING

Pre-season planning for southern U.S. fisheries of interest to the PSC is a coordinated activity involving Tribal, State and Federal management entities, with the involvement of conservation and fishing interests. The Pacific Fishery Management Council (PFMC) conducted a series of public meetings to consider options for ocean fishery season structures while the Tribes and States conducted government-to-government and public, open meetings throughout the region to develop and analyze alternative season structures for fisheries in the inside waters of the Columbia River, coastal Washington and Puget Sound. Participants in these various planning sessions evaluated the biological and socio-economic consequences of the alternative season structures for the outside (ocean) and inside (marine and freshwater) fisheries (Figure 38) including the anticipated impacts on U.S. southern origin stocks in fisheries conducted under the PST in Canada and Southeast Alaska. Agreement was reached on season structures expected to achieve conservation goals, domestic fishery objectives and legal obligations, including the PST, assuming fisheries are conducted as planned and pre-season abundance estimates are accurate.

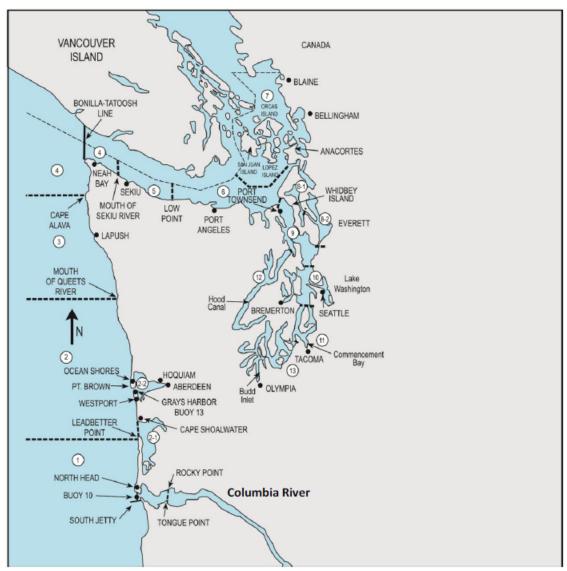


Figure 38. Map of Western Washington marine catch areas of the Washington coast (Areas 1 through 4) and Puget Sound (Areas 5 through 13) (WAC 220-22-030). Inside (Columbia River) fisheries reported in this document extend beyond the scope of this map.

Chinook Salmon Management

Under the 2019 Pacific Salmon Treaty Agreement, southern U.S. fisheries are subject to the Individual Stock Based Management provisions of Annex IV, Chapter 3. These provisions require that Southern U.S. fisheries on Chinook stocks shall be managed to limit the total adult equivalent mortality to the limits listed in Attachement I of Chapter 3.

Conservation obligations associated with the U.S. Endangered Species Act (ESA) for threatened and endangered Chinook salmon stocks originating from Puget Sound and the Columbia River have been more constraining to southern U.S. fisheries than PST obligations. Catch quotas for the 2019 U.S. ocean fisheries in the area north of Cape Falcon, Oregon, were defined by the impact limits on ESA-listed lower Columbia River natural tule fall Chinook stocks, ESA-listed Puget Sound Chinook stocks, and the abundance of other healthy, harvestable Chinook salmon stocks contributing to fisheries in this area. Puget Sound fishing seasons were structured to

provide fishing opportunity on healthy salmon species or stocks within the impact limits defined for ESA-listed Puget Sound Chinook.

Coho Salmon Management

During the pre-season fishery planning process of 2019, Canadian fishery managers informed the U.S. that the Interior Fraser management unit was again expected to be in the *low* categorical abundance status, and U.S. fisheries were constrained to ensure that the exploitation rate on this management unit did not exceed 10.0% as defined by the PST Southern Coho Management Plan. Of the U.S. natural spawning Coho management units (MUs) managed under the PST, the Strait of Juan de Fuca MU was forecasted to be in *low* abundance status. The Skagit, Snohomish, and Hood Canal Coho MUs were predicted to be in *moderate* status, while the Grays Harbor, Queets, Quillayute, Hoh, and Stillaguamish MUs were forecasted to be in *abundant* status.

The impacts of planned Southern U.S. fisheries on natural Coho stocks, seasons, and catch limits were predicted using the Fisheries Regulation Assessment Model (FRAM). The total exploitation rate on the Interior Fraser Coho management unit was predicted to be 9.1% in Southern U.S. fisheries. Seasons and Coho quota levels for U.S. ocean fisheries were closed or severely constrained by the management objectives of Washington coastal and Puget Sound natural Coho and ESA-listed lower Columbia River natural Coho. Limits to fisheries in marine areas within northern Puget Sound and the Strait of Juan de Fuca were likewise constrained by management objectives reflecting very low forecasted returns for some Puget Sound natural Coho stocks.

NORTH OF CAPE FALCON OCEAN FISHERIES

Details regarding North of Cape Falcon ocean salmon fishing plans were reported in Preseason Report III, published by the Pacific Fishery Management Council in April 2019. https://www.pcouncil.org/salmon/stock-assessment-and-fishery-evaluation-safe-documents/preseason-reports/

Fisheries in this area are managed to meet conservation objectives for ESA-listed stocks, natural stocks and brood stock goals for hatchery stocks. Within these stock management objectives, ocean fishing seasons are defined that meet legal requirements of Tribal treaties and allocations between Non-Tribal troll and sport fisheries. Ocean fishery seasons are also constructed to ensure a balance of opportunity for harvest with the inside fisheries. Lower Columbia River hatchery Coho and Columbia River fall Chinook have historically been the major stocks contributing to catches of ocean fisheries in the North of Cape Falcon area.

Chinook and Coho salmon catch quotas were established for the 2019 ocean Tribal, Non-Tribal troll and sport fisheries. Ocean fishery quotas for Chinook salmon were defined by exploitation rate limits on several ESA-listed Puget Sound Chinook stocks as well as the total exploitation rate limit of 38% on ESA-listed lower Columbia River natural tule fall Chinook stocks in all fisheries.

Non-Tribal Troll Fishery

Pre-season quota levels for the non-Tribal troll fisheries were 26,250 Chinook and 30,400 Coho with a clipped adipose fin, hereinafter referred to as marked. The preliminary estimate of non-Tribal harvest in the 2019 North of Falcon troll fishery is 24,200 Chinook (92% of the coast-

wide quota) and 5,500 Coho (18% of the coast-wide non-Tribal troll quota). Trollers harvested 7,000 Chinook in the May 1 – June 30 fishery, and the remaining 17,200 Chinook were harvested in the summer all-species fishery between July 1 and September 30. All Coho were harvested during the summer all-species fishery.

Tribal Troll Fishery

The Tribal troll ocean fishery (also known as the Treaty troll fishery) quotas were defined by conservation concerns for ESA-listed Lower Columbia River natural tule fall Chinook and ESA-listed Puget Sound Chinook. The coho quota was based on concerns for Puget Sound coho, Thompson River coho, and ESA-listed lower Columbia River natural coho.

The Treaty troll fishery was implemented in Ocean Areas 2, 3, 4 and 4B. The 2019 quotas were set at 35,000 Chinook and 55,000 coho. The Chinook quota was split into two sub-quotas—a 17,500 sub-quota during May-June and a 17,500 sub-quota during July-September. The 55,000 coho quota could be harvested during the July-September all-species fishery.

The May-June Chinook Tribal troll ocean catch (2,919 fish) was the lowest recorded in the past 10 years. The May-June fishery harvested 16.7% of the 17,500 Chinook sub-quota. Chinook landings were highest in June, which accounted for 71% of the Chinook landings during this time period. However the number of trips were fairly equal between May and June at 65 and 72 trips, respectively.

The all-species portion of the Tribal troll fishery ran from July 1 until September 15. The fishery harvested 88.1% of the 17,500 Chinook sub-quota and 100.9% of the 55,000 coho quota. Coho landings were highest in August accounting for 61% of the overall catch, followed by July and September at 26% and 13%, respectively. Similar to last year Chinook effort was highest in July, which accounted for approximately 80% of the Chinook landings during this time period. Chinook landings slowed in August (2,800 fish) and were minimal in September (299 fish). There were 761 landings during the all-species portion of the fishery.

Overall the Tribal troll fishery harvested 52.4% of the 35,000 Chinook quota and 100.9% of the 55,000 coho quota. The total ocean salmon harvest for the 2019 Tribal troll fishery was 18,332 Chinook and 55,476 coho.

Ocean Sport Fisheries

Pre-season quotas for the Washington coastal sport fishery (Ocean Areas 1 through 4) were 26,250 Chinook and 159,600 marked Coho. Preliminary total catch estimates for the ocean sport fisheries north of Cape Falcon were 10,800 Chinook (42% of the pre-season coast-wide quota) and 81,700 Coho (51% of the pre-season coast-wide sport quota). A description of the season structure and catches by management area follows.

Columbia Ocean Area (including Oregon)

All-species salmon sport fishing opened in Ocean Area 1 (Columbia Ocean Area) on June 22 with a pre-season quota of 79,800 marked Coho and a guideline of 7,150 Chinook. The fishery closed on its automatic closure date, September 30. The catch estimates for Area 1 were 4,000 Chinook (56% of the guideline) and 53,500 Coho (67% of the quota). The Chinook minimum size limit was 24 inches and the Coho minimum size limit was 16 inches with a sub-area closure in the Columbia Control Zone. A preliminary overall legal-sized Coho mark rate of 59% was

calculated from on-water data collection in this area.

Preliminary estimates of	Preliminary estimates of Coho encounters (retained and released) and mark rate in the Area 1 Coho					
mark-selective sport fishery, June 22 – September 30, 2019.						
Coho retained Coho released Total encounters Mark %						
53,500 28,700 81,200 59%						

Westport, Washington

Ocean Area 2 (Westport, WA) opened for all-species salmon sport fishing on June 22 with a pre-season quota of 59,050 marked Coho and a guideline of 12,700 Chinook. The fishery closed on its automatic closure date, September 3. The catch estimates for Area 2 were 2,300 Chinook (18% of the guideline) and 20,200 Coho (34% of the quota). The Chinook minimum size limit was 24 inches and the Coho minimum size limit was 16 inches with a sub-area closure in the Grays Harbor Control Zone beginning August 12. A preliminary overall legal-sized Coho mark rate of 47% was calculated from on-water data collection in this area.

Preliminary estimates of Coho encounters (retained and released) and mark rate in the Area 2 Coho						
non-retention sport fishery, June 22 – September 30, 2019.						
Coho retained Coho released Total encounters Mark %						
20,200	24,300	44,500	47%			

La Push, Washington

Ocean Area 3 (La Push, WA) opened for all-species salmon sport fishing on June 22 with a preseason quota of 4,050 marked Coho and a guideline of 1,100 Chinook. The fishery closed on its automatic closure date, September 30, and a portion of the area reopened October 1 – 13 with additional quotas of 100 marked Coho and 100 Chinook. The catch estimates for Area 3 were 600 Chinook (50% of the overall guideline of 1,200) and 1,800 Coho (43% of the overall quota of 4,150). Of the total catch, 164 Chinook and 16 Coho were landed during the October limited-area fishery. The Chinook minimum size limit was 24 inches and the Coho minimum size limit was 16 inches. A preliminary overall legal-sized Coho mark rate of 41% was calculated from on-water data collection in this area.

Preliminary estimates of Coho encounters (retained and released) and mark rate in the Area 3 Coho					
non-retention sport fishery, June 22 – October 13, 2019.					
Coho retained Coho released Total encounters Mark %					
1,800	4,000	5,800	41%		

Neah Bay, Washington

Ocean Area 4 (Neah Bay, WA) opened for all-species salmon sport fishing on June 22 with a pre-season quota of 16,600 marked Coho and a guideline of 5,200 Chinook. Effective July 14, Chinook retention was prohibited in the area after 75% of the area Chinook guideline had been landed; the Chinook remaining on the guideline were reserved for hooking mortality impacts associated with Coho-directed fishing through September. The fishery closed on its automatic closure date, September 30. The catch estimates for Area 4 were 3,900 Chinook (75% of the guideline) and 6,200 Coho (37% of the quota). The Chinook minimum size limit was 24 inches and the Coho minimum size limit was 16 inches. A preliminary overall legal-sized Coho mark rate of 37% was calculated from on-water data collection in this area.

Preliminary estimates of Coho encounters (retained and released), in the Area 4 Coho non-retention			
sport fishery, June 22 – September 30, 2019.			
Coho retained	Coho released	Total encounters	Mark %
6,200	16,900	23,100	37%

NORTH OF CAPE FALCON INSIDE FISHERIES

WASHINGTON COASTAL RIVER FISHERIES

North Washington Coastal Rivers

Net and sport fisheries directed at salmon in this region were implemented based upon preseason, Tribal-State agreements and subject to in-season adjustments. Tribal net harvest includes non-selective catch from the Sooes, Quillayute, Hoh, Queets, and Quinault Rivers. The 2019 Tribal net fisheries in north coastal rivers harvested an estimated 11,100 Chinook salmon and 12,000 coho salmon through November 15, 2019.

Recreational fisheries conducted during 2019 in the Quillayute, Hoh and Queets River systems included mark-selective fisheries targeting hatchery Chinook and Coho in the Quillayute and Queets systems. The Hoh system had a hatchery chinook sport fishery in June but was non-selective when the fishery reopened from September 16 through November. Harvest or impact estimates for these fisheries are unavailable at this time.

Grays Harbor, Washington

Harvest numbers reported for Grays Harbor, Washington include catch from both the Humptulips and Chehalis Rivers through November 15, 2019. The non-selective Tribal net fisheries in Grays Harbor, and including fisheries in the Humptulips and Chehalis Rivers, harvested an estimated 2,400 Chinook salmon and 7,700 Coho salmon. The non-Tribal commercial fishery in the northern portion of Grays Harbor near the Humptulips River (Area 2C) was non-selective and harvested 43 Chinook and 19 Coho. There were 2 Chinook salmon (mark-selective) and 799 Coho harvested in the Non-Tribal commercial gillnet fishery in Areas 2A and 2D. Sport fisheries conducted in the Chehalis and Humptulips Rivers included mark-selective components for Chinook and Coho salmon. Harvest data for these fisheries are not available at this time.

COLUMBIA RIVER FISHERIES

Tribal and non-Tribal net and sport salmon fisheries were implemented in 2019 during the winter/spring (January – June 15), summer (June 16 – July) and fall (August – October) periods. All fisheries were constrained by impacts on ESA-listed stocks. Winter/spring fisheries were primarily constrained by impacts on ESA-listed upper Columbia River spring Chinook, Snake River spring/summer Chinook, and Cowlitz spring Chinook. Summer season fisheries were constrained by impacts to upper Columbia summer Chinook and ESA-listed sockeye. Fall fisheries were mainly constrained by impacts to ESA-listed Snake River fall Chinook and upriver summer steelhead. Additionally, careful in-season management to limit the fishery impacts on ESA-listed wild lower Columbia tule fall Chinook, and lower Columbia River Coho further constrained Columbia River fall fisheries during 2019.

Columbia River salmon fisheries are developed and regulated to meet conservation standards. Fisheries are managed to operate within the impact limits set for ESA-listed stocks, meet the objectives for healthy Columbia River natural stocks, and ensure broodstock needs are met for hatchery salmon. Mainstem Columbia River fisheries are also developed and managed to remain within the requirements of the 2018 – 2027 *US v. Oregon* Management Agreement (MA), which includes Tribal/Non-Tribal sharing agreements. All 2019 data are preliminary and subject to change; some fisheries are still ongoing at the time of this report. The following section includes harvest numbers from Columbia River fisheries that are considered to be of the interest to PSC; therefore, the data may not match other reports that include total harvest.

Winter-Spring Fisheries

Non-Tribal Net

The mainstem winter/spring commercial fishery operated under mark-selective fishery (MSF) regulations during 2002 - 2016. As a result of guidance from the Oregon and Washington Fish and Wildlife commissions, there were no winter/spring non-Tribal commercial salmon seasons in the mainstem Columbia River since 2016. Commercial fisheries during the winter/spring timeframe did occur in off-channel areas (Select Areas) in the Columbia River estuary but are not reported in this document.

Sport

Mainstem Columbia River mark-selective sport fisheries began in 2001. For 2019, the area below Bonneville Dam was open from January 1 – April 10, April 13-14, and April 20-21, and April 27-28for hatchery Chinook retention, and was closed downstream of the Lewis River beginning March 1. Catch estimates for this area totaled 1,677 hatchery adult spring Chinook kept and 480 non-adipose fin clipped Chinook released. From Bonneville Dam to the Washington-Oregon state line it was open March 1 – May 5 and May 11-12, there were 274 hatchery adult spring Chinook kept and 80 non-adipose fin clipped Chinook released. The Snake River fishery structure included two specific catch areas open on a days-per-week rotation as was open May 11-27. Catch in the Snake River fishery totaled 326 hatchery adult spring Chinook and 50 non-adipose fin clipped released. Fisheries also occurred in tributaries but are not reported in this document.

Preliminary estimated encounters of adult Spring Chinook in the 2019 Winter/Spring Columbia River mark-selective sport fishery.					
System	Area	Chinook Kept	Chinook Released	Total Encounters	% Kept
Columbia River	Below BON (LCR)	1,677	480	2,157	78%
Columbia River	BON to WA-OR S/L	274	80	354	77%
Snake River	Washington Waters	326	50	376	87%

Tribal

Tribal mainstem winter/spring fisheries typically occur from January 1 through June 15. Tribal mainstem fisheries are not mark-selective. Tribal fisheries are primarily conducted in the mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Some additional harvest occurs just downstream of Bonneville Dam in platform and hook-and-line fisheries. Spring season fisheries may include three fishery sectors, a ceremonial permit gillnet

fishery, a platform and hook and line fishery and a commercial gillnet fishery (during winter and periodically in the spring, after ceremonial needs have been met).

During 2019, the platform and hook-and-line fishery was open for subsistence fishing throughout most of the winter/spring period. Fisheries were temporarily closed for just 18 days to assess catches. Commercial sales did not occur in 2019 Tribal fisheries during the spring management period. Harvest estimates from the combined ceremonial and subsistence fisheries totaled approximately 4,688 upriver spring Chinook (includes harvest from below Bonneville Dam). Tribal harvest in tributaries is not included in this report.

Summer Fisheries

Non-Tribal Net

As a result of guidance from the Oregon and Washington Fish and Wildlife commissions in conjunction with a low run, non-Tribal commercial fisheries did not occur in the 2019 summer management timeframe. Commercial fisheries during the summer timeframe did occur in off-channel areas (Select Areas) in the Columbia River estuary but are not reported in this document.

Sport

Summer season recreational fisheries did not allow retention of any salmon from the Astoria-Megler Bridge near the mouth of the Columbia River upstream to Priest Rapids Dam with an estimated 530 summer Chinook released. The fishery above Priest Rapids Dam had a delayed opening of July 15 and was mark-selective, which are not reported in this document. In-river allocation agreements dictate that a substantial share of the non-treaty catch be provided for fisheries upstream of Priest Rapids Dam.

Tribal

Summer season Tribal fisheries occurred from June 16 through July 28. Tribal mainstem fisheries are not mark-selective. Tribal fisheries are primarily conducted in the mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Some additional harvest occurs just downstream of Bonneville Dam in platform and hook-and-line fisheries. There was a brief period of permit gillnet fisheries followed by two weekly commercial gillnet fishing periods were conducted from June 24 – July 3. Platform and hook-and-line fisheries also occurred throughout the season, and fish were sold commercially or retained for subsistence use. Tribal fisheries within the mainstem harvested a total of 5,637 Upper Columbia summer Chinook.

Fall Fisheries

Non-Tribal Net

Fall season mainstem fisheries are typically categorized into early and late fall seasons. The early fall season generally encompasses the month of August and in some years, early September, whereas the late fall season generally begins in mid-September and may continue through October. Time, area, and gear restrictions were in place for fall season commercial gillnet fisheries. Fall gillnet fisheries are non-MSF. No seine fisheries occurred in 2019 due to ESA constraints. In 2019, the early fall season consisted of four fishing periods during

August 14-27 in commercial Zones 4-5 (Warrior Rock to Beacon Rock). The late fall season consisted of 1 fishing period during October 8-9 in the same area. Harvest estimates are estimated to include 8,148 Chinook and 220 Coho Salmon. Tangle net fisheries occurred with eleven fishing periods during September 30 – October 25 in commercial Zones 1-3 (mouth to Warrior Rock) and are MSF for Coho and non-MSF for Chinook. Harvest estimates are estimated to include 677 Chinook and 2,495 marked Coho Salmon (704 unmarked Coho Salmon were released). Commercial fisheries during the fall timeframe did occur in off-channel areas (Select Areas) in the Columbia River estuary but are not reported in this document.

Sport

Fall season recreational fisheries are mark-selective for Coho, and in recent years have included some mark-selective periods for Chinook in the Buoy 10 area and in the 69-mile stretch of the lower Columbia River from the Tongue Point line upstream to Warrior Rock, which is near the mouth of the Willamette River. There were no mark-selective periods for Chinook in the mainstem Columbia River during 2019. The Buoy 10 fishery opened August 1 and continued through December 31; Chinook retention was allowed August 1 through August 20. Additional regulations for the Buoy 10 fishery included minimum size limits for Chinook (24-inches) and Coho (16-inches), and in 2019, steelhead retention was prohibited August through September. Released Chinook typically consisted of fish that did not meet the minimum size requirement, fish released during non-retention periods, and any voluntary releases of legal-sized Chinook throughout the season.

Buoy 10 catches included 11,240 Chinook and 23,470 hatchery Coho Salmon kept. Released fish included 16,780 Chinook and 25,800 Coho Salmon.

The lower Columbia River (LCR) mainstem sport fishery from the Rocky Point – Tongue Point line upstream to Bonneville Dam opened August 1 through September 25 and October 18 – December 31. In the area from the Rocky Point – Tongue Point line upstream to the Lewis River, Chinook retention was open August 1-27, with Chinook retention closed beginning August 21 downstream of West Puget Island. Chinook retention was allowed August 1-September 5 from the Lewis River upstream to Bonneville Dam. The kept catch estimate for the LCR sport fishery was 7,165 adult Chinook; an additional 6,737 adult Chinook were released, and 1,046 hatchery Coho were kept (1,075 Coho were released). Steelhead retention was closed August through October.

The mainstem sport fishery from Bonneville Dam to the Highway 395 Bridge (near Pasco, Washington) was open August 1 – September 25 and October 18-31. Adult catch estimates for the Bonneville to McNary area totaled 3,351 fall Chinook and 729 Coho Salmon. Steelhead retention was closed August through December below the Dalles Dam, and September through December upstream. Additional fisheries occurred on the Columbia River in the Hanford Reach area (downstream of Priest Rapids Dam), in tributaries and in the Snake River, but are not reported in this document.

Adult Fall Chinook and Coho Salmon Handle in the					
2019 Columbia River Fall Sport Fisheries					
System	Area	Chinook Kept	Chinook Released	Total Handle	% Kept
Columbia River	Buoy 10	11,240	16,780	28,020	40%
Columbia River	LCR Sport	7,165	6,737	13,902	52%
Columbia River	Bonneville-McNary	3,351	390	3,741	90%
System	Area	Coho Kept	Coho Released	Total Handle	% Kept
Columbia River	Buoy 10	23,470	25,800	49,270	48%
Columbia River	LCR Sport 1	1,046	1,075	2,121	49%
Columbia River	Bonneville-McNary ²	729	182	911	80%

Tribal

Fall season Tribal fisheries occur from August 1 through December 31. Tribal fisheries are not mark-selective. Tribal fisheries are primarily conducted in the mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Some additional harvest occurs just downstream of Bonneville Dam in platform and hook-and-line fisheries. Platform and hook and line fisheries will remain open through December 31.

The Tribal commercial gillnet fishery consisted of a brief period of permit gillnet fishing followed by seven weekly fishing periods from August 21 through October 5. Preliminary harvest estimates for all fall season fisheries total 58,447 adult fall Chinook and 4,675 adult Coho; however, some additional fish may be landed in the ongoing platform fisheries. Harvest estimates reported herein include catch from Zone 6 tributary fisheries.

PUGET SOUND FISHERIES

Puget Sound marine fisheries of interest to the Pacific Salmon Commission were regulated to meet conservation and allocation objectives for Chinook, Coho, Chum, Pink, and Sockeye salmon stocks, per Tribal-State agreement. For Puget Sound Chinook listed under the ESA, fisheries were managed according to the Puget Sound Chinook Harvest Management Plan (PSIT and WDFW 2010). This management plan defines limits to total exploitation rates for natural stocks and was determined by the National Marine Fisheries Service (NMFS) to be consistent with requirements specified under the ESA 4(d) Rule.

Release requirements were applied to many sport and net fisheries for Chinook, Coho, and Chum salmon -- the latter to protect ESA-listed Hood Canal and Strait of Juan de Fuca summer Chum.

Puget Sound marine fisheries were constrained by the need to meet management objectives for ESA-listed Puget Sound Chinook and due to conservation concerns for some Puget Sound Coho stocks. The primary constraining Puget Sound Chinook stocks during 2019 pre-season planning included Mid-Hood Canal, Stillaguamish, and Nooksack Chinook. Strait of Juan de Fuca and Snohomish Coho were the primary Coho management units of concern for developing fisheries in the Strait of Juan de Fuca, San Juan Islands, and Puget Sound.

Strait of Juan de Fuca Sport

Marked Chinook retention was allowed for sport fishing in salmon management Area 5 from February 16, 2019 through April 30, 2019 and in Area 6 from February 1, 2019 through April 30, 2019. Sport fishing regulations allowed retention of marked Chinook and marked Coho from July 1 through August 15 in Areas 5 and 6, with marked Coho retention also permitted through September 30 in Area 5. Dungeness Bay was open for marked Coho retention during the month of October. Preliminary estimates of Chinook encounters and the legal-size mark rate in the Area 5 sport mark-selective fishery are presented in the following table.

Preliminary estimates of Chinook retained, released (legal and sub-legal size), and the legal-size mark			
rate in the Area 5 sport mark-selective fishery, July 1 – August 15, 2019.			
Chinook retained	Chinook released	Total encounters	Mark % (legal size)
4,566	10,970	15,897	62.0%

A detailed report of this summer period sport fishery, including estimated catch, effort and other results of sampling and monitoring programs, will be available from the Washington Department of Fish and Wildlife in early 2019.

Strait of Juan de Fuca Tribal Troll (Area 4B, 5, and 6C)

During the winter Tribal troll fishery in Areas 4B, 5, and 6C (November 1, 2018 – April 15, 2019), 1,100 Chinook and zero Coho were caught. In the summer Tribal troll fishery in Areas 5 and 6C only (June 1 – September 30, 2019), 400 Chinook and 200 Coho were caught. The Tribal catch estimates from this area do not include catch from Area 4B during the May-September PFMC management period, which have been included in the North of Cape Falcon Tribal ocean troll summary.

Strait of Juan de Fuca Tribal Net

Preliminary estimates of the 2019 catch in the Strait of Juan de Fuca Tribal net fisheries (no non-Tribal net fisheries in the Strait of Juan de Fuca) are 0 Chinook and 200 Coho salmon.

San Juan Islands Net (Areas 6, 7, and 7A)

Preliminary estimates of the 2019 catch in the San Juan Island net fishery directed at Sockeye, Pink, or Chum salmon totaled 9 Chinook and 869 Coho salmon in the non-Tribal fishery. Tribal fishery landings from this area for all gear types totaled 3,600 Chinook and 1,500 Coho.

San Juan Islands (Area 7) Sport

Marked Chinook retention was allowed in the entire Area 7 during the winter/spring season from January 1, 2019 through April 15, 2019. Preliminary estimates of Chinook retained and released by anglers during this fishery were produced via an intensive sampling program and are presented in the table below. A detailed report of this fishery, including estimates of catch, effort and other results of sampling and monitoring programs, is available from the Washington Department of Fish and Wildlife.

Estimated Chinook retain	Estimated Chinook retained, released (legal and sub-legal size) and the legal size mark rate in the Area										
7 sport mark-selective fishery, January 1 through April 15, 2019.											
Chinook retained	Chinook released	Total encounters	Mark % (legal size)								
3,776											

During the summer season in Area 7, recreational anglers were allowed to retain Chinook from July 1 through July 31. The southern Rosario Strait and eastern portions of Area 7 were closed from July 1 – September 30 to protect Puget Sound Chinook salmon. Additional sub-area closures are described in the 2019-20 Washington State Sport Fishing Rules Pamphlet. The table below presents estimated Chinook encounters (retained and released) and the legal-size mark rate in the Area 7 sport mark-selective fishery, from July 1-31, 2019.

Estimated Chinook retained, released (legal and sub-legal size) and the legal size mark rate in the Area												
7 sport mark-selective fishery, July 1-31, 2019.												
Chinook retained												
3,025												

Inside Puget Sound (Areas 8-13) Sport

Mark-selective sport fisheries (MSFs) targeting adipose fin-clipped (marked) hatchery Chinook were conducted in Area 8.1 (Deception Pass, Hope Island, and Skagit Bay), Area 8.2 (Port Susan & Port Gardner), Area 9 (Admiralty Inlet), Area 10 (Seattle-Bremerton), Area 11 (Tacoma-Vashon Island), Area 12 (Hood Canal), and Area 13 (South Puget Sound) during the winter (October 2018 – April 2019) period, and in Areas 9, 10, 11, 12, and 13 during the summer (May – September 2019) period. Additionally, marked and unmarked Chinook retention was permitted in the Tulalip Bay (Area 8-2) from June 1 through September 2 (Fridays through noon Mondays), and from September 7 through September 29 (Saturdays and Sundays), and in Elliot Bay (Area 10) from August 2 through noon August 5.

Puget Sound	Chinook mark-selective sport fisheries conducted in marine areas during 2017-2019.
Areas	Season
8.1 & 8.2	Winter: December 1, 2018 – April 11, 2019.
9	Winter: January 1, 2019 – April 15, 2019. Summer: July 25 – July 28, 2019; July 31 –
	August 4, 2019; August 6 – August 9, 2019.
10	Winter: January 1, 2019 – January 19, 2019. Summer: July 25 – August 17, 2019;
	Elliot Bay: August 2 – August 5 (noon); Sinclair Inlet: July 1 – September 30, 2019.
11	Winter: October 1, 2018 – April 30, 2019. Summer: July 1 – August 25, 2019.
12	Winter: October 1, 2018 – April 30, 2019. Summer: July 1 – September 30, 2019
	(South of Ayock Point).
13	Year round: January 1 – December 31

Post-season reports detailing results of these Chinook MSFs, including estimates of retained and released encounters, effort and mark rates from sampling and monitoring programs, will be available from the Washington Department of Fish and Wildlife in the spring of 2019.

Mark-selective sport fisheries during 2019 directed at marked Coho were conducted in the following marine catch areas: Areas 5 and 6 from July 1 – September 30, Area 9 from July 16 – September 30 and in Area 13 from January 1 – December 31. Marked and unmarked Coho retention was permitted in Area 7 during the months of July and September, Area 8.1 from August 1 – October 31, 2019, Tulalip Bay from June 1 – September 2 (on Fridays through noon,

Mondays only) as well as from September 7 – September 29 (Saturdays, Sundays), in Area 11 from July 1 – September 30; and in Area 12 from January 1 – April 30, 2019 in the whole area, as well as from August 1 – December 31, 2019 in the areas North of Ayock Point and from July 1 – December 31, 2019 in the area South of Ayock Point.

Puget Sound Marine Net (Areas 8-13 & 7B-D)

To achieve conservation objectives for natural Puget Sound Chinook, limited marine net fishing opportunities directed at returns of hatchery Chinook and both hatchery and natural Coho were planned for 2019. Chinook and Coho were also intercepted in fisheries directed at Pink and Chum salmon. A total of 62,300 Chinook and 45,400 Coho were landed in the Tribal marine net fisheries in Puget Sound (Areas 8-13 & 7B-D) during 2019. Non-Tribal net fishery landings from these areas totaled 12,100 Chinook and 10,900 Coho. Nearly all Chinook landed in the non-Tribal net fishery occurred during Chinook-directed fisheries in Areas 7B, 7C, and 12C.

Puget Sound Rivers Fisheries

Tribal net and non-Tribal sport fisheries were implemented in freshwater systems based upon pre-season, Tribal-State agreements and subject in part to in-season adjustment. Harvest of Chinook and Coho in the Tribal in-river net fisheries (includes catch from river systems in the Strait of Juan de Fuca, Hood Canal, and Puget Sound) totaled 37,500 Chinook and 41,500 Coho during 2019.

Also, recreational fisheries targeting Chinook salmon were conducted in nine Puget Sound Rivers that have PSC Chinook coded wire tag (CWT) exploitation rate indicator stocks or double index tag (DIT) groups, as listed in the table below. Of these, seven rivers had mark-selective fisheries and two rivers had non-selective fisheries, as follows:

Chinook mark-selective sport fisheries of	conducted in Puget Sound rivers during 2019.
River	Season
Nooksack River	September 1 - 30
Cascade River	June 1 – July 15
Skagit River	May 1 – May 31 from the highway 536
	bridge; June 1 – July 15
Skykomish River	June 1 – July 31
Carbon River	September 1 – November 30
Puyallup River	August 15 – December 31
Nisqually River	July 1 – November 15
Chinook non-selective sport fisheries co	nducted in Puget Sound rivers during 2019.
River	Season
Samish River	August 1 – September 22
Green River	August 20 – November 12

During the 2019 season there were mark-selective sport fisheries targeting hatchery Coho in the rivers of Puget Sound that have PSC Coho CWT exploitation rate indicator stocks or DIT groups on the Wallace River (Skykomish tributary) October 17 through December. A mark selective fishery was open on the Dungeness October 16 through November 30. Recreational non-selective Coho fisheries were conducted on the Nooksack River, Skagit River, Skykomish River (September only), Snohomish River, Snoqualmie River, Cascade River, Green River, Carbon River, Puyallup River, Nisqually River, and Quilcene River.

REFERENCES

Pacific Salmon Treaty (PST) Act of 1985. 2008 Agreement. U.S.-Canada. Public Law 99-5, 16 U.S.C. 3631.

Puget Sound Indian Tribes and Washington Department of Fish & Wildlife (PSIT and WDFW). 2010. Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component. Northwest Indian Fisheries Commission, Olympia, Washington. 237 p.

Pacific Fishery Management Council (PFMC). 2008. Fishery Regulation Assessment Model (FRAM): An Overview for Coho and Chinook v3.0. Pacific Fishery Management Council, Portland, Oregon. 43 p.

Table 15. Preliminary 2019 Landed Chinook Catch for Washington and Oregon Fisheries of Interest to the Pacific Salmon Commission. Values are presented in number of fish rounded to the nearest 100. 9/

	2019				Landed								
	Preseas	son ^{5/}					Lanueu						
Fisheries	Total Mortality	Landed 2/	Preliminary Landed	2018	2017	2016	2015	2014	2013	2012			
OCEAN FISHERIES													
Commercial Troll													
Neah Bay and La Push (areas 3,4,4B) ^{3/} Columbia Ocean Area and Westport (area	51,300	45,000	39,100	34,000	35,200	28,100	73,600	77,100	63,700	79,400			
1,2) 4/	24,400	16,200	3,400	13,800	24,700	14,200	50,900	39,100	28,300	20,600			
Sport (see text for quota information)													
Neah Bay (area 4)	6,200	5,500	3,900	3,000	7,300	3,300	8,500	5,900	6,200	5,600			
La Push (area 3) Westport (area 2)	1,000 14,200	900 12,700	600 2,300	400 4,900	500 6,600	300 8,400	2,400 19,100	1,600 23,500	2,400 13,700	1,300 19,500			
Columbia Ocean Area (area 1) ^{13/}	9,200	7,100	4,000	2,200	7,600	6,000	12,200	11,300	8,500	9,100			
			INSIDE FIS	HERIES									
			Sport	10/									
Strait of Juan de Fuca (area 5,6)	20,300	11,100	-	16,700	9,810	15,000	11,800	11,100	14,900	13,900			
San Juan Islands (area 7) Puget Sound Marine (area 8-13)	7,500 29,100	4,700 17,200	- -	7,500 34,400	7,000 21,600	5,900 16,700	8,600 9,000	9,200 12,100	9,500 16,600	5,800 22,000			
Puget Sound Rivers 12/	19,400	18,600	-	8,000	23,700	9,600	11,100	11,800	19,600	23,200			
North WA Coastal Rivers	-	-	-	1,600	1,600	600	2,200	1,200	2,700	1,600			
Grays Harbor ^{7/}	3,400	2,700	-	3,700	2,700	2,800	3,400	1,200	3,800	4,600			
Columbia River (Spring) 6/	-	-	2,000	9,100	9,100	14,100	23,100	21,400	8,400	17,000			
Columbia River (Summer) 6/	-	-	-	1,300	3,800	6,800	6,700	2,300	2,100	3,200			
Columbia River (Fall) (incl. Buoy 10) 6/	-	-	21,800	22,400	60,400	65,600	91,300	63,000	74,500	47,000			
			Commer	cial ^{11/}									

Strait of Juan de Fuca net and troll (area 4B,5,6C)	7,700	4,700	1,500	3,100	1,900	700	5,900	6,100	4,000	3,900
San Juan Islands (area 6,7,7A)	8,500	8,400	3,600	3,900	2,600	100	4,800	6,900	3,800	400
Puget Sound Marine (8-13,7B-D)	45,800	45,000	62,300	70,600	90,600	55,800	33,100	28,400	70,100	75,700
Puget Sound Rivers ^{12/}	34,600	34,600	37,500	41,600	53,900	23,300	21,200	19,900	26,800	39,500
North WA Coastal Rivers	-	-	11,100	11,000	14,200	9,400	17,200	20,100	14,300	12,800
Grays Harbor (area 2A-2D) 7/	1,800	1,600	2,400	2,700	3,700	2,100	10,500	5,100	2,900	4,000
Columbia River Net (Winter/Spring) 8/	-	-	4,700	10,900	8,100	20,400	37,600	28,200	11,200	23,800
Columbia River Net (Summer) 8/	-	-	5,600	9,500	16,300	23,400	41,700	22,200	15,300	9,500
Columbia River Net (Fall) 8/	-	-	67,300	63,000	140,600	188,900	343,900	365,900	312,500	119,800

¹/ Estimates of total mortality (not adjusted for adult equivalents) include non-retention mortality. Total Mortality is estimated by Fishery Regulation Assessment Model (FRAM) as catch + incidental mortality, where incidental mortality = drop off + non-retention mortality (PFMC 2008).

^{2/} For the ocean fisheries, this column shows the Chinook troll and recreational quotas used for 2018 pre-season fishery planning as distributed by ocean area (Landing Quotas = Landed). See text for any in-season adjustments.

³/ Includes Area 4B catch during the PFMC management period (May 1 – September 15); Area 4B Treaty troll catch outside PFMC period included under Strait of Juan de Fuca net and troll (October-April).

^{4/} Includes Oregon troll catch in Area 1.

⁵/ FRAM modeled pre-season fishery impacts cover the current fishery planning year, for Chinook defined as May 1 through April 30.

⁶ Mainstem retained adult sport catch only (upstream to McNary Dam for spring, Priest Rapids Dam for summer and to Hwy 395 for fall). See tables 10, 22-23 in the current Joint Staff Report regarding spring and summer Chinook and tables 25-27 in the annual fall report.

^{7/} Includes Grays Harbor catch, as well as catch from the Chehalis and Humptulips Rivers and their tributaries for sport and Chehalis and Humptulips Rivers for net estimates.

⁸ Mainstem retained catch only, includes tribal C&S and Commercial from all gear types and non-tribal (Columbia River mouth upstream to McNary Dam). Catch data from annual Joint Staff Reports. Winter and spring catch Tables 7 (Tribal) and T18 (non-Tribal). Summer catch is in Table10. Fall catch from annual fall report T21, 23 and 29. http://wdfw.wa.gov/fishing/crc/staff_reports.html.

^{9/} Includes catch from mark-selective fisheries as shown in table 3.

^{10/} Sport data for the most recent two years are preliminary. All data subject to change.

^{11/} Includes non-tribal & tribal commercial, as well as tribal C&S for all gear types.

¹²/ Chinook fisheries in Puget Sound Rivers are modeled using the Terminal Area Management Module (TAMM), based upon FRAM output of terminal run sizes. Total Mortality is estimated in TAMM as catch + non-retention mortality (PFMC 2008).

^{13/} Includes Oregon sport catch in Area 1.

Table 16. Preliminary 2019 Landed Coho Catch for Washington and Oregon Fisheries of Interest to the Pacific Salmon Commission. Values are presented in number of fish rounded to the nearest 100. 6/

		2019				1	andad					
	Preseas	son ^{9/}					Landed					
Fisheries	Total Mortality ^{1/}	Landed ^{2/}	Preliminary Landed	2018	2017	2016	2015	2014	2013	2012		
		0	CEAN FISHI	ERIES								
			Commercial '	Γroll								
Neah Bay and La Push (area 3,4,4B) ^{3/} Columbia Ocean Area and Westport (area	67,800	61,700	55,100	11,900	13,300	-	4,100	60,100	48,500	38,600		
1,2) 10/	31,500	23,700	5,900	1,300	1,800	-	4,800	19,000	5,400	2,800		
Sport (see text for quota information)												
Neah Bay (area 4)	20,100	16,600	6,200	4,900	3,500	100	7,800	5,600	6,500	7,500		
La Push (area 3)	4,900	4,200	1,800	1,000	1,750	-	600	4,600	2,800	2,200		
Westport (area 2)	68,800	59,100	20,200	15,400	15,750	-	30,700	54,500	20,400	11,900		
Columbia Ocean Area (area 1) ^{12/}	90,700	79,800	53,500	20,500	21,600	18,600	44,600	75,100	20,500	11,400		
		II	NSIDE FISHE	ERIES								
			Sport 7/			_	_	_				
Strait of Juan de Fuca (area 5,6)	25,400	21,800	-	28,500	5,450	200	62,900	63,000	41,300	76,200		
San Juan Islands (area 7)	1,100	1,100	-	4,800	100	100	3,700	2,000	2,600	2,200		
Puget Sound Marine (area 8-13)	49,800	44,500	-	51,000	35,200	5,200	77,200	59,200	72,100	91,300		
Puget Sound Rivers	25,900	24,600	-	18,300	9,000	11,300	18,600	17,900	70,000	43,500		
North WA Coastal Rivers	6,000	5,800	-	2,000	4,900	1,600	3,600	8,800	7,200	2,700		
Grays Harbor ^{5/}	14,900	14,200	-	4,000	9,200	3,700	8,200	27,300	21,200	18,300		
Columbia River Buoy 10 ^{4/,11/}	58,700	50,000	23,500	6,800	18,800	9,200	36,900	57,700	7,600	7,400		
			Commercia	l ^{8/}		_	_					
Strait of Juan de Fuca net and troll (area 4B,5,6C)	2,700	2,700	400	5,000	1,200	700	1,700	2,300	2,700	3,500		
San Juan Islands (area 6,7,7A)	10,900	7,500	1,900	4,000	3,400	4,100	3,900	19,800	19,400	10,500		

Puget Sound Marine (area 8-13,7B-D)	133,300	130,400	47,000	124,600	134,400	210,900	28,800	108,400	168,500	236,300
Puget Sound Rivers	74,700	73,200	41,500	114,600	63,200	65,400	17,800	73,400	136,000	132,400
North WA Coastal Rivers	47,300	46,300	12,000	22,000	63,500	57,800	18,400	101,400	44,800	39,700
Grays Harbor (area 2A-2D) 5/	33,100	32,500	7,700	9,800	12,700	3,200	14,700	80,100	30,400	43,400

¹/ Estimates of total mortality include non-retention mortality. Total Mortality is estimated by Fishery Regulation Assessment Model (FRAM) as catch + incidental mortality, where incidental mortality = drop off + non-retention mortality (PFMC 2008).

^{2/} For ocean fisheries this column shows the Coho troll and recreational quotas used for 2019 pre-season fishery planning as distributed by ocean area (Landing Quotas = Landed). See text for any in-season adjustments.

^{3/} Includes area 4B catch during the PFMC management period (May 1 – September 15); area 4B Treaty troll catch outside the PFMC period included under Strait Juan de Fuca net and troll (October-April).

⁴/ Retained catch only. See table 26 in the current Fall Joint Staff report available on line at http://wdfw.wa.gov/fishing/crc/staff_reports.html.

⁵/ Includes Grays Harbor catch, as well as catch from the Chehalis and Humptulips Rivers; their tributaries are included in sport estimates only.

⁶ Includes catch from mark-selective fisheries where estimates are available.

⁷/ Sport data for the most recent two years are preliminary. All data subject to change.

⁸/ Includes Non-Tribal and Tribal commercial and take home, as well as Tribal ceremonial and subsistence (C&S) for all gear types. Starting in 2012, the Copalis, Moclips, and Ozette Rivers have been removed from landed catch.

^{9/} FRAM modeled pre-season fishery impacts cover the current fishery planning year, for Coho defined as January 1 through December 31.

^{10/} Includes Oregon troll catch in Area 1.

^{11/}Sport data are preliminary. For Buoy 10, see tables 25 in the annual fall report.

¹²/ Includes Oregon sport catch in Area 1.

Table 17. Mark-Selective Chinook and Coho Fisheries by Area and Year. "Yes" denotes that a mark selective fishery occurred, even if it only occurred in a subset of the fishing area, season, gear type, or user group.

	2010	2010	201=	2016	2015	2011	2012	2012	2011	2010	2000
Selective Coho	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Ocean Troll											
Cape Flattery & Quillayute (Areas 3/4)	yes	yes	yes	no	yes						
Columbia R & Grays Harbor (Areas 1 & 2)	yes	yes	yes	no	yes						
Ocean Sport											
Neah Bay (Area 4)	yes	yes	yes	no	yes						
LaPush (Area 3)	yes	yes	yes	no	yes						
Grays Harbor (Area 2)	yes	yes	yes	no	yes						
Col. R. (Leadbetter Pt. to Cape Falcon)	yes										
Inside Fisheries											
Sport											
Juan de Fuca (Areas 5 & 6)	yes										
San Juan Islands (7)	no	no	no	no	yes						
Puget Sound Sport (Areas 8-13 all year)	yes										
Puget Sound Rivers	yes										
North WA Coastal Rivers	yes										
Grays Harbor (Areas 2-2)	yes	no	yes	yes							
Willapa Bay (Area 2-1)	no	no	yes	no	yes	no	no	no	no	yes	no
Columbia River Buoy 10	yes										
Commercial											
North WA Coastal Rivers	no										
Grays Harbor (Areas 2A-2D)	no	yes	yes	yes							
Willapa Bay (Area 2-1)	no	yes	no								
Columbia River Net/ - Fall	yes	no	no	no	yes	yes	yes	no	no	no	no
Strait of Juan de Fuca (Areas 4B/5/6C) Net & Troll	no										
San Juan Islands (Areas 6, 7 & 7A)	yes										
Puget Sound Marine (Areas 8 - 13)	no	no	no	yes	no						
Puget Sound Rivers	no										
Selective Chinook	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Ocean Troll											
Cape Flattery & Quillayute (Areas 3/4/4B)	no										
Columbia. R & Grays Harbor (Areas 1&2)	no										
Ocean Sport											
Neah Bay (Area 4)	no	no	no	no	yes	yes	yes	yes	yes	yes	no
La Push (Area 3)	no	no	no	no	yes	yes	yes	yes	yes	yes	no
Grays Harbor/Westport (Area 2)	no	no	no	yes	no						

Col. R./Ilwaco (Leadbetter Pt. to Cape Falcon)	no	no	no	no	yes	yes	yes	yes	yes	yes	no
Inside Fisheries											
Sport											
Juan de Fuca (Area 5&6)	yes										
San Juan Islands (Area 7)	yes										
Puget Sound Sport (Areas 8-13)	yes										
Puget Sound Rivers	yes										
North WA Coastal Rivers	yes										
Grays Harbor (Areas 2-2)	yes	no	no	no							
Columbia River Sport - Winter/Spring	yes										
Columbia River Sport - Summer	yes	no									
Columbia River Sport - Fall	yes	no	yes	yes	yes	yes	yes	yes	no	no	no
Willapa Bay (Area 2-1)	yes										
Commercial											
North WA Coastal Rivers	no										
Grays Harbor (Areas 2A-2D)	yes	no	no	no							
Willapa Bay (Area 2-1)	yes										
Columbia River Net-Winter/Spring	no	no	na	yes							
Columbia River Net - Summer	no	no	na	no							
Columbia River Net - Fall	no	no	no	yes	yes	yes	yes	no	no	no	no
Strait of Juan de Fuca(4B/5/6C) Net & Troll	no										
San Juan Islands (Areas 6, 7 & 7A)	yes										
Puget Sound Marine (Areas 8 - 13)	no	no	no	no	yes	no	no	no	yes	yes	no
Puget Sound Rivers	yes	yes	yes	no	yes	yes	yes	yes	yes	no	no

III. PRELIMINARY REVIEW OF THE 2019 WASHINGTON CHUM SALMON FISHERIES OF INTEREST TO THE PACIFIC SALMON COMMISSION

This summary report provides a preliminary review of the 2019 U.S. Chum salmon (*Oncorhynchus keta*) fisheries conducted by Puget Sound salmon co-managers (Puget Sound Treaty fishing tribes and the State of Washington) in the Strait of Juan de Fuca (Salmon Management and Catch Reporting Areas 4B, 5 and 6C), the San Juan Islands and the Point Roberts area (Areas 7 and 7A) (Figure 39), conducted in compliance with provisions of Chapter 6 of Annex IV of the Pacific Salmon Treaty (PST 2019). The harvest and abundance information provided are based on preliminary data reported through November 18, 2019. These preliminary data are subject to correction and revision as additional information becomes available.

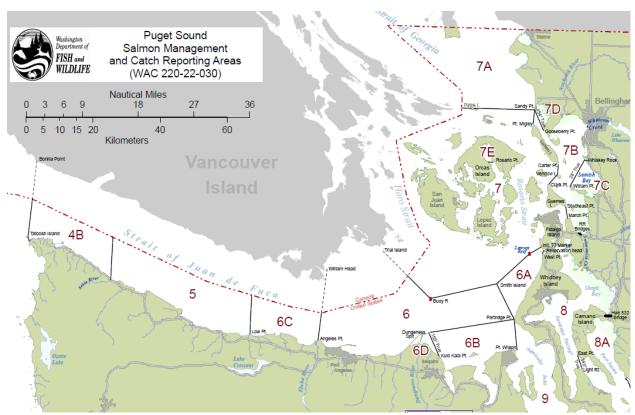


Figure 39. Puget Sound Salmon Management and Catch Reporting Areas with Chum salmon fisheries of interest to the Pacific Salmon Commission.

MIXED STOCK FISHERIES

Areas 4B, 5 and 6C

As in previous years, the 2019 Chum salmon fishery in Areas 4B, 5 and 6C was restricted to limited effort of Tribal fishers using gillnets. The fall Chum-directed salmon fishery opened the week of October 13, with a schedule of six days per week and continued through November 9. A total of 310 Chum salmon were harvested during this period (Table 18). During the fall Chum fisheries in Areas 4B, 5, and 6C, there was a reported by-catch of 6 Coho, 31 Chinook, and zero Steelhead.

Table 18. Preliminary 2019 Chum salmon harvest report for Washington Salmon Catch Reporting Areas 4B, 5, and 6C.

Areas 4B, 5, 6C	Areas 4B, 5, 6C									
Tribal Gill Net On	ly									
Time Periods	GN									
Through 9/21	0									
9/22-9/28	1									
9/29-10/5	2									
10/6-10/12	193									
10/13-10/19	12									
10/20-10/26	102									
10/27-11/2	0									
11/3-11/9	0									
11/10-11/16	0									
Total	310									

Areas 7 and 7A

Chum salmon fisheries in Areas 7 and 7A are regulated to comply with a base harvest ceiling of 125,000 Chum salmon, unless Canada estimates chum stocks migrating through Johnstone Strait ("Inside Southern Chum salmon") are below the critical threshold of 1.0 million (PST 2019). Chapter 6 of Annex IV specifies that U.S. commercial fisheries for Chum salmon in Areas 7 and 7A will not occur prior to October 10. Paragraph 9 (a) specifies run sizes below 1.0 million as critical (estimated by Canada). For Inside Southern Chum run sizes below the critical threshold, Paragraph 10 (b) states the U.S. catch of Chum salmon in Areas 7 and 7A will be limited to those taken incidentally to other species and in other minor fisheries, and shall not exceed 20,000.

On October 7, 2019 Canada notified the U.S. that the Inside Southern Chum aggregate was estimated to be below the critical threshold of 1.0 million and the U.S. was expected to limit chum harvest to incidental and minor fisheries not exceeding 20,000. Following this notification, the U.S. cancelled Area 7 and 7A commercial chum fisheries that were scheduled to open on October 10. Additionally, beginning October 10, the U.S. required chum release from reef net fisheries targeting coho and scheduled the reef net fishery to close on October 16.

Paragraph 9 (d) states that Canada will provide an in-season estimate of Fraser River Chum salmon run size no later than October 22. If that estimate is below 1,050,000, then the U.S. will limit its fishery in Areas 7 and 7A to not exceed a catch of 20,000 additional Chum salmon from the day following notification. On October 16, 2019, Canada notified the U.S. that the Fraser River chum run size was estimated to be below the 1,050,000 fish threshold. Therefore, the U.S. was expected to limit chum harvest to not exceed 20,000 from the day following this notification. Areas 7 and 7A therefore remained closed to commercial chum fisheries through the remainder of the Chum management period.

Non-Tribal reef net fisheries targeting Coho salmon were conducted following the end of Fraser Panel control on September 17 with chum and unmarked coho retention prohibited prior to

October 1. Chum salmon by-catch in this fishery was 574. Following notification from Canada on the prohibition of chum salmon retention, reefnets were required to release chum from October 10 through the end of the fishery on October 16.

The total 2019 Chum salmon catch by all gears in Areas 6, 7, and 7A (reported through November 18) was just 612 fish (Table 19). Because no fall Chum salmon-directed fisheries occurred in Areas 6, 7, and 7A, there was no reported by-catch of Coho, Chinook, or zero Steelhead (Table 19).

Table 19. Preliminary 2019 Chum salmon harvest report for Washington Salmon Catch

Reporting Areas 6, 7 and 7A.

	Area 6			Are	a 7		1	Area 7A	Area 6,7,7A
Time Periods	GN	PS	GN	RN	Area Total	PS	GN	Area Total	Total
Through 9/21		24			24	14		14	38
9/22-9/28					0			0	0
9/29-10/5				6	6			0	6
10/6-10/12				568	568			0	568
10/13-10/19					0			0	0
10/20-10/26					0			0	0
10/27-11/2					0			0	0
11/3-11/9					0			0	0
11/10-11/16					0			0	0
Total	0	24	0	574	598	14	0	14	612
	Gear T	Гуре А	Abbrev	iations:	GN=Gill Net; PS=P	urse	Seine;	RN=Reef Net	
10/10- 11/18	Cohou	. 0	Chin	o oliv O	Staalbaad, O		_		
By-catch	Coho:	U	Chin	ook: 0	Steelhead: 0				

PUGET SOUND TERMINAL AREA FISHERIES AND RUN STRENGTH

Pre-season forecasts for Chum salmon returns to Puget Sound in 2019 predicted a fall Chum run size totaling approximately 1,092,085 fish, with 518,645 Chum predicted to return to Hood Canal and 449,345 predicted to return to South Puget Sound. As of the date of this report, inseason estimates indicate that Chum returns to Puget Sound are generally well below forecast. In-season run size estimates from the 2019 fall Chum fisheries in Hood Canal and South Puget Sound indicate that South Sound fall Chum is roughly half of the pre-season forecast and Hood Canal is about two-thirds of that forecast. As of the date of this report, spawning escapement surveys are in progress for most Puget Sound stocks and therefore escapement estimates are not yet available. Early indications from these surveys suggest that a number of natural chum stocks may fail to meet their escapement goals again this year. It is also now evident that a number of fall Chum hatchery programs throughout Puget Sound will likely not achieve their egg-take objectives for 2019.

REFERENCES

Pacific Salmon Treaty (PST) Act of 1985. 2019 Agreement. U.S.-Canada. Public Law 99-5, 16 U.S.C. 3631.

IV. PRELIMINARY REVIEW OF 2019 UNITED STATES FRASER RIVER SOCKEYE FISHERIES

INTRODUCTION

The 2019 Fraser River Panel fishing season was implemented under Annex IV of the Pacific Salmon Treaty (PST 2014), and guidelines provided by the Pacific Salmon Commission to the Fraser River Panel. The treaty establishes a bilateral (U.S. and Canada) Fraser River Panel (Panel) that develops a pre-season management plan and approves in-season fisheries within Panel Area waters directed at sockeye and pink salmon bound for the Fraser River (Figure 40). In partial fulfillment of Article IV, paragraph 1 of the PST, this document provides a season review of the 2019 U.S. Fraser River salmon fisheries as authorized by the Panel. Catch and abundance information presented is considered preliminary.

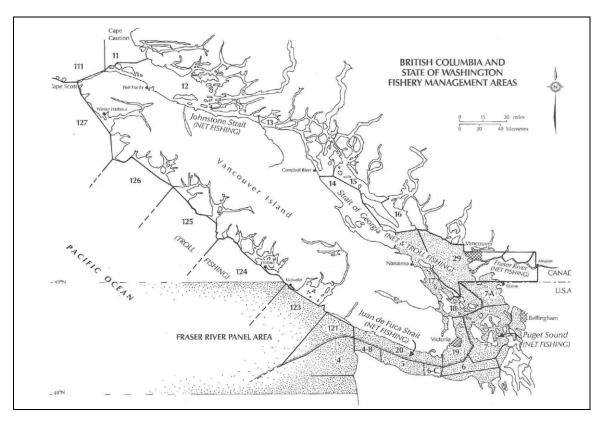


Figure 40. British Columbia and State of Washington Fishery Management Areas, 2019. The shaded area in the figure represents the marine waters managed by the Fraser River Panel.

PRE-SEASON EXPECTATIONS AND PLANS

Forecasts and Escapement Goals

Pre-season run size forecasts and escapement goals by run-timing group (run) at various probability levels were provided to the Panel by the Department of Fisheries and Oceans, Canada (DFO). Table 20 shows the 2019 pre-season sockeye forecasts based on the 50 percent probability level, which represent the mid-point of the range of forecast run sizes. Table 20 also provides the escapement goals for the sockeye run-timing groups based on the pre-season forecast of abundance. The escapement goals for all runs can change in-season as the run size estimates are updated.

Fraser River pink salmon returns were projected pre-season at 5,018,600 fish, with an escapement goal of 4,483,400.

Table 20. 2019 pre-season Fraser River sockeye forecasts and escapement goals by run-timing group.

	Early Stuart	Early Summer	Summer	Late	Total
Forecast of Abundance	41,000	465,000	3,930,000	359,000	4,795,000
Escapement Goal	41,000	186,000	1,572,000	336,600	2,135,600

Northern Diversion Rate

Northern diversion rate is defined as the percentage of Fraser sockeye migrating through Johnstone Strait (rather than the Strait of Juan de Fuca) in their approach to the Fraser River. The pre-season forecast for diversion was 69%, which is greater than the 1990-2017 median diversion of 63%. For pink salmon, a pre-season northern diversion rate of 50% was adopted.

Management Adjustment (MA) and Environmental Conditions

Management adjustments (MA) for sockeye salmon reflect the anticipated difference between escapement estimates at Mission (minus catch above Mission) and actual spawning escapements. Adjustments adopted by the Panel are added to the gross escapement goal, effectively increasing the spawner escapement goal for that run-timing group. MAs are modeled using forecasts of environmental conditions and return timing or median historical differences between estimates. Table 21 provides the pre-season projected MAs used for planning fisheries in 2019. In-season management adjustments use MA models that are based on both measured and forecasted temperatures and discharges or, for Late-run sockeye, upstream migration timing.

Table 21. 2019 pre-season proportional management adjustment (pMA) and corresponding

proportional difference between estimates (pDBE¹) for each run-timing group.

Early	Stuart	Early	Summer	Sum	ımer		Late
pMA	pDBE	pMA	pDBE	pMA	pDBE	pMA	pDBE
0.69	-41%	0.45	-31%	0.09	-8%	0.56	-36%

¹ Early Stuart pDBE = "all years" historical median; Early Summer pDBE = "dominant/subdominant cycle" historical median; Summer pDBE = "all years" historical median; Late pDBE = weighted odd-year median for Lates excluding Birkenhead (-0.58) and all years Birkenhead (-0.27) using p50 forecast abundance.

Run Timing

Run timing is temporal information about the presence of a salmon stock in a specific time and area. Run timing is an important variable when planning fisheries and updating run sizes inseason. The following Area 20 50% dates (the dates when 50% of the run is forecast to have passed through Area 20) were predicted pre-season for the major Fraser River sockeye run groups.

Table 22. 2019 Area 20 median 50% run timing dates and updated pre-season timing forecasts in June.

Run-Timing Group	Area 20 50% Run-Timing Median Date	Area 20 50% Run Timing (June) ¹
Early Stuart	July 4	July 5
Early Summer	July 30	July 30
Summer	August 10	August 10
Late	August 18	August 18
Pink Salmon	August 28	August 28/25 ²

¹ DFO sockeye run-timing forecast used for Early Stuart and Chilko. All remaining components used the historical median run timing.

U.S. Total Allowable Catch (TAC)

Following Annex IV of the PST, U.S. TAC is calculated as 16.5% of the TAC for international sharing for sockeye salmon and 25.7% for pink salmon. Pre-season, the U.S. TAC was established at 331,800 sockeye and 135,800 for pink salmon. The TAC available by sockeye runtiming group is shown in Table 23.

Table 23. 2019 U.S. total allowable catch (TAC) by run-timing group¹.

Run Timing Group	Pre-season U.S. TAC
Early Stuart	0
Early Summer	22,700
Summer	309,100
Late	0
Total	331,800
Pink Salmon	135,800

¹ Based on Panel-approved final pre-season model run.

² The pink run-timing forecast from DFO was not available for the June meeting and pre-season modeling for pink salmon was based on the August 28 median.

Pre-season Management Plans

During the pre-season planning process the Panel evaluates and adopts management approaches for Fraser sockeye that address conservation and harvest objectives for each major run-timing group. The Panel develops fishing plans and in-season decision rules with the objective of meeting management goals. Managing Fraser River sockeye salmon involves a trade-off between catching abundant runs while meeting escapement objectives for less abundant run-timing groups.

In 2019, based on the pre-season forecast, only the Early Summer and Summer run-timing groups had U.S. TAC (Table 23) with the majority of TAC (~95%) in the Summer-run group which was expected to be dominated by the Chilko stock. The U.S. planned to begin fishing relatively early to avoid Late run sockeye which had no U.S. TAC. U.S. fisheries were planned to commence in late July in areas 4B/5/6C and in early August in areas 6/7/7A to target the Summer-run group while also harvesting co-migrating Early-Summer run sockeye and pink salmon.

IN-SEASON MANAGEMENT

In-season, the Pacific Salmon Commission staff analyzes a variety of information to produce best estimates of northern diversion, management adjustments, timing, abundance, and harvest by run-timing group. Stock identification information (both genetic data and scales), age data, test fishing data, escapement counts past Mission, harvest data, and environmental information are all used to provide in-season estimates that are critical to the Fraser Panel for making management decisions.

Run Assessment

The final in-season total sockeye abundance estimate adopted by the Fraser River Panel in 2019 was 500,000 (Table 24), which was about 10% of the pre-season forecast. This is the lowest sockeye return to the Fraser River since record keeping began. All run-timing groups returned below their pre-season forecast. The return of Summer-run sockeye, the group with the largest pre-season forecast, was only 9% of the pre-season forecast.

The 2019 Fraser sockeye run timing varied across run-timing groups. The Early Stuart run was three days later than the pre-season forecast, while the Early Summer run was one day early. Summer-run sockeye had the greatest discrepancy from expected pre-season forecast timing, arriving nine days later than expected, while Late-run sockeye returned one day late (Table 25). Fraser pink salmon were eleven days early relative to the pre-season median timing and eight days earlier than the in-season forecast provided by DFO.

Table 24. Comparison of 2019 pre-season to final adopted in-season abundance estimates

for Fraser River sockeye salmon, by run-timing group.

			Comparison:
	Pre-Season 50%	In-Season Run	In-Season
Run Timing Group	Probability Forecast	SizeEstimate ¹	/Pre-Season
Early Stuart	41,000	26,000	63%
Early Summer	465,000	94,000	20%
Summer	3,930,000	360,000	9%
Late	359,000	20,000	6%
Total Sockeye	4,795,000	500,000	10%
Pink Salmon	5,018,600	8,900,000	173%

¹ As of September 24, 2019.

Table 25. Comparison of 2019 preliminary 50% run-timing dates through Area 20 to inseason estimates.

	Pre-season 50% Run- Timing	In-season 50% Run- Timing
Run-Timing Group	Date	Date
Early Stuart	July 5	July 8
Early Summer	July 30	July 29
Summer	August 10	August 19
Late	August 18	August 19
Pink Salmon	August 28/August 25	August 17

Season Description

The Fraser Panel held 22 regular meetings either in-person or by conference call from July 9 through September 17 (usually on Tuesdays and Fridays) to receive updates from PSC staff on the abundance and timing of the sockeye and pink salmon returns and to review migration conditions in the Fraser River watershed. In 2019, a major landslide on the Fraser River at Big Bar (83 km north of Lillooet, B.C. by river) drastically altered flow conditions in-river limiting fish passage through the area. Water temperature and flow conditions however were not a major factor affecting management decisions in 2019 because of the extremely low number of sockeye returning. The last Fraser Panel in-season meeting was on September 17. Table 26 summarizes changes to run sizes made by the Fraser Panel during the 2019 season and the effect on U.S. TAC.

The following summarizes the major decisions related to U.S. fishing during the 2019 season. Prior to the first U.S. commercial fishery opening, the Panel reduced the adopted run sizes for all sockeye run-timing groups significantly and there was no U.S. TAC for sockeye after the August 13 Panel meeting. Therefore, all U.S. commercial fisheries in 2019 were pink-directed fisheries.

Week ending August 23, 2019

The first panel-approved U.S. commercial fishery opening was from August 21 to August 23 in areas 4B/5/6C and 7/7A for Treaty Indian fishers. The pink run size increased to 7,400,000 on August 23. The pink salmon northern diversion rate remained low at 4%.

Week ending August 30, 2019

The first All Citizens purse seine and gillnet fisheries were opened in areas 7/7A (excluding the apex) on August 24 and 25. The Treaty Indian fishery in areas 4B/5/6C was open from August 24-28. Treaty Indian and All Citizens reefnet fisheries were open in Area 7 on August 25 and 26. The Panel agreed to a provisional pink salmon run size of 5.0 million on August 27, reducing the U.S. TAC below the already landed catch. No further U.S. fisheries were planned. The pink salmon diversion rate increased to 59%. Purse seine test fisheries in areas 12 and 20 finished on August 30, therefore no additional marine CPUE or diversion rate estimates were available for the remainder of the 2019 season.

Week ending September 6

No changes were made to the sockeye or pink salmon run sizes and U.S. fisheries remained closed.

Week ending September 13

On September 12, the Panel approved run size updates for all sockeye run timing groups and the pink salmon run size increased to 8,900,000, which increased U.S. pink salmon TAC and allowed for additional fisheries. All Citizens gillnet and purse seine fisheries were open in Area 7 on September 13 and in Area 7A (excluding the apex) on September 13 and 14 with the September 14 fishery opening having reduced hours. All Citizens and Treaty Indian reefnet fisheries were open in Area 7 on September 13 and 14. Treaty Indian fisheries in areas 4B/5/6C were open from September 15-16. No additional U.S. fisheries were planned thereafter.

The Fraser Panel relinquished control of U.S. fishery areas as follows:

- o Areas 4B/5/6/6C/7 on 11:59 p.m. September 17, 2019,
- o Area 7A (excluding the apex) on 11:59 p.m. September 21, 2019, and
- o Area 7A (apex area) on 11:59 p.m. October 5, 2019.

Table 26. Summary of changes to Fraser River sockeye and pink salmon run sizes adopted by the

Fraser Panel during the 2019 season and U.S. TAC.

Mosting Data	Run-Timing		U.S. T	AC
Meeting Date	Group	Change Made	Sockeye	Pink
Pre-season			331,800	135,800
July 19, 2019	Early Stuart	decreased to 27,000	331,800	135,800
August 2, 2019	Early Summer	decreased to 221,000	308,900	135,800
August 9, 2019	Early Summer	decreased to 112,000	312,8001	135,800
August 13, 2019	Summer	Decreased to 1,065,000	0	136,200
August 16, 2019	Early Summer Summer Late	Decreased to 85,000 Decreased to 224,000 Decreased to 111,000	0	136,200
August 20, 2019	Early Summer Summer	Increased to 90,000 Increased to 400,000	0	131,600
August 23, 2019	Late Pink	Decreased to 40,000 Increased to 7,400,000	0	353,800
August 30, 2019	Pink	Decreased to 5,000,000	0	130,500
September 12, 2019	Early Stuart Early Summer Summer Late Pink	Decreased to 26,000 Increased to 94,000 Decreased to 360,000 Decreased to 20,000 Increased to 8,900,000	0	739,300

¹ Despite the Early-summer run size decreasing, the TAC increased due to revised test fishing deductions.

Harvest

Based on the pre-season forecasts, U.S. harvest opportunities in 2019 was anticipated to be good for sockeye given the "sub-dominant" cycle return with ~ 332,000 sockeye available for U.S. harvest. However, pink salmon harvest was expected to be modest with only ~136,000 U.S. TAC. From the beginning of in-season assessments, sockeye failed to meet pre-season expectations. On August 13th, the Summer run size was downgraded from 3,930,000 to 1,065,000 which eliminated all U.S. sockeye TAC. Pink-directed Treaty Indian fisheries which started on August 21, requested fishers to make all efforts to release sockeye alive, and All Citizens fisheries required sockeye release. In those fisheries 470 sockeye were harvested by Treaty Indian fishers and landed for C&S purposes (Table 27). Thereafter, sockeye were required to be released from pink-directed Treaty Indian fisheries due to the extremely low inseason abundance of sockeye. The pink salmon run size varied throughout the season and eventually increased to 8,900,000 on September 12, 2019. However, despite additional All Citizens and Treaty Indian fisheries following this run size increase, most of the returning pink salmon had passed through U.S. waters. A total of 232,904 Fraser pink salmon were harvested in U.S. fisheries in 2019 (Table 28). Of this, 159,380 pink salmon were harvested in the Treaty Indian fishery (68%) and 73,524 in the All Citizens fishery (32%). Treaty Indian commercial fisheries were open for 10 days in areas 4B/5/6C and 4 days in 7/7A. All Citizens fisheries were open for 4 days for each gear type.

Table 27. Preliminary summary of 2019 U.S. catches of Fraser River sockeye salmon in Panel area waters.

	Treaty Indian	All Citizens
Ceremonial and Subsistence (all areas)	470	0
Commercial Catch in Areas 4B/5/6C	0	0
Commercial Catch in Areas 6/7/7A	0	0
Total Catch	470	0
% of U.S. Catch	100%	0%

Table 28. Preliminary summary of 2019 U.S. catches of Fraser River pink salmon in Panel area waters.

	Treaty Indian	All Citizens
Ceremonial and Subsistence (all areas)	0	0
Commercial Catch in Areas 4B/5/6C	0	0
Commercial Catch in Areas 6/7/7A	159,380	73,524
Total Catch	159,380	73,524
% of U.S. Catch	68%	32%

The 2019 Fraser sockeye and pink salmon season presented many management challenges:

- The sockeye salmon return was only 10% of the pre-season forecast and the lowest on record (<500,000 fish).
- The run timing for the Summer run (August 19) was the second latest recorded and affected the scheduling of pink-directed fisheries in order to reduce sockeye impacts.
- The run timing for the pink salmon run (August 19) was the earliest recorded which also affected the scheduling of pink-directed fisheries in order to reduce sockeye impacts.
- The migration time of pink salmon from Area 20 to the Fraser River appears to have been the longest ever observed at > 20 days.

POST-SEASON REPORT FOR THE 2019 CANADIAN TREATY LIMIT FISHERIES

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I INTRODUCTION

The chapters in Annex IV of the Pacific Salmon Treaty outline the joint conservation and harvest sharing arrangements between Canada and the United States of America (U.S.) for key stocks and fisheries subject to the Treaty. On December 23, 2008, Canada and the U.S. ratified new provisions for five chapters under Annex IV of the Pacific Salmon Treaty. These chapters came into effect on January 1, 2009 and remain in force until 2018. Chapter 4, which covers Fraser River Sockeye and Pink Salmon, was revised in July 2014 and these revisions cover fisheries in 2014 through 2019. All management regimes under Annex IV continue to be implemented by Fisheries and Oceans Canada (DFO) for the 2019 season.

Annex fisheries are reported in the order of the Chapters of Annex IV. Comments begin with expectations and management objectives, escapements (where available and appropriate) and catch results by species. The expectations, management objectives, catches and escapements focus on those stocks and fisheries covered by the Pacific Salmon Treaty.

Annually, DFO releases a Salmon Outlook document which is referenced in various sections of this report; this document provides a categorical indication of salmon production (using a 4 point rating scale), and associated fishing opportunities by geographic area and species stock groups called an Outlook Unit for the coming season. Pre-season quantitative forecasts are documented where they are produced.

The catch information reported in this document provides the best information available to September 30, 2019. The catches are based on in-season estimates (hailed statistics); on-grounds counts by DFO, logbooks, dockside tallies, landing slips (First Nation fisheries), fish slip data (commercial troll and net), creel surveys and observers (recreational and commercial). Appendix 1 summarizes 2003-2019 catches in Canadian fisheries that have at some time been under limits imposed by the Pacific Salmon Treaty. All Southern commercial, recreational, First Nations, Excess Salmon to Spawning Requirements (ESSR) and test fisheries are reported in appendices at the end of this report.

2 TRANSBOUNDARY RIVERS

2.1 STIKINE RIVER

Following the 2019 pre-season meeting of the Transboundary Panel, Canada developed its fishing strategy for Stikine River salmon fisheries based on the catch sharing and management arrangements outlined in Annex IV, Chapter 1 of the Pacific salmon Treaty (PST). The 2019 Canadian Stikine River salmon fishery management approach was designed to achieve the spawning escapement targets and the following harvest objectives: 1) to harvest 47% of the total allowable catch (TAC) of Stikine River Sockeye Salmon in existing fisheries; 2) to allow additional harvesting opportunities for Sockeye that were surplus to spawning requirements; and 3) to harvest up to 5,000 Coho Salmon through a directed fishery. A pre-season forecast of 8,300 Chinook was below the PST threshold run size of 24,500 which did not allow for a directed Chinook fishery in 2019. The low forecast abundance of Chinook Salmon also resulted in the cancellation of the 2019 Chinook assessment fishery.

The 2019 Canadian Stikine River commercial fishing season opened on June 25 (statistical week 26) and ended September 7 (statistical week 36). From statistical weeks 26 through 29 a directed Sockeye fishery was prosecuted followed by a directed Coho fishery which began in statistical week 35 and ended in statistical week 36. No commercial harvest opportunity was provided during statistical weeks 30 through 34 due to low abundance of non-Tahltan Lake origin Sockeye Salmon.

Commercial fishing gear permitted for the 2019 season was limited to one 135-metre (443 ft.) gill net per licence holder. The maximum mesh size permitted was 140 mm (5.5") through July 20, followed by a maximum mesh size of 204 mm (8"). The lower Stikine commercial fishing zone covered the area from the international (U.S./Canada) border upstream to near the confluence of the Porcupine and Stikine Rivers, and also included the lower 10 km (6 mi.) reach of the Iskut River.

In the upper Stikine River commercial fishery, located upstream from the Chutine River, fishing periods generally mirrored those in the lower Stikine River commercial fishery, but lagged by one week. Each commercial fishery licence holder was permitted the use of one net. As in past years, the commercial fishing area was located upstream of the Chutine River to the mouth of the Tuya River. The Canadian First Nation Food, Social, and Ceremonial (FSC) fishery located near the community of Telegraph Creek, British Columbia (BC) was active from June to the first week of August, with no time or gear restrictions imposed in 2019. To facilitate Chinook Salmon conservation, efforts were implemented within the First Nation FSC to minimize Chinook Salmon catch.

Canadian recreational fishery effort was effectively absent in 2019 due to area, retention, and size restrictions for the duration of the Chinook Salmon season.

2.1.1 CHINOOK SALMON

The pre-season forecast of 8,300 large (i.e. fish with a mid-eye to fork length of > 660mm (~26") or a fork length of > 735mm (~29")) Chinook Salmon, as developed by the Canada/U.S. Transboundary Technical Committee (TTC), (TTC)did not result in a total allowable catch allocation that could accommodate directed fisheries. The current, bilaterally recognized fishery management strategy, specifies that a pre-season forecast

run size of < 24,500 precludes either Canada or the U.S. from prosecuting a directed fishery. Specific management provisions were implemented within all Canadian fisheries to minimize the likelihood of interception of Chinook Salmon in 2019.

The 2019 total Canadian fishery catch of Chinook Salmon was 333 large Chinook Salmon and 237 jacks (which occurred exclusively within the First Nation FSC fishery). This was well below the 10-year average of 2,900 large Chinook Salmon and 1,000 jacks. No Chinook Salmon were harvested within the 2019 recreational or commercial fisheries as retention was prohibited.

The preliminary post-season estimate of the 2019 Stikine River Chinook Salmon terminal run was approximately 14,400 large Chinook Salmon. Accounting for the total Canadian catch of Chinook Salmon, the total system-wide spawning escapement was estimated at approximately 13,600 large Chinook Salmon. The Chinook Salmon escapement estimate of 13,600 is 22% below the target S_{MSY} escapement goal of 17,400 large Chinook Salmon and did not achieve the lower end of the escapement goal range.

2.1.2 SOCKEYE SALMON

The forecast for Stikine River Sockeye Salmon, as developed by the TTC, was for a terminal run size¹ of 90,000 fish including: 66,000 Tahltan Lake origin Sockeye salmon (30,000 wild and 36,000 enhanced) and 24,000 non-Tahltan wild Sockeye Salmon. The 2019 Stikine River Sockeye Salmon terminal run size forecast was below the 10-year average terminal run size of approximately 120,000 fish.

The combined harvest of 2019 Stikine River Sockeye Salmon in Canadian c fisheries was 16,213, which is below the 10-year average of 47,000 fish. The lower Stikine River commercial fishery harvested 10,772 Sockeye, while the upper Stikine River commercial and First Nation FSC fisheries harvested a total of 40 and 5,401 Sockeye Salmon respectively. The estimate of the total contribution of Sockeye Salmon from the Canada/U.S. Stikine Sockeye enhancement program to the combined Canadian harvest was approximately 6,000 fish (or 37% of the total harvest). The Sockeye Salmon stock assessment test fishery was not conducted in 2019.

A total of 36,621 Sockeye Salmon returned to Tahltan Lake in 2019. The 10-year average is 26,600, while the escapement goal range is 18,000 to 30,000 fish. An estimated 17,900 of the fish counted (51%) originated from the bilateral Stikine Sockeye Salmon enhancement program. A total of 3,216 Sockeye Salmon were collected for broodstock to support the Stikine Sockeye Salmon enhancement program while 200 fish were removed for stock identification purposes (ESSR). It is estimated that approximately 33,000 fish successfully spawned in Tahltan Lake during 2019. The preliminary total estimated run size of 51,000 Tahltan Lake Sockeye Salmon was approximately 23% below the pre-season expectation of 66,000 fish.

The spawning escapement for the non-Tahltan Sockeye Salmon stock group is calculated using stock identification, test fishery and in-river commercial catch and effort data. Historical non-Tahltan contributions to the overall run was used as the principal tool in estimating the spawning ground escapement of the non-Tahltan Lake stock grouping in 2019. The preliminary escapement estimate for 2019 was 23,150 non-Tahltan Sockeye Salmon. The non-Tahltan spawning escapement estimate was within the escapement goal range of 20,000 to 40,000 and was slightly above the 10 year average of 22,500 fish.

¹ Terminal run excludes U.S. interceptions that occur outside Districts 108 and 106.

Based on the preliminary in-river run reconstruction of the Tahltan Lake Sockeye Salmon run expanded by run timing, along with stock identification data from lower river assessment projects and estimated harvests of Stikine River Sockeye salmon in U.S. terminal gill net fisheries, the preliminary post-season estimate of the terminal Sockeye salmon run size is approximately 86,400 fish. This estimate includes 59,200 Tahltan Lake origin fish and 27,200 Sockeye Salmon of the non-Tahltan stock group. The 2019 Stikine River Sockeye Salmon run was below the 10-year average terminal run size of ~153,000 Sockeye Salmon and is below the preseason forecast of 90,000 fish.

Based on the preliminary post-season run size estimate, Canada was allocated an allowable catch of approximately 15,000 Stikine River Sockeye Salmon. The total Canadian fishery harvest of Stikine River Sockeye Salmon in 2019 was 16,213.

2.1.3 COHO SALMON

The total Canadian fishery harvest of Coho Salmon in 2019 was 5,228. All Coho Salmon were harvested during the directed Coho Salmon fishery in statistical weeks 35 to 36. The total Canadian fishery harvest was below the recent 10-year average of 5,548 fish.

A Coho Salmon test fishery was not conducted in 2019. The CPUE observed in the targeted Coho Salmon fishery was near average for statistical weeks 35 to 36. Aerial surveys of six index spawning sites yielded below average counts observed under excellent viewing conditions.

2.1.4 JOINT SOCKEYE SALMON ENHANCEMENT PROGRAM

Joint Canada/U.S. enhancement activities continued from 2018 through 2019 with the collection of Sockeye Salmon eggs from Tahltan Lake in British Columbia, transportation of eggs to the Snettisham Hatchery in Alaska where they were raised to fry, and subsequent transportation and release at out-plant sites in British Columbia.

From May 16 to May 18, 2019 approximately 1.9 million fry were out-planted into Tahltan Lake. All fry originated from the 2018 egg-take and were mass-marked at the Snettisham hatchery with thermally induced otolith marks. Green egg to released fry survival was approximately 68%. No fry reared at the Snettisham hatchery was lost due to Infectious Hematopoietic Necrosis virus (IHNv). Sockeye Salmon enhancement programs have been subject to IHNv outbreaks before as the disease is naturally occurring in Stikine Sockeye Salmon stocks.

For 2019, the agreed bilateral Stikine River Enhancement Production Plan (TEPP) identified collection of 5.0 million Sockeye Salmon eggs from Tahltan Lake for transport to Snettisham Hatchery in Alaska for incubation and thermal marking. In the fall of 2019, the Sockeye Salmon egg collection target was revised to 4.5 million eggs to respect the projected 50/50 wild/enhanced fry population in Tahltan Lake as a result of adult escapement above the upper end of the spawning escapement goal. A total of 4.5 million sockeye salmon eggs were successfully collected and transported to Snettisham Hatchery. As in previous years additional efforts beyond beach seining were employed to acquire brood stock including angling and temporarily holding female Sockeye Salmon brood stock to mature in floating net pens in Tahltan Lake.

2.2 TAKU RIVER

Following the 2019 pre-season meeting of the Transboundary Panel, Canada developed its fishing strategy for Taku River salmon fisheries based on the catch sharing and management arrangements outlined in Annex IV, Chapter 1 of the Pacific salmon Treaty (PST). Accordingly, the Canadian fishery strategy incorporated specific conservation considerations and contained the following harvest objectives: 1) to harvest 20% of the TAC of Taku River Sockeye Salmon (adjusted as necessary according to projections of the number of enhanced Sockeye), plus harvest any salmon in excess of spawning and brood stock needs; 2) to harvest enhanced Taku River Sockeye Salmon incidentally to wild Sockeye Salmon; and, 3) to harvest 5,000 Coho Salmon plus Canada's share of the TAC and any salmon surplus to spawning needs in a directed Coho Salmon fishery.

The 2019 commercial fishing season on the Taku River opened on July 2 (statistical week 27), and closed on October 15 (statistical week 42). Fishing area and gear restrictions were as per recent years, and incorporated the maximum gill net length of 36.6 metres, established in 2008 for drift gill nets and in 2009 for set gill nets.

The Taku River commercial fishing area in Canada consists of the mainstem of the river from the international border upstream approximately 18 km (11 mi.), to a geological feature known locally as Yellow Bluff. Nearly all commercial fishing activity takes place in the lower half of this area, downstream of the Tulsequah River / Taku River confluence.

The First Nation Taku River FSC fishery is primarily located in the lower Taku River in the same area as the Canadian commercial. Small numbers of fish are also harvested on the lower Nakina River and at the outlet of Kuthai and King Salmon lakes.

Canadian recreational fishery effort was largely absent in 2019 due to area, retention, and size restrictions for the duration of the Chinook salmon season. Restrictions were implemented within the recreational fishery to prohibit the harvest of Taku River Chinook Salmon as abundance being well below the minimum spawning escapement requirement.

2.2.1 CHINOOK SALMON

The bilateral pre-season forecast was for a terminal run of 9,100 large Chinook Salmon, approximately 61% below the previous 10-year average of 23,600 fish. A run size of 9,100 fish was well below the S_{MSY} escapement goal of 25,500 fish (below the lower end of the escapement goal range of 19,000 to 36,000), and as a result, there was no allowable catch (AC) for either the U.S. or Canada. In response, Canada did not prosecute a directed commercial Chinook Salmon fishery. Additionally, significant efforts were made in all other fisheries to avoid the incidental harvest of Chinook Salmon. For 2019, the in-river Chinook assessment fishery was not conducted to allow for the maximum number of Chinook Salmon to pass to the spawning grounds.

The catches of large Chinook Salmon in the Canadian fisheries were: 0 large Chinook salmon harvested in the directed commercial Sockeye and Coho Salmon fisheries; 5 large Chinook salmon in the First Nation FSC fishery; and 0 large Chinook Salmon in the recreational fishery. The total base level and test/assessment fishery harvest of 5 large Chinook Salmon was well below the allowance of 2,900 fish.

The preliminary Taku River large Chinook Salmon spawning escapement estimate for 2019 was approximately 11,600 fish, which was well below the S_{MSY} target of 25,500 and the goal range of 19,000 to 36,000. The previous 10-year average spawning escapement was 19,700 large Chinook.

The total Canadian catch of large Chinook Salmon was 5, which was well below the 10-year average of approximately 2,000 fish (excluding test/assessment fisheries).

2.2.2 SOCKEYE SALMON

The Canadian pre-season run outlook for wild Sockeye salmon was 154,000 fish, approximately 15% below the previous 10-year average total run size of 181,000 fish. In addition, approximately 2,500 adult Sockeye Salmon of Tatsamenie Lake origin were expected to return from fry out plants associated with the Canada/U.S. joint Taku Sockeye salmon enhancement program. The forecasted return of enhanced Tatsamenie Lake origin Sockeye Salmon was considered to be a below average return.

The Canadian Sockeye Salmon catch was 21,486 fish, of which 21,395 were taken in the commercial fishery, 91 in the First Nation FSC fishery, and 0 in assessment/test fisheries. This harvest was 8% below the 10-year average total of 23,400 fish, with the contribution of Sockeye salmon from the bilateral enhancement program estimated at 300 fish (1% of the total Canadian catch).

To reduce incidental harvest of Chinook Salmon, the directed Sockeye Salmon fishery commenced 16 days late on July 2 (statistical week 27). Additionally, the use of set nets was not permitted for the first opening and fishers were not permitted to retain incidentally-caught Chinook—salmon in the directed Sockeye Salmon fishery. The maximum permissible mesh size in the first three weeks of the directed Sockeye Salmon fishery was 140 mm (5.5") which was intended to reduce the gilling of large Chinook Salmon and permit release. Projections of the total wild Sockeye—salmon run size, TAC, and total escapement were made weekly throughout the fishing season. As in past years, projections were based on the joint mark-recapture program, the estimated catch of Taku River Sockeye Salmon in U.S. fisheries, the catch in the Canadian fishery, and historical run timing information. The preliminary post-season estimate of run size is 143,000 fish (comprising 140,000 wild and 3,000 enhanced Sockeye Salmon). Subtracting the interim (2019) escapement target of 59,000 from the wild run of 140,000 fish resulted in a TAC of approximately 81,000 wild fish. The Canadian allowable catch, based on a 20% harvest share (which in turn is associated with an enhanced return of 1 to 5,000 fish), was 16,200 wild fish; the actual catch was 21,186, representing 26% of the TAC. Under new Chapter 1 provisions for 2019, Canada was able to harvest any surplus fish above spawning and brood stock needs.

The estimated spawning escapement of wild Sockeye salmon in the Canadian section of the Taku River was 76,000 fish which was above the interim escapement goal range of 55,000 to 62,000 fish.

2.2.3 COHO SALMON

The catch of 12,239 Coho salmon (12,145 commercial and 94 First Nation FSC) was 29% above the 10-year average of 9,500 fish. The catch during the directed commercial/assessment Coho salmon fishery, i.e. after statistical week 33, was 9,746 fish. Based on the mark-recapture program, the bilateral estimate of the run into the Canadian section of the drainage is approximately 95,000 fish. In accordance with the new PST provisions beginning in 2019, a run size of this magnitude afforded Canada an allocation of approximately 25,000 Coho

Salmon. The post-season spawning escapement estimate is 83,000 fish, which is near the 10-year average of 82,000 fish. The 2019 escapement was above the target of 70,000 fish and within the escapement goal range of 50,000 to 90,000 fish.

2.2.4 JOINT SOCKEYE SALMON ENHANCEMENT PROGRAM

Joint Canada/U.S. enhancement activities continued from 2018 through 2019 with Sockeye salmon fry hatched at Snettisham Hatchery in Alaska transported back to Tatsamenie Lake, British Columbia (where these fish were collected as eggs in 2018). On May 19, 2019, approximately 1.4 million emergent Sockeye salmon fry were out-planted into Tatsamenie Lake from the 2.3 million eggs collected in 2018. No losses were experienced from Infectious Hematopoietic Necrosis virus (IHNv) for the eggs collected in 2018. In addition, as part of an extended rearing project, approximately 371,000 fry were released into net pens for rearing between May 25 and June 14. Net pen reared fry were released at approximately 2.1 grams on June 22 and July 5. Smolt production for 2019 was above average with an estimate of 1.7 million coming off a strong brood year in 2018. Analysis to determine the origin of smolts is underway in order to inform annual release strategies.

As a result of the large return of sockeye salmon to King Salmon Lake in 2019, the planned enhancement (egg take) program did not proceed. The success of natural production in a "high escapement" year will be evaluated to inform future enhancement program considerations.

For 2019, the agreed bilateral Taku River Enhancement Production Plan (TEPP) identified collection of up to 3.0 million Sockeye Salmon eggs from Tatsamenie Lake and 500,000 eggs from Little Trapper Lake for transport to Snettisham Hatchery in Alaska for incubation and thermal marking. Approximately 2.6 million Sockeye Salmon eggs were collected from Tatsamenie Lake and approximately 279,000 Sockeye Salmon eggs were collected from Little Trapper which was hampered by high brood stock holding mortality. The resulting fry will be released to Trapper Lake, upstream of a barrier, to establish a small escapement of salmon for barrier passage evaluation. Barrier removal project plans were established in 2016 and are ongoing in support of a potential Sockeye Salmon enhancement program for Trapper Lake.

2.3 ALSEK RIVER

Although catch sharing provisions for Alsek River salmon stocks between Canada and the U.S. have not yet been established, Annex IV, Chapter 1 of the Pacific Salmon Treaty calls for the development and implementation of cooperative abundance-based management plans and programs for Alsek River Chinook and Sockeye Salmon. In 2013, escapement goal ranges for Alsek River Chinook and Sockeye Salmon were recommended by the Transboundary Panel, these are: 3,500 to 5,300 Chinook Salmon and 24,000 to 33,500 Sockeye Salmon. Additionally, the escapement targets were revised for Klukshu River Chinook and Sockeye Salmon; these are: 800 to 1,200 Chinook and 7,500 to 11,000 Sockeye. The principal escapement-monitoring tool for Chinook, Sockeye, and Coho Salmon stocks on the Alsek River is the Klukshu weir, in operation since 1976 by DFO in collaboration with the Champagne and Aishihik First Nations (CAFN).

The development of basin-wide stock assessment programs are being investigated as part of the development of abundance-based management regimes and to accurately assess whether the escapement goals for Alsek River Chinook and Sockeye Salmon stocks achieve sustainable stock conservation objectives. At this time, there are no programs in place to estimate the Coho Salmon returns or spawning escapement to the Alsek River

watershed. A proportion of Chinook and Sockeye Salmon spawning escapement to the Alsek River watershed is enumerated at the Klukshu River using video enumeration techniques. Current escapement monitoring programs include the Klukshu River, Village Creek Sockeye Salmon enumeration, and post-season run reconstructions using genetic stock identification analyses which allow for annual comparisons of escapement indices. The most reliable long-term comparative escapement index for Alsek River drainage salmon stocks is the Klukshu River count. Chinook Salmon stock assessment feasibility projects are being conducted on the Blanchard and Takhanne Rivers to develop an improved understanding of Alsek River Chinook Salmon production.

The harvest estimate for the 2019 Canadian Alsek River First Nation FSC fishery was 32 Chinook, 648 Sockeye and 0 Coho Salmon. The Champagne and Aishihik First Nations encouraged their members to reduce salmon fishing effort in their traditional territory in response to the poor pre-season forecasts for Chinook and Sockeye Salmon. The 10-year average harvest in the Canadian First Nation FSC fishery on the Alsek River is 61 Chinook, 1,034 Sockeye, and 16 Coho Salmon, although noting that this most recent period has experienced significant reductions in Chinook and Sockeye Salmon returns (and associated fishery harvests). 2019 catch estimates for the Alsek River recreational fishery were 5 Chinook Salmon retained, and 5 Sockeye Salmon retained. Notably, the retention of Chinook and Sockeye Salmon in the recreational fishery was not permitted for the majority of the 2019 the season in response to the poor pre-season forecasts and early in-season run abundance information. Approximately 10 Coho Salmon were harvested in the recreational fishery.

The 2019 count and escapement estimate for Klukshu River Sockeye Salmon was 19,073 and 18,878 fish. The count and escapement estimate were both below the 10-year average of 11,000 and 10,800, respectively. Sockeye Salmon spawning escapement was above the upper end of the escapement goal range. The Sockeye Salmon count at Village Creek was 1,497 fish; compared to the recent 10 year average of 700 fish.

The most reliable comparative Chinook Salmon escapement index for the Alsek River drainage is considered to be the Klukshu River count. The Chinook Salmon count and escapement estimate in 2019 was 1,589 and 1,573 fish, above the average of 1,200 and 1,170 fish respectively. Chinook Salmon spawning escapement was above the upper end of the escapement goal range in 2019.

The Klukshu River Coho Salmon count was 2,180. The 2019 count, as in past years, is not considered a complete indicator of run strength as the assessment program is not operated for the entire duration of the Coho Salmon return to the Klukshu River.

3. I NORTHERN BC CHINOOK AGGREGATE ABUNDANCE-BASED MANAGEMENT (AABM) FISHERIES

3.1.1 OBJECTIVES AND OVERVIEW

Escapement of northern Chinook Salmon has declined dramatically in recent years. Reduced survival rates, and productivity, have been observed across British Columbia and South East Alaska. This has led to unprecedented declines of northern Chinook and the need for conservation measures to be to be implemented in 2019 salmon fisheries. Chinook Salmon fisheries implemented under the PST AABM management regime include three mixed-stock fisheries:

- Southeast Alaska recreational, net and troll (SEAK)
- Northern British Columbia troll and Haida Gwaii (Queen Charlotte Islands) recreational (NBC); and
- West Coast of Vancouver Island troll and outside recreational (WCVI).

These fisheries are managed to an annual total allowable catch (TAC) based on the forecast abundance of the aggregate of stocks that contribute to each fishery. In Canada, conservation is the first priority in fisheries management. Once conservation obligations are met, priority access is given to First Nations for food, social, ceremonial, and treaty requirements. Once those obligations are met, priority access to Chinook Salmon is provided to the recreational fishery, with commercial fisheries next in priority. Management constraints to the fishery include management for stocks of conservation concern, minimizing encounters of undersized Chinook Salmon and non-target species and minimizing fisheries where legal and sublegal-sized Chinook Salmon have to be released.

3.1.2 STOCK STATUS

The pre-season planning distribution of the total NC AABM TAC by fishery is shown in Table 3-1 below. The total Chinook catch in the Area F Troll fishery and recreational fishery can be found in Appendix 3.

	Pre-Season	In-Season
NC BC Troll AABM and Haida Gwaii Sport Abundance Index	0.96	-
NC BC Troll AABM and Haida Gwaii Sport Chinook TAC	124,800	-
NC BC Troll AABM Chinook TAC	88,400	Actual catch: 42,801
Haida Gwaii Sport Chinook TAC	36,400	Actual catch: 45,200
Total AABM	79,900	Actual catch: 88,001

Table 3-1: Pre-Season Total Allowable Catch Estimate for NC AABM Chinook

3.1.3 RECREATIONAL FISHERIES

Estimates for tidal sport catches near the mainland coast of Northern BC were obtained from creel surveys and lodge catch reports from lodges operating on Haida Gwaii. The recreational fishery maintained full daily limits of two daily and four possession. A minimum size limit of 45 cm was in effect and barbless hooks were mandatory in the sport fishery. Virtually all sport releases in AABM areas are legal sized.

In Area 1, the recreational salmon fishery primarily occurs between Masset and Lanagara Island along the north shore of Graham Island. The recreational salmon fishery primarily occurs between Englefield Sound and Port Louis. The early Chinook Salmon fishery in east Skidegate during late winter and early spring was reported to be average. While the harvest of Chinook in Area 2E is unknown, it is assumed to be less than 500 pieces and a small proportion of the overall recreationally intercepted salmon harvested in Area 1 and 2W of Haida Gwaii. Recreational effort (>99%) primarily occurs in Area 1 and 2W. The majority of the fishery occurs between the middle of May to the middle of September with little to no effort in the winter months.

3.1.4 COMMERCIAL FISHERIES

The North Coast BC troll fishery opening for Chinook fishing was delayed and opened from August 20 to September 30 as part of fishery restrictions designed to pass through Fraser Summer 4₁ (South Thompson) Chinook to Fraser River fisheries. The entire 2019 Northern BC troll fishery was conducted under a system of individual transferable quotas. The size limit was 67 cm and barbless hooks and revival boxes were mandatory. No troll test fisheries were conducted in the North Coast of BC in 2019.

3.2 NORTHERN BC CHINOOK INDIVIDUAL STOCK-BASED MANAGEMENT (ISBM) FISHERIES

3.2.1 OBJECTIVES AND OVERVIEW

Fisheries included in this category are commercial net fisheries throughout north and central BC, marine sport fisheries along the mainland coast and freshwater sport, and First Nations FSC fisheries in both marine and freshwater areas. The PST obligations in these fisheries are for a general harvest rate reduction (estimated in aggregate across fisheries) for ocean mixed stock fisheries and for stock-specific objectives (i.e., achieving the escapement goal) in terminal areas.

3.2.2 STOCK STATUS

Since assessments of the ISBM fisheries are relative to the escapements achieved in the Chinook indicator stocks, a brief overview of the 2019 returns is provided. Chinook escapements to the upper Nass River are 13,262 (based on mark-recapture data). Skeena River Chinook escapements decreased from 2018 to approximately 24,244. This is a preliminary GSI-based estimate that is subject to change once all the data has been reviewed. The Bella Coola/Atnarko River Chinook escapements were up from 2018, with an estimated total of 20,000.

The total Chinook catch in the Test fishery on the Skeena River was 550. Since 1984, the lowest Chinook catches at the Tyee Test Fishery have been in 1995 and 2017. ISBM catch data can be found in Appendix 3.

3.2.3 FIRST NATIONS FSC FISHERIES

Catches by First Nations in Areas 6 and 7 of the Central Coast were not available at the time of this report. No Chinook catches were reported by First Nations in Smith Inlet (Area 10).

3.2.4 RECREATIONAL FISHERIES

3.2.4.1 RECREATIONAL – TIDAL

Estimates for tidal sport catches near the mainland coast of Northern BC were obtained from a creel survey conducted in Areas 3 and 4 in 2019. Chinook daily limits started at 2 per day, but was reduced in Area 3, 4, and 5 to 1 (one) Chinook per day from July 27, 2019 to August 5, 2019. This change was implemented as part of measures to address poor Sockeye returns to the Skeena River; specifically, to ensure First Nations priority access for FSC fisheries.

Area 6 had a daily limit of 2 per day for the 2019 season.

The 2019 catches in the mainland sport fishery in Areas 5 and 6 were not available at the time of writing.

Tidal sport catch from lodges operating in the Smiths Inlet, Rivers Inlet, Hakai Pass and Bella Bella areas were estimated using log books.

3.2.4.2 RECREATIONAL- NON-TIDAL

The Skeena River watershed started with normal daily limits and opening times for Chinook, Coho and Pink Salmon in 2019. Sockeye started with a daily limit of 2 per day on the Skeena River.

On June 25, 2019 the Department implement management measures for Chinook as follows:

- Reduced daily limit to two (2) Chinook Salmon, only one of which can be over 65 cm, in the Skeena River main stem and sections of the Bulkley, Kitsumkalum, and Morice Rivers.
- Closed Skeena River main stem upstream of the Sustut River to Chinook fishing.
- Closed all tributaries and lakes of the Skeena River to Chinook fishing.
- Close the entire Skeena River watershed to Chinook fishing on Aug 15, 2019.
- Closed all rivers and lakes flowing into PFMAs 3, 4, 5 and 6 to Chinook fishing, excluding the Kitimat, Skeena and Nass Rivers.

In addition to the above, the following areas were closed to fishing for salmon:

- Skeena River main stem waters near the Kitsumkalum River mouth, from the confluence with the Zymagotitz River (also known as Zymacord River) upstream to the Classified Waters boundary at the top of Hell's Gate - July 1, 2019 to Aug 31, 2019.
- Kitsumkalum River (including lakes and tributaries) July 1, 2019 to Aug 31, 2019.

- Skeena River main stem waters near the Kitwanga River mouth, from Mill Creek upstream to the Highway 37 Bridge June 25, 2019 to March 31, 2020.
- Skeena River main stem waters within the three white triangular fishing boundary signs located at the confluence of the Skeena River and Kispiox River June 25, 2019 to March 31, 2020.

On July 27, 2019 the Department closed the entire Skeena River watershed to fishing for all salmon. This closure was an identified conservation measure to address Sockeye conservation. On Aug 15, 2019 sections of the Skeena River and specific tributaries re-opened to Coho and/or Pink Salmon. Chinook remained closed for the remainder of the season.

The Nass River watershed started with normal daily limits and opening times for Chinook.

On June 25, 2019 the Department implemented management measures for Chinook as follows:

• Reduced daily limit to two (2) Chinook Salmon, only one of which can be over 65 cm, in the Nass River watershed.

In addition to the above, the Department closed the Nass River main stem waters near the Meziadin River confluence, from white triangular fishing boundary signs located downstream of the Meziadin River confluence and upstream to the Hwy 37 Bridge to fishing for all salmon. This closure remained in place for the 2019 season.

3.2.5 COMMERCIAL FISHERIES

Chinook commercial fisheries were closed in the North Coast (Areas 3-10), except for Area 8. In Area 8, the gillnet fishery opened on June 3, 2019. Opportunities were generally limited to one fishing day a week and the last opening was on June 24, which was extended for an extra day. Total effort was 171 boat days. Additionally, there was a small scale economic opportunity fishery in the Bella Coola Gill Net area, conducted by the Nuxalk First Nation for chinook and chum. Three fisheries were held; June 25, July 25 and August 1 for the Nuxalk First Nation Commercial Salmon Allocation Framework (CSAF) Fishery. Total effort was 46 boat days.

Refer to Appendix 3 for Chinook catch totals.

3.3 NORTHERN BC PINK SALMON FISHERIES

3.3.1 OBJECTIVES AND OVERVIEW

In 2019, Canada was to manage the Area 3-1 to 3-4 net fisheries to achieve an annual catch share of 2.49% of the annual allowable harvest (AAH) of Alaskan Districts 101, 102 and 103 Pink Salmon. The total return of Pink Salmon to Alaskan Districts 101, 102 and 103 was not available at the time of publication.

Canada was also to manage the Area 1 troll fishery to achieve an annual catch share of 2.57% of the annual allowable harvest (AAH) of Alaskan Districts 101, 102 and 103 Pink Salmon.

3.3.2 COMMERCIAL FISHERIES

Areas 3-1 to 3-4 Pink Net Catch

In the Canadian northern boundary area, Pink Salmon returns were anticipated to be average to below average for Areas 3 and 4, based on brood year return strength. Actual returns to Area 3 were higher than anticipated, while the Area 4 returns were below average.

Area 1 Pink Troll Catch

The Canadian commercial troll fishery targeting Coho Salmon with retention of Pink Salmon was open in the northern portion of Area 1 (Dixon Entrance AB Line) from July 1 to July 17, and then expanded to the rest of Area 1 until it was closed on September 30. Pink retention was also permitted during the Chinook directed fishery in parts of Area 1 which opened from August 20 to September 30. Area 1 Pink Salmon directed effort was very minimal and the total Pink catch in the Area F Troll fishery and recreational fishery can be found in Appendix 3.

4 SOUTHERN BC CHINOOK SALMON

4. I SOUTHERN BC AGGREGATE ABUNDANCE-BASED MANAGEMENT (AABM) CHINOOK

4.1.1 OBJECTIVES AND OVERVIEW

Chinook fisheries are managed by either an aggregate abundance-based management (AABM) or individual stock-based management (ISBM) regime. Allowable harvest impacts in AABM areas are determined by provisions in the Pacific Salmon Treaty and subject to domestic considerations, such as conservation and allocation. In Southern BC, all AABM Chinook fisheries are located off the West Coast Vancouver Island (WCVI), including components of the recreational fishery, First Nations fisheries, and the Area G troll fishery.

For the period October 2018 through September 2019, the forecast Chinook abundance index was 0.61 of the PST base period; therefore, under Treaty provisions, the maximum allowable catch was 79,900 Chinook for WCVI AABM fisheries, which includes a 12.5% reduction consistent with the treaty provisions that came into effect in January 2019.

Domestic considerations for managing Chinook catch in WCVI AABM fisheries are driven by concerns regarding the low status of natural WCVI, Lower Strait of Georgia (LGS), and Fraser River Chinook, as well as Interior Fraser Coho and Interior Fraser River Steelhead populations. Management measures in AABM Chinook fisheries to limit impacts to these domestic stocks of concern are summarized in the fishery subsections.

To protect returning Fraser Chinook stocks of concern, the Area G troll fishery was closed until August 1, 2019. Additionally, a 27-day rolling window closure was applied to protect Interior Fraser River Steelhead.

The pre-season planning distribution of the total WCVI AABM TAC by fishery is shown in Table 4-1 below.

AABM Chinook catch and release information from all fisheries can be found in Appendix 4.

Table 4-I Pre-Season Total Allowable Catch Estimate for October 2018 to September 2019 WCVI AABM Chinook

	Pre-Season	In-Season		
WCVI AABM Abundance Index	0.61			
WCVI AABM Chinook TAC	79,900			
AABM Recreational Harvest Projection	50,000	Actual catch: 35,418		
First Nations Harvest Projection (FSC)	5,000	Actual catch: 71		
Maa-nulth First Nations Domestic Allocation (FSC)	3,297	Actual catch: 1,184		
Five Nations Allocation	7,039	Actual catch: 7,123		
Area G Troll Allocation	14,564	Actual catch: 23,195		
Total AABM	79,900	66,991		

4.1.2 FIRST NATIONS DOMESTIC AND FSC FISHERIES

The 2019 WCVI AABM FSC Chinook reported catch (to date) can be found in Appendix 4. Catch from Maanulth Nations Domestic fisheries can also be found in Appendix 4.

4.1.3 FIRST NATIONS COMMERCIAL HARVEST

Five Nations Communal Sales Fishery

In 2019, the Department provided communal sale fishery opportunities for the Five Nations (five Nuu-chahnulth First Nations located on the West Coast of Vancouver Island - Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) that included AABM Chinook. These opportunities were categorized as Offshore Integrated Hook and Line communal sale fisheries.

The TAC was 7,039 pieces. The fishery was carried out in portions of Areas 24, 25, 26, 124, 125 and 126 on the west coast of Vancouver Island over several openings from May to November. A 100% independent dockside monitoring program was in place for the entire season. Retention of Chum, Pink and hatchery-marked Coho was also permitted, as well as several groundfish species. Total salmon catches from this fishery can be found in Appendix 4.

4.1.4 COMMERCIAL FISHERIES

For the 2018/2019 Chinook year (October 1, 2018 to September 30, 2019), fisheries were shaped by conservation concerns for the following domestic stocks: Fraser River Spring 4₂ Chinook, Fraser River Spring 5₂ and Summer 5₂ Chinook, WCVI wild Chinook, LGS Chinook, Interior Fraser River Coho, and Interior Fraser River Steelhead.

The distribution of the WCVI AABM TAC between fisheries is shown above in Table 4-1.

Area G Troll

The Area G troll annual management plan is designed to maintain exploitation rates on domestic stocks of concern within established limits through the use of fishing time and area closures in conjunction with fishing effort limits. The management plan is subject to change when required to address specific conservation concerns. For the 2019 fishing season, the following changes to the annual fishing plan were implemented:

- Additional conservation measures to further protect low returns of Fraser River Chinook were implemented. For Area G troll this addressed by implementing a fishery closure that remained in place until August 1.
- A 27-day rolling window closure starting in September was applied to protect Interior Fraser River Steelhead.

The Area G catch in 2019 occurred over two openings from August 1 to 8 and from August 29 to September 15. Catch is summarized in Appendix 4.

4.1.5 RECREATIONAL FISHERIES

The WCVI AABM recreational Chinook fishery primarily takes place in offshore Areas 121 to 127 from June to September. Chinook catch from inshore Areas 21 to 27 in June and Areas 21 to 24 in July are also included in the AABM estimate. Catch and effort are largely driven by abundance and weather, and together both have impacts on annual harvest. Previous sampling has indicated that there is minimal AABM catch and effort outside of this period.

Domestic Chinook management measures are in place in the near-shore AABM areas to protect migrating WCVI-origin Chinook. In 2019, management measures continued to include finfish closures in several areas, increasing terminal Chinook non-retention areas, and focusing recreational opportunities in areas where DNA samples indicated that WCVI Chinook presence is lower.

New domestic management actions were implemented to further protect Fraser River Chinook populations, which included a Chinook non-retention area from April 19 to July 14 (inclusive) in Areas 121 to 127 seaward of a 1 nm surfline boundary. As a result of the Big Bar landslide, and concerns around the successful migration of Fraser Chinook, further measures were put in place from July 15 to July 31 (inclusive) which restricted the maximum size to 80 cm for Chinook retention in these offshore areas.

Chinook catch in the AABM recreational fishery is estimated through several catch monitoring programs, including a creel survey, a logbook program and DFO's electronic survey information (iREC). The creel survey continues to be the most utilized catch monitoring program in this area particularly because it collects effort (number of boat trips), and catch per unit effort data. Catch for any given species within a defined time-area stratum is estimated by multiplying effort estimates by CPUE. Total effort is estimated through vessel counts, gathered through either aerial or on-water boat surveys of the fishing area. CPUE is estimated from interviews with anglers at specific landing sites and from trip logbooks and manifests submitted by lodges and guides through a voluntary monitoring program. Logbook effort is removed from effort estimates where there is overlap. Data regarding the daily activity profile of the fishery, fishing locations, and the proportion of guided versus un-guided effort are also gathered from angler interviews. See Figure 4-1 below which illustrates catch and effort from 1995 through 2019.

The preliminary Chinook recreational catch estimate from the creel survey for the 2019 WCVI AABM fishery is provided in Appendix 4.

AABM Chinook Catch and Effort 80.000 80.000 AABM Catch -AABM Effort 70.000 70,000 60.000 60.000 AABM Chinook Catch 50,000 50 000 40,000 40,000 30.000 30.000 20,000 20,000 10.000 10.000 2008 2010 2000 2012 2016

Figure 4-1 WCVI Recreational AABM Catch and Effort- Chinook, 2000-2019

4.2 SOUTHERN BC CHINOOK INDIVIDUAL STOCK BASED MANAGEMENT (ISBM) FISHERIES

4.2.1 OBJECTIVES AND OVERVIEW

In addition to the PST regime, Canada implemented management actions as required to ensure conservation of Canadian-origin Chinook and to meet domestic allocation requirements. These Chinook fisheries were managed to harvest rates on an individual stock basis (ISBM).

Measures were taken in 2019 in First Nations FSC, recreational and commercial Chinook fisheries to protect West Coast Vancouver Island (WCVI), Lower Strait of Georgia (LGS), and Fraser River Chinook stocks.

Specific management actions were taken to protect WCVI-origin Chinook in Canadian ocean fisheries (not including enhanced terminal areas), the harvest of which is managed to an exploitation rate of 10%. Fisheries to which this limit applies are the northern troll, Haida Gwaii recreational, WCVI troll and WCVI recreational. Most Southern BC fisheries were managed such that impacts on WCVI wild Chinook stocks were minimized, with the exception of terminal fisheries focussed on enhanced stocks.

LGS Chinook stocks are improving from historic lows seen in 2009 and are stable or rebuilding. Significant management measures in recreational and commercial fisheries implemented in 2005 were relaxed in 2019 in light of improved escapements and broader conservation measures for Chinook. Some LGS Chinook stocks are seeing a strong increase in terminal returns, particularly in the Cowichan River.

For 2019, the management target for Spring 4₂, Spring 5₂, and Summer 5₂ Chinook was to reduce overall Canadian fishery mortalities on these populations to near 5% to support conservation and promote rebuilding. Expected fishery mortalities were not intended to be a management target and the objective was to allow as many fish to pass through to the spawning grounds as possible. In addition, the precautionary fishery measures were expected to reduce Canadian fishery mortalities on Summer 4₁ and Fall 4₁ Chinook management units by at least 25%.

First Nations FSC management actions in the Fraser River included time and area closures, and reduced fishing times.

Recreational fisheries in Juan de Fuca Strait, the lower Strait of Georgia and the approach waters of the Fraser River had specific time, area, size and mark-selective restrictions designed to minimize the amount of exploitation on these Chinook stocks.

In 2019, commercial fisheries in Barkley Sound and Nootka Sound targeted ISBM Chinook. Chinook non-retention was in place for other southern BC commercial fisheries (excluding AABM Chinook).

ISBM Chinook catch and release information from all fisheries can be found in Appendix 4.

4.2.2 STOCK STATUS

4.2.2.1 WEST COAST VANCOUVER ISLAND CHINOOK

Wild West Coast Vancouver Island (WCVI) Chinook are a stock of concern. While stocks are low and stable, they are below target and have not rebuilt from low abundances that resulted from a decline in productivity observed during the early to mid-1990s. Of particular concern are those stocks that originate from the SWVI area conservation unit (i.e. Clayoquot Sound).

Hatchery production supports terminal fisheries directed at surplus production with extensive management measures in place to reduce impacts on wild origin stocks. For WCVI hatchery stocks, the terminal return is defined as total catch (First Nations FSC, sport and commercial) in the near approach areas of the hatchery plus escapement (brood collection plus natural spawners, and ESSR if applicable). In these approach areas, catch is dominated by the hatchery stock (e.g. > 95%); therefore, higher exploitation rates are permitted than in times and areas dominated by naturally produced WCVI Chinook stocks.

A small assessment fishery near the Mquq^Win / Brooks Peninsula occurred in 2019 in order to assess the ability to improve the precision and accuracy of annual WCVI Chinook return estimates. The total catch was 344 Chinook.

4.2.2.2 STRAIT OF GEORGIA CHINOOK

Fall Season

Adult returns of fall Chinook to SEP facilities south of Campbell River were average to above average in 2019. Puntledge River escapements continued to increase with over 13,000 adults returning compared to the 10 year average of 6,834. Further south, the Big Qualicum River escapement was closer to the 4 year average of 6,830

and similar to 2018 at 6,387. Counts in the Little Qualicum River were above average at 5,936 based on preliminary swim results.

Chinook escapement to mid-island streams were modest. The peak count in the Englishman River (920) was slightly above the 12 year average of 870. Nanaimo River counts were near the four year average with a preliminary AUC estimate of 3,900.

Cowichan River Chinook (a wild Chinook indicator stock) declined from a high of 16,982 adults in 1995 to 1,260 in 2009. Exploitation rates on CWT hatchery fish were estimated at 80 to 90% in the early 1990s but declined to an average of 56% for the period 2006 to 2012 as a result of various harvest restrictions implemented over the last 20 years. Additional conservation measures were introduced in 2005 to reduce the harvest of Cowichan Chinook by the Strait of Georgia sport and WCVI troll fisheries. First Nations have substantially reduced harvests of Chinook in the Cowichan River in recent years. The declining trends after 1990 in various southern Strait of Georgia Rivers are attributed to high exploitation rates, a decline in marine survival, and habitat issues.

The Cowichan River counting fence was operational from September 9th to October 17th following significant repairs in 2017 and further modifications in 2018. In 2019, the fish passageways were significantly widened and new camera systems installed to reduce migration delays. A total of 11,742 adult Chinook were enumerated before the fence was removed due to increasing water levels. The preliminary escapement estimate using a PIT tag based expansion (as in 2017 and 2018) is currently 17,196 adults, including brood captures. FSC fishery harvest and lower river spawners (below the fence) are additional to this total and will be included in the final estimate. Hatchery contributions based on adipose clips were estimated at 7.6% for adults. Jack returns were down from the three year average of 6,800 to 3,907 while the proportion of adipose clips in the population increased to 16.7%.

The escapement target of 6,500 naturally spawning adults was met for a fourth consecutive year. As a result of increasing escapements in recent years as well as more restrictive fishing regulations throughout southern B.C. the Cowichan specific spot closures implemented in 2005 were lifted in the central and northern Strait of Georgia. Terminal closures in Area 18 remain in effect.

On the mainland side of the northern Strait of Georgia, Sliammon and Lang hatcheries continue to have variable returns; however, in the last five years the returns to Lang Creek have been stronger than in previous years. 300 adult Chinook returned to Sliammon Creek in 2019 which is above the 12 year average of 110. There are a few very small, wild populations remaining in the Theodosia and Skwakwa rivers, and those rivers entering Jervis Inlet, where assessment data are poor or not available. Historically, a large proportion of the Chinook stock aggregate originating from rivers north of Nanaimo migrate into central and northern BC and Alaska. Exploitation rates on this stock aggregate have gradually been reduced over the last 15 years, thus the stable trend in annual returns to rivers over this period suggests a reduction in marine survival.

Spring/Summer Season

The Puntledge, Nanaimo and more recently the Cowichan systems have identified early runs of Chinook in the Strait of Georgia. Efforts to recover Puntledge summers to viable levels have resulted in improved returns to the river since 1999. The estimate for 2019 escapement to Puntledge is approximately 625 adults, which is close to the four year average of 750. Monitoring of Nanaimo spring/summer Chinook escapement was improved in

2019 with a series of swims from June through September. Several surveys of the reach upstream of second lake where spring run fish are believed to reside produced a peak count of three jacks. The count of 122 summer run adults was well below the 4 year average of 670. Two swim surveys of the Chemainus River revealed a peak count of just nine summer Chinook adults. Recent counts in this system have been very low but the rock slide in the lower canyon was cleared naturally in winter 2018/2019, restoring access to a significant portion of the system.

4.2.2.3 JOHNSTONE STRAIT MAINLAND INLET CHINOOK

Currently only three systems are monitored consistently. In Area 12, the Nimpkish River is assessed using standardized swim surveys and stream walks by hatchery staff. In Area 13, the Campbell/Quinsam and Phillips rivers are assessed by intensive mark-recapture programs. The Campbell/Quinsam is a long-term Chinook indicator, assessed yearly since 1984 (program carried out by Quinsam Hatchery). Other systems are covered using intermittent visual surveys. In 2019, surveys in Area 12 Mainland Inlet systems, such as Ahnuhati and Wakeman Rivers, indicated an increase in Chinook observations.

Nimpkish River

In 2019, observations of Chinook abundance were up relative to both the 2018 and 2015 returns. The preliminary estimate of 2,500 Chinook (peak count 1,543) is 69% higher than the 5-year average (1,476) and approximately 89% larger than the 2015 parental brood year (1,318). Hatchery broodstock targets were met.

Campbell/Quinsam System

The 2019 program resulted in a combined system preliminary Chinook estimate of approximately 7,500 adults; an increase over the estimated 7,000 that returned in 2018 and above both the 5-year average (6,130) and 1984 to 2018 historic average (6,979). The parental brood year for the returning age-4s was approximately 3,900. The 2019 Chinook broodstock target was attained by the hatchery.

Phillips River

Preliminary results for the Phillips River program indicate the 2019 Chinook escapement is in the range of 2,600; however, the estimate is highly uncertain. Deadpitch effort remained similar to past years, however increased bear activity on the river impacted carcass availability. The 5-year historic average for this system is approximately 2,100.

4.2.2.4 FRASER RIVER CHINOOK

Escapements of spring and summer stream type stocks have been at low levels during the 2009 Agreement, and in 2019 fisheries were restricted further in the Canadian marine fisheries and Fraser River to address concerns about poor status for all Fraser Chinook stock groups. Relative to the parental brood escapements, the 2019 escapement decreased approximately as follows to the Spring 4_2 (-49%), Spring 5_2 (-90%) and Summer - 5_2 (-80%) stock groups.

Status at this time is not available for the Summer 4₁ stock group, Lower Shuswap River is above the escapement goal.

Annual Fraser River fall-run Chinook stock group escapements are, on average, large (~100,000 during the 2009 Agreement). Historically, the major contributor and principal focus of assessment of this stock group is Chinook returning to the Harrison River, and Harrison River transplants to the Chilliwack River Hatchery. Harrison River escapements have been below the escapement goal for the last four years.

4.2.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

WCVI FSC Fisheries and Treaty Domestic Fisheries

Somass First Nations caught Chinook by gill net, rod and reel and as bycatch during other salmon fisheries in Area 23. Catch reports for Maa-nulth Treaty harvest and WCVI Nuu-chah-nulth non-treaty First Nations harvest can be found in Appendix 4.

Strait of Georgia FSC Fisheries and Treaty Domestic Fisheries

Chinook Salmon were harvested by hook and line from the Strait of Georgia between July 15 and early October. Terminal harvests of Chinook took place in Puntledge and Qualicum Rivers in October, using hatchery brailing and hand-picking/sorting methods. Chinook Salmon were also harvested in hook and line and gill net fisheries in Cowichan and Nanaimo Rivers late September through October. Tla'amin Treaty and other First Nations catch reports in the Strait of Georgia can be found in Appendix 4.

Johnstone Strait FSC Fisheries

Chinook Salmon were harvested primarily by hook and line in Johnstone Strait from July 15 to mid-September. Chinook were also incidentally harvested through a small number of gill net and seine net fisheries targeting Pink Salmon that took place mid- to late August. A small number of Chinook Salmon were harvested terminally in the Campbell River by hook and line. First Nations catches in Johnstone Strait can be found in Appendix 4.

Fraser River FSC Fisheries

FSC fisheries took place in the Lower Fraser River between the mouth and Sawmill Creek from August through November 2019. A total number of Chinook harvested from Chinook-directed fisheries and Chum-directed FSC openings or limited participation openings, can be found in Appendix 3 and Appendix 4. No Sockeye-directed fisheries were authorized in 2019. Sockeye, Pink, Coho, and Chum bycatch that occurred during Chinook-targeted FSC openings is also listed in those appendices.

Chinook-directed FSC fisheries took place in the Fraser River and tributaries above Sawmill Creek from April through early October 2019. A preliminary total of Chinook harvested, as well as bycatch estimates can be found in those appendices.

4.2.4 FIRST NATIONS COMMERCIAL HARVEST

Somass Economic Opportunity (EO)

In 2019, an agreement was reached with the Hupacasath and Tseshaht First Nations for an Economic Opportunity fishery. The fisheries occurred in portions of Subareas 23-1 and 23-2, in upper Alberni Inlet, including the tidal portion of the Somass River. The target species was Chinook with a bycatch of Coho

allowed. There were commercial Chinook openings on August 20, August 25, September 4, September 5, September 10, September 15, September 22, and September 29. The in-season Economic Opportunity TAC for Chinook was 30,750 in 2019 but the total TAC was not caught due to rapid fish migration behavior and lower than anticipated participation in the mid-September openings. The total Chinook catch and Coho bycatch can be found in Appendix 4.

Five Nations Communal Sales Fishery

In 2019, the Department provided communal sale fishery opportunities for the Five Nations (five Nuu-chahnulth First Nations located on the West Coast of Vancouver Island - Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) that included ISBM Chinook. These opportunities were categorized as Nearshore Integrated Hook and Line and Terminal salmon fisheries.

The Nearshore fishery targeted Conuma River enhanced Chinook returns using troll and gillnet. Fishery openings occurred between July 15 and August 29. The initial in-season TAC was 2,314 Chinook.

The Terminal fishery targeted Burman River enhanced Chinook returns using troll and gillnet gear. Fishery openings occurred between August 9 and September 19. The initial in-season TAC was 2,275 Chinook.

The total Chinook catch from the Conuma-targeted fishery and the Burman-targeted fishery can be found in Appendix 4. Chum, pink and Coho were also permitted to be sold.

Fraser River Economic Opportunity and Inland Demonstration Fisheries

Economic Opportunity or inland demonstration fisheries did not occur in 2019 for ISBM Chinook in either the upper or lower reaches of the Fraser River as part of additional management actions to provide protection for Fraser Chinook stocks.

In 2019, no Economic Opportunity or demonstration fisheries occurred for Fraser Sockeye due to extremely low returns and no available Canadian Commercial TAC (CCTAC). There is currently one Inland Commercial Fishing Enterprise (CFE) operating in the Lower Fraser: Harrison Fisheries Authority. This CFE was authorized a demonstration fishery on Sockeye using gill nets in the Harrison River; however, no fishing occurred as the run size for the Harrison River Sockeye return was not sufficient to sustain a fishery. Therefore, there were no incidental impacts on Chinook from these fisheries.

Economic opportunity and demonstration fisheries occurred for Fraser Pink in the lower Fraser River in 2019 and were conducted by the Harrison Fisheries Authority and 16 communities from the Port Mann Bridge to Sawmill Creek. Retention of Chinook was not permitted.

In 2019, no Economic Opportunity fisheries for Fraser Chum occurred in the lower reaches of the Fraser River due to the estimated poor in-season Fraser Chum terminal return.

There are currently three Inland CFEs operating in the BC Interior: Okanagan Nation Alliance, Upper Fraser Commercial Fishing Enterprise, and Riverfresh (Secwepemc Fisheries Commission). Riverfresh is the only CFE that receives allocation for Chinook (S. Thompson, Summer 41 Chinook). In 2019, Riverfresh was not provided a Chinook-directed opportunity due to additional management actions to provide protection for Fraser Chinook Stocks.

4.2.5 COMMERCIAL FISHERIES

Area B Seine

Due to a relatively large forecast of 130,000 Chinook for Robertson Creek Hatchery, Area B seine fisheries were provided in Area 23. The fisheries occurred in portions of Subarea 23-1 and 23-2, upper Alberni Inlet, targeting Chinook with a bycatch of Coho permitted. The fisheries were operated using a pool system with only designated vessels permitted to fish. The fishery opened daily from September 2 to 6 and September 8 to 17. The Area B in-season TAC was 10,762 Chinook. The fisheries in 2019 were not as successful as 2018. This was mainly due to fish migration behaviour, which made them less vulnerable to seine gear. The total Chinook catch and Coho bycatch can be found in Appendix 4.

Area D Gill Net

Area D gill net fisheries were provided in Area 23. The fisheries occurred in portions of Subarea 23-1 and 23-2, in upper Alberni Inlet, targeting Chinook with a bycatch of Coho allowed. The fisheries were opened one night a week in the last two weeks of August. After Labour Day there were two openings nightly in early and mid-September. The fisheries occurred on August 18, August 27, September 3, and September 25. The Area D inseason TAC was 19,988 Chinook. The Area D gill net fisheries were very successful this year, with high catch rates in the August openings. The total Chinook catch and Coho bycatch can be found in Appendix 4.

In 2019, gill net fisheries occurred in Tlupana Inlet (Area 23) targeting Chinook returns to the Conuma River hatchery. Fisheries occurred discontinuously from August 12 to September 12. The total estimated catch during the Chinook-directed fishery can be found in Appendix 4.

Area E Gill Net

There were no Area E gill net fisheries for ISBM Chinook in 2019.

Coast-wide management actions for Fraser Chinook were in place for 2019. The management target was to reduce the Canadian fishery mortalities to near 5%; Retention of Chinook in Sockeye- and Chum-directed Area E fisheries would not be permitted. There were no Area E gill net commercial openings in the Fraser River (Area 29) during the 2019 season.

4.2.6 RECREATIONAL FISHERIES

ISBM Chinook catch and release information from all fisheries can be found in Appendix 4.

West Coast Vancouver Island

In 2019, a strong return of Chinook was expected to the Robertson Creek hatchery and a moderate return to the Conuma River hatchery. Actual returns were near forecast for Robertson Creek and above forecast for Conuma River, and provided good recreational fishing opportunities in terminal areas supported by these enhanced stocks. The annual limit for Chinook Salmon in these areas was reduced from 30 to 10. See Figure 4-2 below which illustrates catch and effort from 1995 through 2019.

ISBM Chinook Catch and Effort

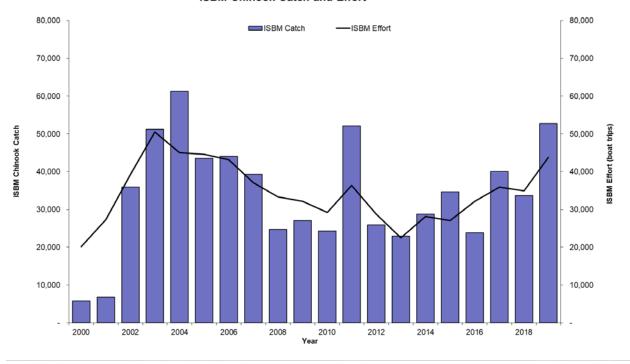


Figure 4-2 Recreational WCVI Chinook ISBM Catch and Effort, 2000 to 2019.

Inside Areas: Johnstone Strait, Strait of Georgia, and Juan de Fuca Strait

The 2019 recreational fisheries in the Inside Areas were further restricted this year to minimize impacts on returning Fraser River Chinook. Significant management measures were implemented to provide additional protection for these stocks and included Chinook non-retention, maximum size limits, and reductions in daily limits in specific areas/times. Salmon closures and Chinook non-retention areas were also implemented in portions of the Fraser approach waters, Southern Gulf Islands and Juan de Fuca Strait to support the recovery of Southern Resident Killer Whales.

The following regulations were in place for the inside areas for 2019:

Queen Charlotte and Johnstone Straits (Subareas 12-1 to 12-13, 12-15 to 12-48):

- 00:01 hours April 19 to 23:59 hours July 14, 2019, Chinook non-retention;
- 00:01 hours July 15 to 23:59 hours July 31, 2019, 1 Chinook per day with a maximum size limit of 80 cm;
- 00:01 hours August 1 to 23:59 hours August 29, 1 Chinook per day.
- 00:01 hours August 30 to 23:59 hours December 31, 2 Chinook per day.

Strait of Georgia - North - Areas 13 to 17, Area 28 and Subareas 29-1 and 29-2:

• 00:01 hours April 19 to 23:59 hours July 14, 2019, Chinook non-retention;

- 00:01 hours July 15 to 23:59 hours July 31, 2019, 1 Chinook per day with a maximum size limit of 80 cm;
- 00:01 hours August 1 to 23:59 hours August 29, 1 Chinook per day.
- 00:01 hours August 30 to 23:59 hours December 31, 2 Chinook per day.

Strait of Georgia - South and Juan de Fuca - Areas 18, 19 and Subareas 20-3 to 20-7, 29-3 to 29-5 and 29-8:

- 00:01 hours April 19 to 23:59 hours July 31, 2019, Chinook non-retention;
- 00:01 hours August 1 to 23:59 hours August 29, 2019, 1 Chinook per day;
- 00:01 hours August 30 to 23:59 hours December 31, 2019, 2 Chinook per day.

In consideration of the increased management measures for Fraser Chinook implemented in the Strait of Georgia and other mixed-stock areas, the previous annual finfish closure near Cape Mudge on Quadra Island and the Chinook non-retention closures near Sentry Shoals, Harwood Island, Denman Island-Hornby Island and Kitty Coleman were removed. Reductions to the annual limit for Chinook Salmon (to an annual limit of 10 Chinook) were also implemented in 2019 across all inside areas listed above. Chinook management measures also include a minimum size limit of 62 cm in the Johnstone Strait/Queen Charlotte Strait and Strait of Georgia, and to Cadboro Point (Subarea 19-5). For the Canadian portion of Juan de Fuca Strait south of Cadboro Point, the minimum size limit is 45 cm.

Salmon fishing closures were also implemented from August 1 to October 31 in the following portions of the Southern Gulf Islands and Juan de Fuca to support SRKW:

- Subareas 18-9 and portions of 18-2, 18-4, and 18-5; and,
- Subareas 20-3 and 20-4.

In 2019, marine sport fisheries were monitored by creel surveys in three main areas: 1) Juan de Fuca including Victoria (south of Cadboro Point) and Juan de Fuca Strait through Subarea 20-1; 2) Portions of the Strait of Georgia including Areas 14 through 18, that portion of Area 19 north of Cadboro Point, Areas 28 and 29; and 3) Johnstone Strait including Areas 11 to 13. Creel survey monitoring of these fisheries includes using an access point (landing site) survey for collecting catch, CPUE, and biological information combined with an aerial survey for effort counts. In addition, logbook programs, directed at estimating the sport catch by fishing guides during guided trips, were conducted in the Campbell River and intermittently throughout other areas in the South Coast. The Avid Angler program and the Area 13 remote lodges around Stuart Island provided the majority of logbook program data in 2019. Painters Lodge in Campbell River was a regular interview site in 2019 which provided guided catch as well. Electronic survey estimates from the iREC program will also be used to produce catch estimates for those areas where creel surveys did not take place.

The Johnstone Strait creel survey for Areas 11 and 12 was conducted from June through August.

The Strait of Georgia creel survey for Areas 13 and 14 was conducted from May to October, for Area 15 from June to September, for Area 16 from August to September, for Areas 17 and 18 from May to September, and for Areas 19 and the SOG portion of Area 20 from April to October.

Effort, catch and release information from marine fisheries are summarized in Appendix 4.

Region 1 Vancouver Island Tributaries

River conditions in most tributaries on Vancouver Island were improved in 2019 compared to previous years due to an adequate snowpack, cooler temperatures over the summer and more precipitation during portions of the summer months. All systems in Region 1 that are typically open remained open in 2019, with the exception of Regions 1-1 to 1-6 that are managed using seasonal closures between July 15 to August 31. Many Chinook systems on the east and west coasts of Vancouver Island saw strong Chinook returns in 2019; particularly those from enhanced systems. These returns provided early and productive opportunities for recreational fresh water fisheries. The Campbell River, Qualicum River, Little Qualicum River, Puntledge River, Nitinat River, Somass River and Conuma River all provided some recreational opportunities to harvest Chinook stocks during this time period.

Fraser River and Tributaries

Fraser River Chinook stocks required additional management measures in 2019 due to continued concerns about poor stock status.

Fraser River Mouth (Subareas 29-6, 29-7, 29-9 and 29-10):

• January 1 to December 31, fishing for salmon was closed in this area.

Tidal Fraser River:

In the tidal waters of the Fraser River the following regulations were in place for 2019:

- January 1 to September 13, fishing for salmon was not permitted.
- September 14 to September 20, fishing for Chinook Salmon was permitted but Chinook Salmon could not be retained.
- September 21 to November 1, fishing for salmon was not permitted.
- November 2 to December 31, fishing for Chinook Salmon was permitted but Chinook Salmon could not be retained.

Non-Tidal Fraser River:

Region 2

- January 1 to November 2, fishing for salmon was not permitted.
- November 3 to December 31, fishing for Chinook Salmon was permitted but Chinook Salmon could not be retained.

Region 3: January 1 to December 31, fishing for salmon was not permitted on the Fraser River.

Region 5: January 1 to December 31, fishing for salmon was not permitted on the Fraser River.

Region 7: January 1 to December 31, fishing for salmon was not permitted on the Fraser River.

Fraser River Tributaries:

Region 2

There were several tributaries to the Fraser River in which Chinook retention was permitted. These included:

- Alouette River: daily limit of one Chinook from September 1 to December 31;
- Chehalis River: daily limit of four with only one over 50 cm from June 1 until August 31 and a daily limit of four Chinook with only one over 62 cm from September 1 until December 31;
- Chilliwack/Vedder River: daily limit of four with only one over 62 cm from July 1 until August 31, daily limit of four with two over 62 cm from September 1 to December 31;
- Coquitlam River: daily limit of one Chinook from September 1 to December 31;
- Harrison River downstream of the Highway No. 7 Bridge, daily limit of four with only one over 62 cm from September 1 to December 31.

Region 3

Thompson River: That portion of the Thompson River from the White Triangular Fishing Boundary (WTFB) signs just downstream of Gold Pan Provincial Park to the easterly border of the Skihist Ecological reserve along the Thompson River located at 50°15′N, 121°31′W; this is approximately 5 km northeast of Lytton at Skihist Park.

• September 13 to September 22, daily limit of four Chinook, zero over 50 cm.

Kamloops Lake: In the waters of Kamloops lake upstream of the fishing boundary signs at the outlet of Kamloops Lake.

• August 22 to September 22, 2019 daily limit of four Chinook, only one over 50 cm.

South Thompson River: That portion of the South Thompson River from the green can buoy near outlet of Little River, including Little Shuswap Lake, to the fishing boundary sign approximately 100 m downstream of Campbell Creek.

• August 16 to September 22, daily limit of four Chinook, only two greater than 50 cm. There is a monthly quota of six Chinook from the South Thompson River.

Region 5

January 1 to December 31, fishing for salmon was not permitted in any portion of the Fraser watershed in Region 5.

Region 7

January 1 to December 31, fishing for salmon was not permitted in any portion of the Fraser watershed in Region 7.

Region 8

Note: there is a monthly limit of four Chinook in Region 8.

Mabel Lake: That portion of Mabel Lake that is both northerly of a line drawn from a white triangular fishing boundary sign situated at the northern edge of Mabel Lake Provincial Park to the prominent point of land on the western shore; and southerly of a line drawn between two white triangular fishing boundary signs located on opposite shores approximately 1 km from Wap Creek.

• August 16 to September 12, daily limit of four Chinook, only two over 50 cm.

Middle Shuswap River: No fishing for salmon.

Lower Shuswap River: That portion of the Lower Shuswap River upstream from white triangular fishing boundary signs upstream of the Mara Bridge to Mable Lake, except no fishing in those waters 50 metres upstream and downstream of the Trinity Valley Road Bridge.

August 16 to September 12, daily limit of four Chinook, only two over 50 cm.

4.2.7 EXCESS SALMON TO SPAWNING REQUIREMENTS (ESSR) FISHERIES

The Tseshaht and Hupacasath First Nations were issued a joint Excess Salmon to Spawning Requirements (ESSR) Licence for Chinook and Coho at the Robertson Creek Hatchery facility.

The Ditidaht First Nation was issued an ESSR Licence for Chinook, Coho and Chum at Nitinat Lake and Nitinat hatchery.

The Mowachaht/Muchalaht First Nation was issued an ESSR licence to harvest Chinook, hatchery-marked Coho, and Chum from the Conuma River and hatchery.

An ESSR for the Qualicum First Nation for Chum, Coho and Chinook was issued October 3, 2018 UFN at the Big Qualicum hatchery.

The K'ómoks First Nation was issued an ESSR licence to harvest Fall Chinook Salmon and Chum Salmon at the DFO Puntledge River Hatchery between September 27 and December 31, 2019. Harvest of ESSR Fall Chinook Salmon took place between October 8 and October 22, 2019.

There were ESSR fisheries at the Capilano hatchery in 2019 that harvested Chinook Salmon.

There were ESSR fisheries at the Chilliwack hatchery in 2019 that harvested Chinook Salmon.

There were ESSR fisheries at the Chehalis hatcheries in 2019 that harvested Chinook Salmon.

The A-Tlegay Fisheries Society was issued an ESSR licence to harvest Chinook Salmon at the DFO Quinsam River Hatchery between October 15 and November 15, 2019. There was no Chinook Salmon surplus identified so the ESSR harvest did not take place.

Therefore no Johnstone Strait ESSR opportunities on Chinook occurred in 2019.

There were no Interior Fraser ESSR opportunities on Chinook in 2019

All ESSR harvest information can be found in Appendix 7.

5.1 SOCKEYE SALMON

5.1.1 OBJECTIVES AND OVERVIEW

In 2019 the Fraser River Panel (FRP) adopted the p50 probability run size forecast for all run timing groups (4.8 M Fraser Sockeye) for pre-season planning purposes. At the p50 and p25 run size forecasts TAC for international sharing was available and pre-season plans took this into consideration. All fishery planning focused on staying within constraints to minimize impacts on less abundant stock groups and species of concern. Actual in-season harvest opportunities were dependent on in-season stock assessments.

Fishing plans incorporate provisions to meet escapement and conservation objectives for stocks of concern while considering other international and domestic objectives. Fishing plans include the following assumptions and guiding principles in no particular order:

- The Fraser River Panel (FRP) operated in accordance with Chapter 4, Annex IV of the Pacific Salmon Treaty;
- The U.S. share of the annual Fraser River Sockeye Salmon total allowable catch (TAC), harvested in the waters of Washington State, is 16.5% of the aggregate as per Chapter 4 provisions. To the extent practicable, the FRP shall manage the United States fishery to implement a fishing plan that concentrates harvest on the most abundant management group or groups;
- It is understood that the U.S. harvest may exceed 16.5% of the TAC for one or more of the less abundant management groups by a small but acceptable amount despite concentrating the harvest in this manner;
- For computing TAC by stock management groupings, the Aboriginal Fishery Exemption (AFE) of 400,000 Fraser River Sockeye, shall be allocated to management groups as follows: The Early Stuart Sockeye exemption shall be up to 20% (maximum 80,000) of the Fraser River AFE, and the remaining balance of the latter exemption shall be based on the average proportional distribution of First Nations Food, Social and Ceremonial catch for the most recent three cycles and modified annually as required to address concerns for Fraser River Sockeye stocks and other species, and as otherwise agreed to by the Fraser River Panel;
- It was anticipated that an in-season run size estimate for Cultus Lake Sockeye would not be possible due to low abundance relative to co-migrating Sockeye stocks. As a result the Cultus exploitation rate is assumed to be the same as the exploitation rate from the similarly timed Late run stocks (excluding the Birkenhead and Birkenhead-type miscellaneous stocks), caught seaward of the confluence of the Fraser and the Harrison Rivers;
- The four run timing aggregates identified under the Pacific Salmon Treaty Annex generally contain stocks with similar timing in the marine area. Recent trends in timing of some stocks, including Raft River and North Thompson (in the Early Summer run prior to 2012), and Harrison River (in the Late run prior to 2012) Sockeye now differ substantially from the other stocks in their respective historical run

timing groups. Fisheries and Oceans Canada continues to manage these stocks as part of the Summer run aggregate to better align these stocks with other stocks of similar run timing. Escapement plans, management adjustments and harvest rules have been adjusted to account for this change;

- Canada's escapement plan specified escapement requirements that varied with run size for each of the run timing aggregates;
- The Total Allowable Mortality (TAM) cap describes the upper range of the total mortality (including management adjustments and exploitation rate). The TAM cap was 60% for all run timing/management groups;
- At low abundances, low abundance exploitation rates (LAERs) are implemented to protect 80-90% of the run timing aggregate (10-20% LAER) while allowing for fisheries on more abundant co-migrating run timing groups and/or other species. In 2019 Canada's escapement plan permitted up to a 20% LAER for all stock groups with the exception of Early Stuart sockeye which permitted up to a 10% LAER;
- The allowable harvest in a LAER situation is not a target; the objective is to allow as many fish as possible to pass to the spawning grounds. In most circumstances harvests under a LAER would be considered incidental harvest or bycatch only; however, in some circumstances limited directed harvest in terminal areas may be considered. All fishery impacts are to be accounted for under the LAER;
- In 2019, Early Stuart Sockeye window closures and other fishing restrictions were planned for commercial, recreational and First Nations fisheries to protect a significant proportion (90%) of the Early Stuart return. These measures included a 3-week rolling window closure based on run timing of the Early Stuart Sockeye migration through various fishery areas. In some years, including in 2019, an additional week long closure was added on to the end of the Early Stuart window closure in order to protect the earliest of the early-timed Early Summer Sockeye that have conservation concerns; and
- Conservation concerns for other Sockeye stocks and species continued to impact the planning of Sockeye fisheries. The stocks and species of concern in 2019 included: Cultus Lake Sockeye, Nimpkish River Sockeye, Sakinaw Lake Sockeye, Interior Fraser River Coho, Southern BC Chinook including Fraser River Chinook, and Interior Fraser River Steelhead.

5.1.2 STOCK STATUS

Please Note: Tables 5-2 and 5-4 are adapted from or courtesy of the Pacific Salmon Commission.

5.1.2.1 PRE-SEASON ASSESSMENT

Pre-season expectations were for a median run size (p50 level) of 4,795,000 Fraser River Sockeye Salmon with a one-in-two chance that the run size would be between 2,891,000 (p25 level) and 8,676,000 (p75 level).

Table 5-1 2019 Pre-season run size abundance forecast range by management group for Fraser Sockeye

Run timing group	Probability	Probability that return will be at/or below specified run size									
	10%	25%	50%	75%	90%						
Early Stuart	18,000	27,000	41,000	61,000	92,000						
Early Summer	112,000	221,000	465,000	898,000	1,753,000						
Summer	1,553,000	2,454,000	3,930,000	7,048,000	11,187,000						
Late	111,000	189,000	359,000	669,000	1,265,000						
Total	1,794,000	2,891,000	4,795,000	8,676,000	14,297,000						

The pre-season diversion rate forecast for Fraser River Sockeye through Johnstone Strait was 69%. Expected Area 20 50% migration timing dates were July 5th for Early Stuart, July 30th for Early Summer, August 10th for Summer, and August 18th for Late-run Sockeye.

Pre-season spawning escapement goals at the p50 run size forecasts were 41,000 Early Stuart, 186,000 Early Summer, 1,572,000 Summer and 336,600 Late-run Sockeye for a total of 2,136,600 Sockeye spawners (Table 5-2).

Table 5-2 Fraser Sockeye 2019 Pre-season (top) and Most Recent In-season (bottom) Values for Total Allowable Catch (TAC) and Other Management Parameters. Post-season values are not available at this time.

				Spawning			Manage-		Aboriginal		Total	Harvest		Mission	50% Migration	Diversion
		Management	Total	Escapement			ment	Test	Fishery	Total	Allowable	(includes	Catch	Escape.	Date	Rate
	Date	Group	Abundance	Target	TAM	pMA	Adjust.	Fishing	Exemption	Deductions	Catch	for AFE)	to date	to date	Area 20	To-date
_	r.	Early Stuart	41,000	41,000	0.00	0.69	28,300	500	3,600	41,000	0	0	0	0	5-Jul	
19	SC	Early Summer	465,000	186,000	0.60	0.45	83,700	9,500	48,200	327,400	137,600	185,800	0	0	30-Jul	
9	ĕ	Summer	3,930,000	1,572,000	0.60	0.09	141,500	53,000	290,100	2,056,600	1,873,400	2,163,500	0	0	10-Aug	
₹	å	Late	359,000	336,600	0.06	0.56	188,500	4,000	58,100	359,000	0	0	0	0	18-Aug	
	<u>r</u>	Sockeye	4,795,000	2,135,600			442,000	67,000	400,000	2,784,000	2,011,000	2,349,300	0	0		69%
24		Early Stuart	26,000	26,000	0.00	0.69	17,900	100	2,500	26,000	0	0	46	25,908	8-Jul	
, .	6	Early Summer	94,000	94,000	0.00	0.45	42,300	1,100	8,300	94,000	0	0	1,011	92,530	29-Jul	
ğ	as	Summer	360,000	360,000	0.00	0.09	32,400	5,000	31,000	360,000	0	0	5,039	339,006	19-Aug	
eπ	Se	Late	20,000	20,000	0.00	0.56	11,200	500	1,500	20,000	0	0	343	21,679	19-Aug	
abt	<u> </u>	'														
Š		Sockeve	500.000	500.000			103.800	6.700	43.300	500.000	0	l o	6.439	479,124		84%

^{*} The TAC is determined by the run sizes and TAC deductions (spawning escapement targets, management adjustments, projected test fishing catches and AFE Exemptions) that were in effect when the the Fraser River Panel control of the last U.S. fishery area was relinquished.

The goals for each Sockeye management group were established by applying Canada's Spawning Escapement Plan to the forecasted pre-season run size. For pre-season planning purposes, the harvest rule for Early Stuart Sockeye was constrained by a Low Abundance Exploitation Rate (LAER) limit of up to 10%. The Early Summer, Summer, and Late Sockeye LAER limits were up to 20%. Harvest rules were further constrained by a 60% Total Allowable Mortality (TAM) rate for all management groups (Table 5-3).

^{**} In a no TAC situation, the allowable harvest is the maximum harvest allowed under LAER management as identified in Canada's Escapement Plan. However the LAER is not a target and is usually by-catch

in fisheries directed on other stocks or species with some limited directed terminal harvest. All impacts from all fisheries count towards the LAER.

*** Available Harvest = total abundance minus spawning escapement target.

^{***} Available Harvest = total abundance minus spawning escapement target.

**** The Fraser River Panel relinquished control of U.S. Panel Area Waters on Sept. 17th in Areas 4B, 5, 6c, 6 & 7, Sept. 21th in Area 7A, and Oct. 5th in the Apex. Oct. 5th is the final relinquishment date.

Table 5-3 Fraser River Sockeye Salmon 2019 Escapement Plan and Application of the Plan to each Management Group across a Range of Forecast Abundances

	Harvest Rule Parameters								
	Low Abundan	ce		Lower Fishery	Upper Fishery				
Management Unit	ER (LAER)	TAM Cap		Reference Point	Reference Point				
Early Stuart	1	0%	60%	108,000	270,000				
Early Summer (w/o misc)	2	0%	60%	100,000	250,000				
Summer (w/o misc)	2	0%	60%	1,000,000	2,500,000				
Late (w/o misc)	2	0%	60%	300,000	750,000				

Management	Pre-season Forecast Return										
Unit		p10	p25	p50	p75	p90					
Early Stuart	forecast	18,000	27,000	41,000	61,000	92,000					
	TAM Rule (%)	0%	0%	0%	0%	0%					
	Escapement Target	18,000	27,000	41,000	61,000	92,000					
	MA	12,400	18,600	28,300	42,100	63,500					
	Esc. Target + MA	30,400	45,600	69,300	103,100	155,500					
	LAER	10%	10%	10%	10%	10%					
	Available ER at Return	0%	0%	0%	0%	0%					
	Allowable ER	10%	10%	10%	10%	10%					
	Allowable Harvest	1,800	2,700	4,100	6,100	9,200					
	2019 Performance										
	Projected S (after MA)	9,600	14,300	21,800	32,400	48,900					
	BY Spawners	10,096	10,096	10,096	10,096	10,096					
	Proj. S as % BY S	95%	142%	216%	321%	484%					
	cycle avg S	44,409	44,409	44,409	44,409	44,409					
	Proj. S as % cycle S	22%	32%	49%	73%	110%					
Management		Pre-s	eason Forecast R	eturn							
Unit		p10	p25	p50	p75	p90					
Early Summer	lower ref. pt. (w misc)	147,400	157,900	167,900	161,200	165,500					
(w/o RNT)	upper ref. pt. (w misc)	368,400	394,600	419,700	403,100	413,800					
	forecast (incl. misc)	112,000	221,000	465,000	898,000	1,753,000					
	TAM Rule (%)	0%	29%	60%	60%	60%					
	Escapement Target	112,000	157,900	186,000	359,200	701,200					
	MA	50,400	71,100	83,700	161,600	315,500					
	Esc. Target + MA	162,400	229,000	269,700	520,800	1,016,700					
	LAER	20%	20%	20%	20%	20%					
	Available ER at Return	0%	0%	42%	42%	42%					
	Allowable ER	20%	20%	42%	42%	42%					
	Allowable Harvest	22,400	44,200	195,300	377,200	736,300					
	2019 Performance										
	Projected S (after MA)	61,800	122,000	186,100	359,400	701,500					
	BY Spawners	137,845	137,845	137,845	137,845	137,845					
	Proj. S as % BY S	45%	89%	135%	261%	509%					
	cycle avg S	144,830	144,830	144,830	144,830	144,830					
	Proj. S as % cycle S	43%	84%	128%	248%	484%					

Management		Pre-s	season Forecast R	eturn		
Unit		p10	p25	p50	p75	p90
Summer	lower ref. pt. (w misc)	1,109,500	1,109,500	1,109,500	1,109,500	1,109,500
(w. RNT & H	ar) upper ref. pt. (w misc)	2,773,900	2,773,900	2,773,900	2,773,900	2,773,900
	forecast	1,553,000	2,454,000	3,930,000	7,048,000	11,187,000
	TAM Rule (%)	29%	55%	60%	60%	60%
	Escapement Target	1,109,500	1,109,500	1,572,000	2,819,200	4,474,800
	MA	99,900	99,900	141,500	253,700	402,700
	Esc. Target + MA	1,209,400	1,209,400	1,713,500	3,072,900	4,877,500
	LAER	20%	20%	20%	20%	20%
	Available ER at Return	22%	51%	56%	56%	56%
	Allowable ER	22%	51%	56%	56%	56%
	Allowable Harvest	343,600	1,244,600	2,216,500	3,975,100	6,309,500
	2019 Performance					
	Projected S (after MA)	1,112,600	1,112,600	1,576,400	2,827,100	4,487,300
	BY Spawners	977,005	977,005	977,005	977,005	977,005
	Proj. S as % BY S	114%	114%	161%	289%	459%
	cycle avg S	651,121	651,121	651,121	651,121	651,121
	Proj. S as % cycle S	171%	171%	242%	434%	689%
Management		Pre-s	season Forecast R	eturn		
Unit		p10	p25	p50	p75	p90
Late	lower ref. pt. (w misc)	336,600	336,600	336,600	336,600	336,600
(w/o Har)	upper ref. pt. (w misc)	841,400	841,400	841,400	841,400	841,400
•	forecast	111,000	189,000	359,000	669,000	1,265,000
	TAM Rule (%)	0%	0%	6%	50%	60%
	Escapement Target	111,000	189,000	336,600	336,600	506,000
	MA	54,400	98,300	188,500	198,600	323,800
	Esc. Target + MA	165,400	287,300	525,100	535,200	829,800
	LAER	20%	20%	20%	20%	20%
	Available ER at Return	0%	0%	0%	20%	34%
	Allowable ER	20%	20%	20%	20%	34%
	Allowable Harvest	22,200	37,800	71,800	133,800	435,200
	2019 Performance					
	Projected S (after MA)	59,600	99,500	184,900	336,100	504,400
	BY Spawners	68,022	68,022	68,022	68,022	68,022
	Proj. S as % BY S	88%	146%	272%	494%	7429
	cycle avg S	465,982	465,982	465,982	465,982	465,982
	Proj. S as % cycle S	13%	21%	40%	72%	108%
Allowable Har	vest (TF, US, CDN)	390,000	1,329,300	2,487,700	4,492,200	7,490,200
Total projecte	d spawners	1,243,600	1,348,400	1,969,200	3,555,000	5,742,100

Pre-season Management Adjustments (MAs) were adopted by the Panel and accounted for 28,300 Early Stuart, 83,700 Early Summer, 141,500 Summer-run and 188,500 Late-run Sockeye, which were added to the spawning escapement targets to increase the likelihood of achieving the escapement targets. The application of a LAER for any management group indicates that spawning escapement targets are unlikely to be reached and therefore obviates the need for MAs. In 2019 this was the case pre-season for Early Stuart, as it was apparent that for the entire range of pre-season run size forecasts LAER management was necessary. Early Summer Sockeye would be in a LAER scenario around run sizes less than p50, Summer Sockeye would not be in a LAER until an abundance less than p10, and Late Sockeye would be in a LAER scenario at run sizes less than p75.

The pre-season MAs were derived from historical proportional differences between estimates (pDBEs). For all aggregates, except the Late run, the pre-season pDBEs were historical medians from all cycle years. For Late run the Panel agreed to use the weighted average of the historical odd-year median for Late run excluding Birkenhead and the all-year median for Birkenhead. If the Late run upstream timing was later than September 15th the MA would be the weighted average of the all years timing model for Late run excluding Birkenhead and the all-years median for Birkenhead.

The projected Total Allowable Catch (TAC) of Fraser River Sockeye for international sharing based on the median forecasted abundances and bilaterally agreed deductions was approximately 2,011,000 Sockeye, of which 16.5% would be allocated to the United States (U.S.).

Pre-season model runs indicated that if the in-season return was less than the median forecast and similar to the p25 forecast there would still be some international TAC. In Canada, at the p25 forecast no TAC would be

available for commercial or recreational fisheries directed on Sockeye and limited harvest opportunities would be available for First Nations FSC fisheries due to constraints (e.g. Early Stuarts, Early Summers and Lates being in LAERs). Pre-season model runs also indicated it was unlikely the Summer run TAC could be fully harvested due to the overlap in return timing with other groups that would not have TAC (Figure 5-1).

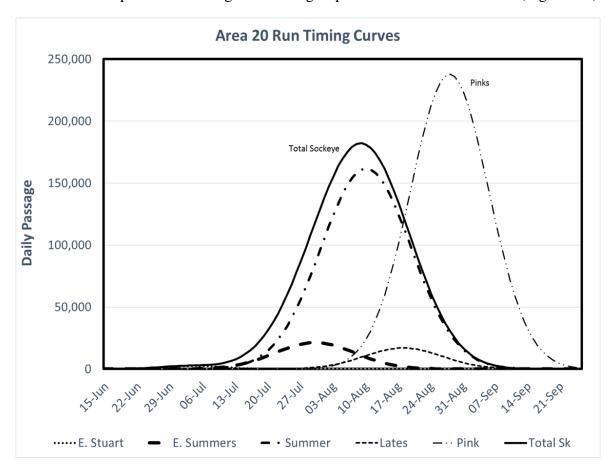


Figure 5-1 Pre-Season Projections of Daily Fraser River Sockeye Salmon Abundance by Management Group

5.1.2.2 IN-SEASON ASSESSMENT

Overall the marine migration timing was similar to pre-season expectations for all management groups with the exception of Summer runs which were much later than anticipated: 3 days later for Early Stuart, 1 day earlier for Early Summer, 9 days later for Summer, and 1 day later for Late-run Sockeye.

The Johnstone Strait diversion rate was 84% compared to a pre-season adopted value of 69%.

Returns for all management groups were well below median pre-season forecast levels:

- The return of Early Stuarts was low: 26,000 or 63% of the pre-season 50% probability level (p50) forecast (41,000), i.e. closer to the p25 forecast (27,000).
- The return of Early Summers was very low: 94,000 or 20% of the pre-season p50 forecast (465,000), i.e. slightly below the p10 forecast overall (112,000).

- The return of Summers was very low: 343,000 or 9% of the pre-season p50 forecast of 3,930,000. All stock groups were below the p10 forecast.
- The return of Lates was also very low: 23,000 or 6% of the pre-season p50 forecast of 359,000.

A landslide in the Big Bar area on the Fraser River upstream of Lillooet was discovered on June 23, 2019 and is thought to have occurred sometime between October and November 2018. It created a 5-metre-high waterfall/cascade that posed a migration passage challenge to salmon migrating to rivers and streams upstream of the slide. The Big Bar landslide had notable impacts to Sockeye passage to the spawning grounds, especially prior to August 28, 2019 when water flow decreased enough to enable greater natural Sockeye migration above the slide. Based upon where the various stocks spawn, 100% of Early Stuart, 58% of Early Summer, 90% of Summer, and 0% of Late Sockeye were expected to migrate past the Big Bar slide. Preliminary passage estimates past the slide, with very limited natural passage as well as helicopter assisted passage, were only estimated to be approximately 20% for Early Stuart, 24% for Early Summer, and 70% for Summer Sockeye. Due to the low in-season return estimates, the Department decided to: (i) delay and not licence Sockeye-directed fisheries as no in-season TAC was identified, and (ii) plan fisheries directed on other species in a way that allowed as many Sockeye to reach the spawning grounds as possible by minimizing bycatch impacts to levels well below the LAER limits identified in the escapement plan. Management Adjustments had no management implications in-season, but post-season, the Big Bar landslide will impact the Difference Between Estimates (DBEs) for Early Stuart, Early Summer and Summer runs.

A Unified Command that includes all levels of government (First Nations, provincial, federal) came together to lead response operations. Information about the Big Bar Slide was communicated through DFO fishery notices on Fraser River Sockeye Updates, Fraser River Panel meetings, the Province of BC's website (https://www2.gov.bc.ca/gov/content/safety/emergency-preparedness-response-recovery/emergency-response-and-recovery/incident-summaries/big-bar-landslide-incident), and the Fraser River Aboriginal Fisheries Secretariat (https://www.frafs.ca/node/75).

Fraser River discharge was far below the mean discharge (1981 to 2010) through most of June (near minimum discharge levels part of the time), slightly below the mean for most of July despite flooding on the Chilcotin River which was accompanied by higher water levels, turbulence and debris, near the mean for most of August, and near or above the mean for September. For most of the season, the Fraser River daily water temperatures fluctuated a few degrees above the historical mean reaching historical maximum observations at a few points during the season.

5.1.2.3 POST-SEASON ASSESSMENT

The preliminary post-season return of adult Fraser Sockeye was estimated to be ~90% below the pre-season median forecast and the smallest return on record (1893 to 2019) (Table 5-2). The run size was ~78% below the brood year run size (2.2 M) and ~90% below the 2019 cycle line average of 4.8 M).

Even though there were no licenced Sockeye-directed fisheries in 2019, there were fisheries for other species where Fraser Sockeye were encountered, notably Chinook and Pink Salmon-directed fisheries (e.g. in Canada, FSC for Chinook and Pink, commercial (including economic opportunity and demonstration) for Pink; in Washington, in both Treaty Indian and All Citizens Pink fisheries). Fishery-induced mortality estimates were

applied to all non-retained Sockeye encountered in these fisheries. There was no Fraser Sockeye TAC for international sharing, based on the calculation method set out in Annex IV, Chapter 4 of the Pacific Salmon Treaty. As such there was no U.S. share, the Canadian share of the TAC, including the Aboriginal fisheries exemption (AFE), comprised the entire TAC.

The total Canadian Fraser Sockeye catch (either directed or bycatch) can be found in Appendix 5 as well as Appendices 1 and 6. The preliminary post-season exploitation rate is estimated to be 3.2%. See Table 5-4 for preliminary projected post-season exploitation rates relative to allowable exploitation rates..

Table 5-4: Preliminary 2019 Post-Season Exploitation Rate Estimates for All Fraser Sockeye Catch by Management Group

Management Group	Early Stuart	Early Summer	Summer	Late	T otal
Preliminary Exploitation Rate	0.7%	2.8%	3.8%	1.7%	3.3%
Allowable Exploitation Rate*	10.0%	20.0%	20.0%	20.0%	19.4%
LAER?*	Yes	Yes	Yes	Yes	Yes

^{*}The Low Abundance Exploitation Rate (LAER) is not a target. Due to the very low returns, all efforts were made to minimize fisheries impacts to Fraser Sockeye

DFO's preliminary estimates of spawning escapements to streams in the Fraser River watershed are as follows:

Management Unit Spawning Escapement **Spawning Success** % high precision 89 Early Stuart 100% 0% Early Summer TBD TBD TBD TBD TBD TBD Summer Late TBD TBD TBD TBD TBD TBD Total

Table 5-5: Preliminary 2019 Fraser Sockeye Salmon Escapement Summary by Management Unit.

Ongoing post-season work continues on the following topics that were highlighted during the 2019 season:

- **Impacts of the Big Bar landslide:** The effect of the Big Bar landslide on 2019 passage and escapement on the Fraser River is still being evaluated. Work to mitigate the effects of the Big Bar slide is ongoing, and potential implications for passage in 2020 or in the future are still uncertain and will require ongoing evaluation.
- Low productivity: In recent years there has been declining productivity, climate change and the increased variability that accompanies it, as well as low Sockeye abundances (the two lowest on record occurred in 2016 and 2019). As part of adaptive management, DFO will be reviewing potential adjustments/improvements to current harvest control rules, alternative strategies that take into account changing conditions and key uncertainties, and what implications there may be for future advice. Initial

work will begin in 2019 through the Fraser River Sockeye Spawning Initiative (FRSSI) and is anticipated to be ongoing in 2020 and 2021. Forecast model methods may also be reviewed.

- Estimation of species composition and passage at Mission hydroacoustic site: There are a variety of methods used to determine the number of Sockeye, Pink and Chinook Salmon that pass by Mission. The Mission estimates are critical to in-season estimates of run size and migration timing. For example, Sockeye escapement estimates are typically based on total salmon past Mission minus Pink and Chinook. When Pink proportions increase, another method is used instead (i.e. Sockeye CPUE at Whonnock multiplied by the expansion line). Species proportions are also derived from hydroacoustic-based length data and the previous year's species-specific average lengths. These methods and others have been reviewed by the Fraser River Panel Technical Committee but remain a considerable source of uncertainty. If numbers of one species are inaccurately or imprecisely estimated it may affect in-season estimates and expectations of catch of the other species in in-river fisheries. DFO is looking to further review these methods in future years.
- **Species and stocks of concern:** In 2017, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determined that of the 24 Fraser Sockeye designatable units (DUs), 8 were endangered, 2 were threatened, and 5 were of special concern. Recovery Potential Assessments are underway in 2019

5.1.3 FIRST NATIONS FSC AND TREATY DOMESTIC FISHERIES

Due to extremely low returns there were no licenced Sockeye-directed fisheries in 2019. There were fisheries in both marine and in-river for other species where Fraser Sockeye were encountered, notably Chinook and Pink Salmon-directed fisheries (e.g. in Canada, FSC for Chinook and Pink).

For marine FSC fisheries, the retention of Sockeye was not authorized in 2019. First Nations were encouraged to work with the Department to plan fisheries directed at other species (e.g. Fraser Pink Salmon) where Fraser Sockeye may be present. There was very little effort and catch of other species in 2019.

For FSC fisheries in the Fraser River, licences indicated that the fishery was limited to the target species (Chinook or Pink Salmon), and all efforts and attempts shall be made to return all non-target species including Sockeye Salmon, Steelhead and Sturgeon to the water alive and unharmed. In Lower Fraser Above Port Mann (APM) areas, dead Sockeye could be retained in the first FSC fishery (August 9th to 10th), after which Sockeye could not be retained in other FSC fisheries (marine and in-river) targeting other species. Gear-specific fishery-induced mortality estimates, as described in the IFMP, were applied to all non-retained Sockeye encountered in these fisheries.

For catch estimates, see Appendix 5.

5.1.4 COMMERCIAL FISHERIES

There were no directed commercial fisheries on Fraser River Sockeye in Canada or the United States in 2019.

5.1.5 RECREATIONAL FISHERIES

5.1.5.1 TIDAL RECREATIONAL FISHERIES

In southern BC in all areas except Area 23 (Barkley Sound), the marine tidal recreational fishery was not permitted to retain Sockeye Salmon in 2019. However, the creel survey reported a small number of Sockeye kept in areas closed to Sockeye retention.

The tidal waters of the Fraser River remained closed to fishing for Sockeye Salmon in 2019.

5.1.5.2 NON-TIDAL RECREATIONAL FISHERIES

The non-tidal waters of the Fraser River remained closed to fishing for Sockeye Salmon in 2019. For catch estimates, see Appendix 5.

5.1.6 EXCESS SALMON-TO-SPAWNING REQUIREMENTS (ESSR) FISHERIES

There were no ESSR opportunities directed on Fraser River Sockeye in 2019.

5.2 PINK SALMON

5.2.1 OBJECTIVES AND OVERVIEW

In 2019 the Fraser River Panel (FRP) adopted a pre-season fishing plan at the p50 probability run size forecast for Fraser Pink Salmon (5.02 M) for pre-season planning purposes. At the p50 run size forecast TAC for international sharing was available and pre-season plans took this into consideration. All fishery planning focused on staying within constraints to minimize impacts on less-abundant stock groups and species of concern. Actual in-season harvest opportunities were dependent on in-season stock assessments.

Fishing plans incorporate provisions to meet escapement and conservation objectives for stocks of concern while considering international and domestic objectives. Fishing plans include the following assumptions and guiding principles (in no particular order):

- The FRP operated in accordance with Chapter 4, Annex IV of the Pacific Salmon Treaty;
- The U.S. share of the annual Fraser River Pink Salmon total allowable catch (TAC), harvested in the waters of Washington State shall not exceed 25.7% of the TAC;
- Canada's escapement plan specified escapement requirements that varied with run size;
- The escapement target varies with run size and the maximum exploitation rate cap was 70%;
- Harvest of Fraser Pink Salmon may be constrained by the management objectives for Fraser Sockeye
 and for stocks of concern, particularly Interior Fraser River (IFR) Coho Salmon and IFR Steelhead;
- Due to conservation concerns alternative fishing gear and fishing strategies may be employed to access Fraser Pink TAC. Alternative gears used in the past have included beach seines, shallow seines, and fish

wheels in the Fraser River. In the marine areas, varying fishing strategies and gear are considered such as allowing purse seines with independent observer coverage to access areas at the mouth of the river and possibly within the river.

• Further, when Pink TAC is available and there are bycatch constraints for other species (i.e. Fraser Sockeye) the Department may consider decision rules similar to recent years where the total Sockeye mortalities associated with a gear specific Pink fishery is 1% or less for Sockeye. This calculation takes into account the release mortality rate of the gear being used to harvest Pink Salmon as well as the estimated proportion of Sockeye expected to be encountered in the fishery.

5.2.2 STOCK STATUS

Please Note: Figure 5-2 and Table 5-7 are adapted from or courtesy of the Pacific Salmon Commission.

5.2.2.1 PRE-SEASON ASSESSMENT

Pre-season expectations were for a median run size (p50 level) of 5.02 million Fraser River Pink Salmon with a 50% chance that the run size would be between 3.58 million (at p25) and 7.51 million (p75).

Pre-season expectations of diversion rate for Fraser River Pink through Johnstone Strait were 50% and the expected Area 20 50% migration timing date was August 28th.

The pre-season spawning escapement target was 4.48 million Fraser River Pink spawners at the median forecast (p50).

Harvest constraints were established by applying Canada's Fraser Pink Escapement Plan to the forecasted preseason run size distribution. The harvest rate for Fraser River Pink Salmon varied with abundance and was constrained by a 70% exploitation rate.

The projected Total Allowable Catch (TAC) of Fraser River Pink for international sharing based on the median forecasted abundance and bilaterally agreed deductions was 535,600 Fraser Pink, of which 25.7% were allocated to the United States (U.S.).

Table 5-6 2019 Fraser Pink Escapement Plan and Application across a Range of 2019 Forecast Abundances

2019 Fraser Pink Escapement	Plan							
Run Size	Escapement Plan							
Less than 7.059M	Exploitation rate increa	ases linearly from	0% at run size =0 to	o 15% at run size =	7.059M			
Between 7.059M-20M	Fixed Escapement. Escapement goal = 6,000,000							
Greater than 20M	Exploitation Rate Cap	= 70%						
	2019 Pre	-season Forecast	Return					
	p10	p25	p50	p75	p90			
forecast	2,530,000	3,577,000	5,018,600	7,513,000	10,610,000			
escapement target	2,394,000	3,305,000	4,483,000	6,000,000	6,000,000			
allowable ER	5%	8%	11%	20%	43%			
Available Harvest (TF, US, CDN)	136,000	272.000	535,600	1.513.000	4.610.000			

5.2.2.2 IN-SEASON ASSESSMENT

Marine migration timing was 11 days earlier than pre-season expectations which created more run timing overlap with the weak Sockeye returns. The Pink Area 20 peak return timing of August 17th was also the earliest on record (1959 to 2019).

The Pink Salmon return was bimodal with a larger second mode, and the return timing spread of 19 days was the narrowest (1987 to 2019), with the longest Pink travel time of 23 days from Area 20 to Mission (2009 to 2019), all of which contributed to challenges in estimating return abundance in season.

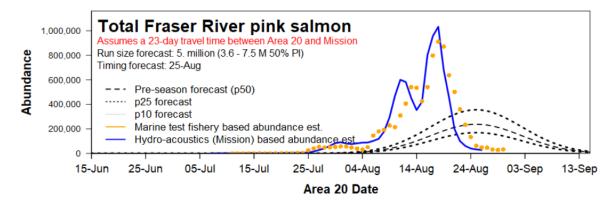


Figure 5-2 Pre-Season Projections and In-Season Reconstruction of Daily Fraser River Pink Salmon Abundance

The Johnstone Strait diversion rate was 11%, much lower than the pre-season forecast of 50%. This was the lowest Pink northern diversion rate between 1987 and 2019.

The Pink return (Table 5-7) was substantially above the median pre-season forecasts (approximately 73% above the median forecast). The TAC of Fraser River Pink for international sharing based on the final Fraser River Panel adopted in-season run size (8.9 million) was 2,882,900 Pinks, of which 25.7% (740,900) were allocated to the U.S. and the remainder to Canada (2,142,000).

Table 5-7 2019 Pre-Season (top) and Most Recent In-Season (bottom) Values for TAC and Other Management Parameters. Post-season values are not available at this time.

			Spawning			Total	Harvest		Mission	% Migratio	Diversion
	Management	Total	Escapement	Test	Total	Allowable	(includes	Catch	Escape.	Date	Rate
Date	Group	Abundance	Target	Fishing	Deductions	Catch	for AFE)	to date	to date	Area 20	To-date
June 19	Pre-Season Pink	5,018,600	4,483,000	7,200	4,490,200	528,400	528,400	0	0	28-Aug	50%
September 24	In-Season Pink	8,900,000	6,000,000	23,500	6,023,500	2,876,500	2,876,500	263,087	8,463,160	17-Aug	11%

^{*} The TAC is determined by the run sizes and TAC deductions (spawning escapement targets, management adjustments, projected test fishing catches and AFE Exemptions) that were in effect when the Fraser River Panel control of the last U.S. fishery area was relinquished.

A landslide in the Big Bar area on the Fraser River upstream of Lillooet was discovered on June 23, 2019 and is thought to have occurred sometime between October and November 2018. It created a 5 metre high waterfall/cascade that posed a migration passage challenge to salmon migrating to rivers and streams upstream of the slide. The Big Bar landslide had notable impacts to fish passage to the spawning grounds, especially prior to late August when water flow decreased enough to enable greater natural migration above the slide. It is unknown what proportion of Fraser Pinks were expected to migrate past the Big Bar slide, however expert opinion suggests the range was between 5 to 30%. It was noted in-season that although natural passage of Pink

^{**} Available Harvest = total abundance minus spawning escapement target.

^{***} The Fraser River Panel relinquished control of U.S. Panel Area Waters on Sept. 17th in Areas 4B, 5, 6c, 6 & 7, Sept. 21th in Area 7A, and Oct. 5th in the Apex. Oct. 5th is the final relinquishment date.

Salmon was observed, mainstem spawning was prevalent directly downstream of the slide. Due to uncertainty surrounding the implications of the Big Bar landslide and the very low in-season Sockeye return estimates, the Department planned fisheries directed on species other than Sockeye, including Pink salmon, in a way that allowed as many Sockeye to reach the spawning grounds as possible. This included measures to minimize sockeye bycatch impacts such as requiring the use of selective fishing gear like shallow seines, beach seines, and fish wheels.

A Unified Command that includes all levels of government (First Nations, provincial, federal) came together to lead response operations. Information about the Big Bar Slide was communicated through DFO fishery notices on Fraser River Sockeye Updates, Fraser River Panel meetings, the Province of BC's website (https://www2.gov.bc.ca/gov/content/safety/emergency-preparedness-response-recovery/emergency-response-and-recovery/incident-summaries/big-bar-landslide-incident), and the Fraser River Aboriginal Fisheries Secretariat (https://www.frafs.ca/node/75).

Fraser River discharge was far below the mean discharge (1981 to 2010) through most of June (near minimum discharge levels part of the time), slightly below for most of July, near the mean for most of August, and near or above the mean for September. For most of the season, the Fraser River daily water temperatures fluctuated a few degrees above the historical mean, reaching historical maximum observations at a few points during the season. Although Fraser River discharge and temperature can have effects on salmon migration, environmental conditions rarely play the same kind of role in Pink management as they do for Fraser Sockeye given timing and migration differences between the species.

5.2.2.3 POST-SEASON ASSESSMENT

The estimated post season return of Fraser Pink is provided in Table 5-7. The 2019 Fraser Pink return was 177% of the median forecast (5.0 M) and ~145% higher than the brood year (3.5 M).

Fraser River Pink Salmon catch numbers are available in Appendix 5. Canadian catch occurred in Pink-directed First Nations Food, Social and Ceremonial (FSC), economic opportunity, and demonstration fisheries, as well as recreational fisheries and very limited commercial fisheries. A small amount of Fraser Pink bycatch in fisheries directed at other species has yet to be included as the stock of origin is uncertain. Final catch estimates will be available in January 2019. The preliminary post-season exploitation rate is estimate to be approximately 6.3%, which is well below the preliminary post-season allowable exploitation rate of 32%. This is partly a result of difficulties encountered in estimating in-season run size – the larger run size was not identified until Pink salmon migrated past Mission, and at this point they were not accessible to regular commercial fisheries.

DFO spawning escapement enumeration programs were not conducted on Fraser Pink Salmon and will not be available. Spawner abundance is estimated indirectly by subtracting the total catch from the run size.

Total Allowable Catch (TAC) calculated for Fraser Pink was based on the calculation method set out in Annex IV, Chapter 4 of the Pacific Salmon Treaty and the July 7, 2017 Commission Guidance. In these calculations, the TAC is fixed on the date that Panel control of the last U.S. Panel Area was relinquished (October 5th in 2019).

Ongoing post-season work will continue to review 2019 assessment challenges, some of which include:

- Impacts of the Big Bar landslide: The effect of the Big Bar landslide on 2019 passage and escapement on the Fraser River is still being evaluated. Work to mitigate the effects of the Big Bar slide going forward are ongoing, and potential implications for passage in the future are still uncertain and will require ongoing evaluation.
- In-season assessment of the daily abundance of Pink Salmon, including: test fishery expansion lines and the incorporation of various data sources (e.g. U.S. Area 7 commercial fishery data has proven useful in a number of years but was not in 2019), daily passage of Pink Salmon past the Mission hydroacoustic site including high density passage days, and the incorporation of behaviour anomalies observed (spread of the run and migration speed) into assessment tools.

5.2.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

The Marine area was open for First Nations directed FSC harvest on Fraser Pink Salmon. First Nations were encouraged to work with the Department to plan fisheries using selective gear and to fish in areas that would have reduced impact on co-migrating Fraser River Sockeye. There was very little effort and catch in marine area Fraser Pink FSC fisheries in 2019.

There were directed harvest opportunities for Fraser Pink salmon in First Nations FSC fisheries in the Fraser River where only selective gear was permitted (e.g. shallow seines, beach seines, fish wheels, dip nets). Incidentally caught Pink were also licensed for retention in the lower and mid-Fraser, in chinook-directed fisheries.

There were no provisions for directed Pink harvest for FSC-type purposes in any Final Agreements.

See Appendix 5 for estimates of kept Fraser Pink catch.

5.2.4 FIRST NATIONS COMMERCIAL HARVEST

There were Comprehensive Fisheries Agreements (CFAs) signed for Pink Salmon for commercial purposes in the Fraser River. Limited First Nations commercial Economic Opportunity (EO) and demonstration beach seine and fish wheel fisheries occurred September 17th to 27th. See Appendix 5 for catch estimates.

5.2.5 COMMERCIAL FISHERIES

There was Fraser Pink Commercial TAC identified in-season and there were limited commercial fishery openings in Canada. Commercial Area B seine and Area H troll Fraser Pink ITQ demonstration fisheries occurred in Area 29 from September 14th to 17th with very minimal catch. By the time TAC was identified and the commercial fisheries opened, most Pink Salmon had already migrated through the terminal marine area and into the river. See Appendix 5 for catch estimates.

5.2.6 RECREATIONAL FISHERIES

5.2.6.1 TIDAL RECREATIONAL FISHERIES

Fraser River Pink harvest opportunities were available in marine tidal areas with a daily limit of four Pink Salmon in 2019.

It is unknown how many Fraser Pink were harvested in mixed-stock marine tidal recreational fisheries as the stock of origin is currently unknown. Final estimates will be available in January 2020.

In the tidal waters of the Fraser River, the retention of Pink Salmon was permitted from September 14 to September 20 and from November 2 to December 31 with a daily limit of four. From September 20 until November 1 the window closure to protect Steelhead Trout was in place and fishing for any species of salmon was closed.

The in-river tidal Fraser River recreational fishery was assessed from September 14 to September 20 and from November 2 to November 30. Catch estimates can be found in Appendix 5.

5.2.6.2 NON-TIDAL RECREATIONAL FISHERIES

Region 2:

Non-tidal Fraser River - In 2019, the retention of Pink Salmon was not permitted in the non-tidal Fraser River due to concerns for co-migrating Sockeye.

Chilliwack River – From July 1 to December 31, the retention of two pink salmon per day was permitted from a line between two fishing boundary signs on either side of the Chilliwack River 100 m from the confluence of the Chilliwack River and Slesse Creek downstream including that portion of the Sumas River from the Barrow Town Pump Station downstream to fishing boundary signs near the confluence with the Fraser River.

Harrison River – From January 1 to December 31, the retention of two pink salmon per day was permitted in those waters from the Hwy 7 bridge downstream to the confluence with the Fraser River.

In 2019, the Chilliwack River recreational fishery was assessed from September 1 to November 15. Catch estimates can be found in Table 4. No assessment was conducted on the recreational fishery occurring on the Harrison River.

Region 3:

Pink Salmon retention did not occur due to concerns for co-migrating Sockeye.

Region 5:

Recreational Pink Salmon fisheries did not occur due to concerns for co-migrating Chinook Salmon and the Big Bar rock slide.

5.2.7 EXCESS SALMON-TO-SPAWNING REQUIREMENTS (ESSR) FISHERIES

There were limited ESSR fisheries for Fraser Pink Salmon in 2019. There were licences issued for ESSR fisheries that included Pink Salmon that were in surplus of escapement requirements at the Chilliwack, Chehalis, and Inch Creek hatcheries, as well as the Weaver Creek spawning channel. However Pink Salmon were only harvested at the Chilliwack Hatchery. See Appendix 7 for catch estimates.

6.1 OBJECTIVES AND OVERVIEW

Coho stocks in Southern BC are managed domestically and through international Abundance Based Management provisions which are outlined in the Pacific Salmon Treaty. Harvest levels are outlined in the Treaty's Southern Coho Management Plan, which provides maximum exploitation rates dependent on abundance, and it is Canada's responsibility to ensure that its domestic stocks are not harvested beyond the maximum exploitation rate as outlined in the Treaty.

In Southern BC, Coho management measures in commercial and recreational fisheries are implemented based on their impacts to specific stocks. Southern BC Coho management is primarily based on the status of the Interior Fraser River Management Unit. In 2019 an exploitation rate of up to 10% was permitted in Canadian fisheries with an additional 10% permitted in U.S. fisheries as per the Pacific Salmon Treaty management low status regime. Coho management measures varied in Southern BC in 2019, depending on the area of harvest and impact on specific Coho stocks.

The Canadian objective for Interior Fraser River (IFR) Coho (including Thompson River Coho) was to manage Canadian fisheries in a highly precautionary manner with fisheries management measures similar to those in place prior to 2014. This approach was expected to achieve an overall exploitation rate in Canadian waters within the 3 to 5% range.

Assessments of IFR Coho Salmon stocks in the mid-1990s revealed that alarming declines in spawning populations were occurring at many spawning sites. Low marine survival rates in combination with excessive fishery impacts were identified as key factors in this decline. Beginning in 1997, DFO implemented a number of fishery management measures to reduce the harvest impacts on these stocks, with more severe measures being implemented beginning in 1998. In most years since that time, Canadian fisheries impacting these stocks have been curtailed to limit the exploitation rate to 3% or less, with an additional 10% permitted in U.S. fisheries (as per the Pacific Salmon Treaty management regime).

Currently, there is no evidence that IFR Coho has departed from the 'low' productivity regime that has persisted since the 1994 return year. Current productivity is still well below that of the relatively high productivity period of 1978-1993. However, there have been improved returns of Coho in Northern B.C., WCVI, and inside Strait of Georgia stocks in recent years.

No specific management measures were in place in 2019 to protect Strait of Georgia Coho stocks beyond measures put in place for IFR Coho.

Management measures in place for WCVI Coho provided opportunities for recreational and commercial fisheries harvest in WCVI areas where IFR Coho were not considered to be impacted. These were largely terminal opportunities in portions of Area 23-27, where stock composition information showed that IFR Coho are not present.

In WCVI areas/times where IFR Coho are known to be prevalent, non-retention of unmarked Coho remained in effect.

Coho catch and release information from all fisheries can be found in Appendix 4.

6.2 STOCK STATUS

6.2.1 STOCK STATUS - UPPER FRASER RIVER

Interior Fraser

Escapement surveys to estimate returns of Coho to the Interior Fraser are currently underway, and preliminary escapement estimates will not be available until mid-January 2020 at the earliest.

6.2.2 STOCK STATUS – LOWER FRASER RIVER

Currently there is not a whole system escapement estimate available for Lower Fraser River (LFR) Coho.

A hatchery Coho indicator stock at Inch Creek hatchery provides estimated rates of survival and minimum estimates of exploitation on marked LFR Coho. Catch monitoring and escapement work in support of the Inch Creek indicator program are currently underway; however, preliminary survival information for the 2016 brood is not expected to be available until March 2020.

6.2.3 STOCK STATUS - STRAIT OF GEORGIA

Coho Salmon production within the Strait of Georgia (SOG) has declined dramatically since the early 1990s. Marine survivals have been fluctuating near replacement levels with recent estimates in the 1 to 4% range. Preliminary 2019 escapement estimates are below average in most areas and similar to pre-season expectations based on recent returns and poor ocean conditions throughout the SOG.

Hatchery stocks

Coho returns to most facilities north of Nanaimo were average to below average in 2019. Escapement to the Puntledge River was near the 12-year average at 6,179 but down from 2018 (8,169). The Big Qualicum River had a poor return in 2019 with 2,700 fish, down from the 12-year average of 10,520. However, this was not unexpected due to a significant loss of smolts in 2018. Swim surveys of the Little Qualicum River suggest abundance for this system was average at 2,100 fish. Similarly, Nanaimo River returns were close to the 4-year average at 2,800.

Escapements to southern SOG stocks were variable, with 298 estimated in the Goldstream River (50% of the 4-year average). 2,156 fish were counted in Shawnigan Creek, which was above the 4-year average of 2,030 and comparable to 2018.

Wild stocks

In the past, both Black Creek and Myrtle Creek served as indicators of SOG Coho. Myrtle Creek was discontinued as an indicator in 2014. Counts on the Englishman River were near the 4-year average in 2019 with a peak count of 3,700. An AUC estimate will be conducted post-season. Returns to the Colquitz River (near Victoria) were reported to be 25% of the 4-year average at 116 fish.

Black Creek (DFO Wild Indicator for SOG)

2019 Black Creek adult assessments are complete, but estimates are still considered preliminary. Limited fall rains allowed crews to operate the counting fence continuously through the Coho migration window without the fence being over topped by high flows. 750 adult Coho and 1,860 jacks were handled at the Black Creek fence in the fall of 2019. Video data from periods when the fence was open are currently under review and the final estimate is expected to increase by approximately 25%.

The smolt production contributing to 2019 brood year was 40,309. This is below the 24-year average smolt production of 51,109 smolts. The parental brood year (2016) estimate was 4,000 adults. The 2019 return is 25% of its parental brood, but is within the expected realm based on poor marine evaluations during residency in the SOG. The outlook for 2019-2020 is for continued poor marine conditions, and the 2020 adult return is uncertain, but expected to be low.

6.2.4 STOCK STATUS - WEST COAST VANCOUVER ISLAND

In most recent years, spawning abundances for wild West Coast Vancouver Island (WCVI) Coho populations are near historic levels. However, the overall production of WCVI Coho is likely much lower than historic levels as less fish are caught in fisheries while g spawning abundances have been maintained. Hatchery production has also been reduced. Initial surveys suggest that 2019 escapement is below recent-year averages in most systems.

6.2.5 STOCK STATUS - JOHNSTONE STRAIT AND MAINLAND INLET

The Keogh River plays an important role as the wild Coho indicator stock for the upper Johnstone Strait area. Historically, the Keogh River adult Coho Salmon return has averaged 2,674 (range: 230 to 9,465), while the juvenile abundance has averaged 62,213 (range 33,812 to 110,565). Following a peak in adult abundance in 2014 (9,465), annual escapement decreased to reach its lowest level in 2016 (230). Returns have increased modestly since, and the preliminary estimate of adult Keogh River Coho Salmon in 2019 is 850 fish. The number of migrant Coho smolts in 2019 (71,779) was higher than in 2018 (62,213), despite low adult abundance for the brood year (335 adults), suggesting continuation of extremely high freshwater productivity that first began in 2011. Coho tend to be extremely productive at low abundance, and individual productivity has increased dramatically in recent years, peaking with the 2016 brood year at 270 smolts per spawner (average 38 smolts per spawner, brood years 1998 to 2015). Expectations in 2020 are for below-average returns, but with the hope that marine conditions improve to result in a positive trend in Coho returns.

Quinsam River Hatchery is the Coho marine survival indicator for Area 13. In 2019, the Quinsam Coho return of ~2,800 adults (preliminary) is well below both the 4- and 12-year escapement averages. Seven thousand jacks are also estimated to have returned to the Quinsam this year, surpassing the adult returns by more than 2-fold. The 2019 adult return is lower than expected, indicating poorer than anticipated marine survival. Expectations in 2020 are for below-average returns with low survival conditions continuing.

In 2019, Village Bay Creek on Quadra Island continued with video monitoring of returning Coho. A total of 700 adults were counted through the fence; more than triple the 2016 escapement. The 2019 return was higher than expected, and exceeds the 4- and 12-year escapement averages. This system appears to be bucking the poor escapement trend widely seen in the local area.

Heydon Bay Creek in Loughborough Inlet is in the process of being developed into a mainland inlet Coho indicator system. One hundred and fifty Coho were counted through the fence in 2019, which is well below the historical average (as determined during the period the fence was in operation prior to 2013).

Extensive escapement reports for Coho in many systems are indicating below-average escapements in 2019. As anticipated, Coho marine survivals over the past year were poor, and similar conditions are expected through 2020; consequently, a continued trend of low escapement is anticipated next year.

6.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

WCVI FSC and Treaty Fisheries

First Nations Coho catch reports are preliminary at this time. Estimates based on catch reports from Maa-nulth Treaty harvest and WCVI Nuu-chah-nulth non-treaty First Nations harvest can be found in Appendix 4.

Lower Fraser

There were no Coho-directed fisheries in the Lower Fraser in 2019. Both hatchery-marked and wild Coho were authorized to be retained in FSC fisheries before and after the Interior Fraser Coho window closure; during the closure, harvest was limited to hatchery-marked Coho. The total hatchery-marked and wild Coho harvested and released during Chinook, Pink and Chum FSC fisheries can be found in Appendix 5.

BC Interior

In most years, FSC fisheries in the area target Sockeye, Chinook or Pink Salmon. This year, First Nations harvesters were requested to release unharmed any Coho incidentally caught. Directed opportunities were permitted subject to abundance. In 2019, a small fishery took place based on data obtained at the Dunn Creek enumeration fence. Dunn Creek is a tributary to the North Thompson River. The total Coho catch (either directed or bycatch) in First Nations fisheries can be found in Appendix 5.

Strait of Georgia FSC Fisheries and Treaty Domestic Fisheries

There were no Coho Salmon-directed fisheries in the Strait of Georgia in 2019. Coho Salmon were harvested terminally in Puntledge, Qualicum, Nanaimo, and Cowichan Rivers using hatchery brailing and hand-picking/sorting methods, hook and line, and gill net. First Nations Coho catch reports are preliminary at this time; estimates based on catch reports from Tla'amin Treaty harvest and non-treaty First Nations harvest can be found in Appendix 4.

Johnstone Strait

Small numbers of Coho Salmon were harvested in Johnstone Strait by hook and line and gill net between late May and late September. Terminal harvest of Coho Salmon by hatchery brailing and hand-picking/sorting methods took place in the Quinsam River in mid-October and at the Puntledge hatchery. First Nations Coho catch reports are preliminary; estimates for the Johnstone Strait are found in Appendix 4.

6.4 FIRST NATIONS COMMERCIAL HARVEST

WCVI Economic Opportunity

In 2019, DFO with Hupacasath and Tseshaht First Nations reached an agreement for an Economic Opportunity (EO) fishery targeting Coho in Subareas 23-1 and 23-2. The fishery took place in upper Alberni Inlet in the tidal portions of the Somass River south to Hocking point. The allocation for Coho was 3,000 pieces. Most of the Coho catch was retained as bycatch in EO-directed Chinook fisheries in late August and September. There were two directed Coho EO fisheries on September 22 and September 29. The catch in these openings were poor. The total Coho catch in these fisheries can be found in Appendix 4.

Five Nations Communal Sales Fishery

In 2019, the Department provided communal sale fishery opportunities for the Five Nations (five Nuu-chahnulth First Nations located on the West Coast of Vancouver Island - Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) that included southern BC Coho. These opportunities were categorized as offshore and nearshore integrated hook-and-line communal sale fisheries and terminal communal sale fisheries. The TAC for the offshore was 2,000 Coho (hatchery-marked only) and for the nearshore was 1,200 (hatchery-marked and unmarked).

There was no directed Coho Five Nations communal sale fishery in 2019; however, hatchery-marked Coho retention for sale was permitted in the offshore integrated hook-and-line fishery. Both hatchery-marked and unmarked Coho were permitted to be sold in the nearshore integrated hook-and-line communal sale fishery and the terminal communal sale fishery. Total Coho catch in these fisheries can be found in Appendix 4.

Lower Fraser

There were no directed Coho fisheries authorized in the Lower Fraser in 2019.

In 2019, Fraser Pink EO and demonstration fisheries took place in the Fraser River with the Harrison Fisheries Authority, and 16 communities from Port Mann Bridge to Sawmill Creek; retention of hatchery-marked and unmarked Coho was not permitted in these fisheries. The total hatchery-marked and unmarked Coho encountered and released in Pink EO/demonstration fisheries can be found in Appendix 5.

BC Interior

There were no EO or demonstration fisheries in the BC Interior (Fraser River above Sawmill Creek) targeting Coho in 2019.

6.5 COMMERCIAL FISHERIES

Southern BC commercial fisheries are regulated so that impacts on Coho, in particular Interior Fraser Coho stocks, are minimized. Retention of Coho bycatch in most of these fisheries was not permitted, including the Fraser River, with the exception of a few terminal seine and gill net fisheries targeting Chinook and Sockeye where Interior Fraser River Coho were not prevalent.

WCVI Offshore Area Coho

Coho retention was not permitted in the 2019 Area G WCVI AABM Chinook troll fishery.

WCVI Terminal Area Coho

In 2019, in Area 23 there were commercial gill net and seine fisheries in Alberni Inlet targeting Chinook, which permitted Coho bycatch retention. Retention of both hatchery-marked and unmarked Coho were permitted. The total Coho bycatch can be found in Appendix 4.

Coho retention in other terminal WCVI commercial fisheries was not permitted in 2019. The total WCVI Coho bycatch in commercial terminal fisheries can be found in Appendix 4.

6.6 RECREATIONAL FISHERIES

6.6.1 TIDAL RECREATIONAL FISHERIES

Tidal recreational fisheries can be categorized as occurring in: mixed-stock areas, where multiple stocks are found concurrently in the same fishing area, and in terminal areas where local stocks dominate the catch. Areas where mixed stocks occur typically have more restrictive management measures in place that are designed to protect Interior Fraser Coho stocks. In terminal areas, opportunities may be permitted based on abundance forecasts, and local enhancement programs where Coho stocks are enhanced. The table below outlines the areas in southern BC and the general Coho regulations pertaining to them.

Table 6-1 Southern BC Coho Fishery Regulations in 2019

	Daily Limit (marked or	Size	
Mixed stock fishing area	unmarked)	Limit	Coho Season
		30	0 0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Johnstone Strait	2, 1 may be unmarked	cm.	June 1 – Jul 31
		30	
Johnstone Strait	2 marked	cm.	Aug 1 – Dec 31
		30	
Northern Georgia Strait	2 marked	cm.	June 1 - Dec 31
		30	
Southern Georgia Strait	2 marked	cm.	June 1 - Dec 31
		30	
Southern Georgia Strait (19)	2, 1 may be unmarked	cm.	Oct 1 – Dec 31
		30	
Juan de Fuca Strait	2 marked	cm.	Jun 1 – Dec 31
Juan de Fuca Strait (20-5 to 20-		30	
7)	4, 1 may be unmarked	cm.	Oct 1 – Dec 31
		30	
WCVI - Inshore	2	cm.	June 1 – Dec 31
		30	
WCVI - Offshore	2 marked	cm.	June 1- Dec 31

^{*} for specific management measures in specific areas refer to the information provided in the Fishery Notices.

Catch and release information for Coho can be found in Appendix 4.

In 2019, hatchery marked Coho retention was increased to 4/day (with unmarked retention remaining 2/day) in Areas 23 and 25 where stocks are supported by hatchery production.

Tidal Waters of the Fraser River

In the tidal waters of the Fraser River downstream of the CPR Bridge at Mission, BC, from November 2 to December 31 the retention of two hatchery-marked Coho per day was permitted.

6.6.2 NON-TIDAL RECREATIONAL FISHERIES

Region 1 Vancouver Island Tributaries

Fresh water conditions continued to remain favourable in 2019 compared to past years and no additional restrictions were in effect on Vancouver Island due to drought-like conditions.

Northern Vancouver Island

Typical non-tidal openings for Coho were available on:

- Campbell/Quinsam River from October 1 to December 31 for four per day, two of which could be marked over 35 cm;
- Cayeghle River (including the Colonial River) from April 1 to March 31 for one per day;
- Cluxewe River from April 1 to March 31 for two per day, hatchery-marked only;
- Kokisilah River from April 1 to March 31 for one per day, maximum size limit of 35 cm;
- Nahwitti River from April 1 to March 31 for one per day; and
- Quatse River from June 15 to March 31 for two per day, hatchery-marked only.

Anglers were restricted to the use of barbless hooks. Catch is not estimated in these freshwater fisheries.

Strait of Georgia

In 2019 Coho openings were provided on:

- Cowichan River from November 8 to December 31 for one Coho per day, minimum size limit of 25 cm;
- Nanaimo River from November 1 to December 31 for 2 hatchery-marked only Coho per day, minimum size limit of 25 cm;
- Puntledge River from October 1 to November 30 for 1 hatchery-marked only Coho per day, minimum size limit of 25 cm; and

• Chemainus River from October 15 to March 31 for one per day, maximum size limit of 35 cm.

Catch is not estimated in these freshwater fisheries.

West Coast Vancouver Island

Typical non-tidal openings for Coho were available on:

- Somass/Stamp River from August 25 to December 31 the daily limit was two, hatchery-marked or unmarked. A single, barbless hook restriction is in effect all year and there was a bait restriction in the Upper Somass and Stamp rivers from May 1 to October 31.
- Nitinat River from October 15 to December 31 the daily limit for Coho was two, hatchery-marked or unmarked. The 2 week closure between October 1 and October 14 provided protection to Chinook Salmon during the peak spawning period. The area above Parker Creek is closed to fishing. A single barbless hook restriction and bait restriction is in effect all year.
- Conuma River from August 25 to December 31with a daily limit of two Coho, hatchery-marked or unmarked.
- Washlawlis River and Waukwass River and other west coast rivers are open year-round with a daily limit of one Coho, hatchery-marked or unmarked. Barbless hooks are required. No creel survey information is collected. Other rivers receiving some directed catch and release effort for Coho stocks are the Wakeman, Artlish, Zeballos, Tahsis, Burman, Ash, Taylor, Pacheena, Toquart and Leiner. The quota for all west coast streams, unless identified above, is zero (0).

Catch is not estimated in these freshwater fisheries.

Non-tidal Fraser River and Tributaries

Region 2: The retention of two hatchery-marked Coho per day was permitted once the majority of the Interior Fraser wild Coho population was through the area and following the Steelhead window closure in the following area:

• From the CPR Bridge at Mission, BC upstream to the Highway #1 Bridge at Hope - November 3 to December 31.

There are no directed Coho openings in the Fraser River or tributaries upstream of the Highway #1 Bridge at Hope, BC. This includes all of Regions 3, 5, 7 and 8.

The following tributaries to the Fraser River in Region 2 were open during the dates stated below:

- Alouette River and De Boville Slough from October 1 to December 31 for one hatchery-marked Coho per day.
- Coquitlam River from September 1 to December 31 for one hatchery-marked Coho per day.
- Kanaka Creek from November 1 to November 30 for one hatchery-marked Coho per day.

- Chilliwack River/Vedder for four hatchery-marked Coho per day from January 1 to March 31 and from July 1 to December 31.
- Chehalis River from January 1 to December 31 for four hatchery-marked Coho per day.
- Harrison River for four hatchery-marked Coho per day from January 1 to March 31 and from September 1 to December 31.
- Nicomen Slough, Norrish Creek and the Stave River for four hatchery-marked Coho per day from January 1 to December 31, with only two over 35 cm.

During 2019, there were limited non-tidal openings for hatchery-marked Coho on the following systems which enter Boundary Bay:

• Little Campbell River, Nicomekl River and the Serpentine River one hatchery-marked Coho per day from September 1 to December 31.

6.7 EXCESS SALMON-TO-SPAWNING REQUIREMENTS (ESSR) FISHERIES

WCVI ESSR Fisheries

The Somass First Nations were issued an ESSR licence at the Robertson Creek Hatchery in 2019 that included Coho and Chinook Salmon. The Ditidaht First Nation was issued an ESSR Licence for Chinook, Coho and Chum at Nitinat Lake and Nitinat hatchery.

The Mowachaht/Muchalaht First Nation was issued an ESSR licence at the Conuma Hatchery in 2019 that included hatchery marked Coho and Chinook Salmon, however no Coho were harvested.

All ESSR harvest information can be found in Appendix 7.

Lower Fraser ESSR Fisheries

In 2019, there were ESSR fisheries at the Capilano, Chilliwack, Inch Creek and Chehalis hatcheries; harvest of Coho Salmon was permitted. All ESSR harvest information can be found in Appendix 7.

Strait of Georgia ESSR Fisheries

An ESSR for Chum, Coho and Chinook Salmon was issued to the Qualicum First Nation on September 4, 2019 at the Big Qualicum Hatchery. See Appendix 7 for preliminary catch numbers.

Johnstone Strait ESSR Fisheries

For 2019, there were no ESSR opportunities on Coho in Johnstone Strait.

7 SOUTHERN BC CHUM

7.1 JOHNSTONE STRAIT CHUM SALMON

7.1.1 OBJECTIVES AND OVERVIEW

The Johnstone Strait Chum Salmon fisheries primarily target Chum that spawn in Johnstone Strait, the Strait of Georgia, and the Fraser River areas. To improve the management of Johnstone Strait Chum fisheries and to ensure adequate escapement, a 20% fixed exploitation rate (ER) strategy was implemented in 2002. Of the 20% exploitation rate, 15% is allocated to the commercial fisheries and the remaining 5% is set aside for test fisheries, First Nations FSC, sport harvesters, and to also provide a buffer to commercial exploitation. Since the implementation of this management strategy, annual fisheries have been planned well in advance of the Chum return.

On July 11th 2019, the Government of Canada and the Province of BC announced a comprehensive Steelhead Action Plan that contains new conservation measures for Thompson and Chilcotin Steelhead Trout. A decision was made not to proceed with an emergency listing of Thompson and Chilcotin (Interior Fraser River (IFR)) Steelhead under SARA due to suboptimal ecological, social and economic outcomes relative to a collaborative federal/provincial Action Plan. Based on estimates of migration timing, IFR Steelhead are assumed to be encountered primarily in fisheries targeting southern Chum. A key component of the Action Plan is a series of window closures for fisheries on the approach routes of IFR Steelhead to the spawning grounds in both marine and freshwater fishing areas.

In 2019, the pre-season commercial fishing plan was a modified approach to maintain opportunity in Johnstone Strait while aligning with the intent of the Steelhead rolling window closure. With the window closures reducing access to a portion of the Inside Southern Chum (ISC) run, fisheries were planned at a reduced ER (below the typical 20% ER).

As outlined in Chapter 6 of the Pacific Salmon Treaty, commercial Chum fisheries in Johnstone Strait are suspended when it is estimated that less than 1.0 million Chum Salmon will migrate through Johnstone Strait. Early indications from the Johnstone Strait test fishery were that ISC abundance was tracking below the 1.0 million critical threshold. On October 7 the US was notified, as per the treaty language, that the aggregate Chum Salmon abundance for ISC through Johnstone Strait was predicted to be below the 1.0 million critical threshold, based on the Johnstone Strait test fishery. In accordance with the Pacific Salmon Treaty, below this critical threshold Canada shall only conduct assessment fisheries and non-commercial fisheries; therefore, on October 7 Canada suspended operation of commercial fisheries that target Chum Salmon in Johnstone Strait. Chum catch and release information from all fisheries can be found in Appendix 4.

7.1.2 STOCK STATUS

Mixed Stocks

The main components of the Inside Southern Chum (ISC) return were expected to be both Fraser and non-Fraser stocks. These stocks are typically dominated by four-year-old fish which were from a below-average 2015 brood return that out-migrated in 2016. Other salmon species that out-migrated in 2016 encountered poor

survival conditions (i.e. local Pink and Coho returns in 2017 were poor). The pre-season expectation for ISC suggested below to near target returns to the area but was highly uncertain. Based on the very strong 2016 brood year, it was expected that the age 3₁ component would contribute more than average to the 2019 Chum return.

The Johnstone Strait test fishery, which ran from September 10th through October 24th, provided timing and abundance information for the 2019 return, which is important in assessing the performance of the 20% fixed exploitation rate strategy. It also provided an index of abundance, used to determine the likelihood of the number of returning Chum being over the 1.0 million critical level (requirement for commercial openings). From the onset of the program the Chum catch per unit effort (CPUE) in the test fishery was well below what was encountered during 2010, one of the lowest Chum returns on record (1980-2018). On October 7th it was determined that the ISC index of abundance was likely below the 1.0 million critical level (Figure 11-1) and any planned Johnstone Strait commercial mixed stock fisheries were suspended. For the duration of the test fishery the Chum CPUE continued to track well below 2010 (Figure 11-1) and was the lowest on record. The age composition derived from the test fishery and commercial samples exhibited a lower than average contribution of 4-year-olds throughout the season, confirming the reduced survival of the 2015 brood.

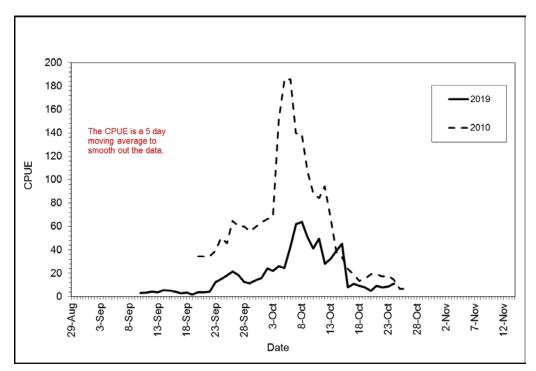


Figure 11-7-1 2019 Johnstone Strait Chum Test Fishery Catch per Unit Effort (CPUE) compared to 2010 (one of the lowest returns in recent years).

Terminal returns

Although escapement monitoring is limited, summer Chum preliminary returns tended to be well below average. Assessments of terminal fall Chum, such as the Nimpkish, are ongoing but information suggests another poor return to that system.

Information on escapements and catches suggest ISC aggregate returns (Johnstone Strait, Strait of Georgia and Fraser combined) were well below average and most populations were well below their respective escapement goals throughout the ISC area (see next Sections 12 and 13).

7.1.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

First Nations fisheries for Chum Salmon were not restricted in 2019. Chum Salmon harvests took place using gill nets and seine nets in Johnstone Strait as early as August, with most of the effort in October. The total Chum Salmon catch in the Johnstone Strait FSC fishery can be found in Appendix 4.

7.1.4 FIRST NATIONS COMMERCIAL HARVEST

There was no First Nations commercial harvest of Johnstone Strait Chum in 2019.

7.1.5 COMMERCIAL FISHERIES

Commercial Chum fisheries in 2019 were planned as per the Pacific Salmon Treaty, however a modified approach was taken to maintain opportunity in Johnstone Strait while aligning with the intent of the Interior Fraser Steelhead rolling window closure, which was put in place to protect co-migrating stocks of concern (See Objective and Overview for more detail). Fisheries are usually scheduled to achieve a 20% fixed exploitation rate (ER) on Inside Southern Chum (ISC) stocks passing through Johnstone Strait with 15% ER for commercial and 5% ER for test, FSC, recreational and a commercial buffer. Shares of the 15% commercial ER are usually shared among the Area B seine (11.55%), Area D gill net (2.55%), and Area H troll fleets (0.9%). With the Steelhead window closure reducing access to a portion of the ISC, the 2019 fisheries were planned pre-season to a reduced commercial ER of 9.83%, shared between the Area B seine (6.54%), Area D gill net (2.27%), and Area H troll (1.01%) fleets.

As returns were below the critical threshold abundance, there were no commercial Chum fisheries in Johnstone Strait directed at southern Chum in 2019.

7.1.6 RECREATIONAL FISHERIES

7.1.6.1 TIDAL RECREATIONAL FISHERIES

The marine recreational daily limits for Chum are four (4) with a possession limit of eight (8) salmon. Chum opportunities are typically opened at full limits in the Johnstone Strait area, but may be reduced if Chum returns are low. Peak participation in the recreational Chum fishery typically occurs over the Thanksgiving weekend in mid-October, and activity is usually driven by abundance. The Strait of Georgia creel survey for Areas 13 and 14 was conducted from May to October. Recreational catches were reported as very low, as Chum abundance in the marine area was poor in 2019. The majority of the recreational Chum Salmon fishing effort occurs in Area 13, which is included in the Strait of Georgia catch estimate.

7.1.6.2 NON-TIDAL RECREATIONAL FISHERIES

There are no Chum-retention fisheries in non-tidal waters in the Johnstone Strait area. Some catch-and-release fisheries do take place, and are considered to very minimal.

7.1.7 EXCESS SALMON-TO-SPAWNING REQUIREMENTS (ESSR) FISHERIES

There were ESSR fisheries at the Chilliwack hatchery in 2019 that harvested Chum Salmon.

There were ESSR fisheries at the Inch Creek hatchery in 2019 that harvested Chum Salmon.

There were ESSR fisheries at Chehalis hatchery in 2019 that harvested Chum Salmon.

All ESSR harvest information can be found in Appendix 7.

7.2 FRASER RIVER CHUM

7.2.1 OBJECTIVES AND OVERVIEW

Chum Salmon return to the Fraser River from September through December, with the typical peak of migration through the lower river occurring from mid- to late October. Spawning locations are predominately located in the Fraser Valley downstream of Hope, BC, with major spawning aggregations occurring within the Harrison River (including Weaver Creek and Chehalis River), the Stave River, and the Chilliwack River. No spawning locations have been identified upstream of Hell's Gate.

The escapement objective for Fraser River Chum is 800,000. Since 2001, this objective has been achieved in all but four years; escapement to spawning grounds in 2009, 2010, 2017, and 2018 did not meet the escapement goal, with approximately 460,000, 590,000, 620,000, and 650,000 returning to spawn in those years, respectively.

Fraser River Chum are typically harvested in Johnstone Strait, the Strait of Georgia, U.S. waters of Area 7 and 7A, and in the Fraser River.

Within the Fraser River, Chum-directed fisheries include: First Nations FSC fisheries; recreational fisheries; and commercial fisheries. In recent years, significant conservation measures have been implemented in-river during the Fraser River Chum migration period to protect co-migrating stocks of concern (including Interior Fraser River (IFR) Coho and IFR Steelhead). Depending on the fishery, these measures have included both time and area closures and gear restrictions. These conservation measures have restricted Fraser River commercial Chum fishing opportunities in recent years.

To address conservation concerns for IFR (Thompson and Chilcotin) Steelhead, the Department implemented management measures for 2019 to reduce the incidental impacts of Chum fisheries on co-migrating IFR Steelhead. Moving window closures 42-days in duration were put in place for all commercial salmon fisheries located along the migratory route of Thompson and Chilcotin River Steelhead, including Southern BC marine waters and the Fraser River and tributaries downstream of Thompson and Chilcotin River Steelhead spawning areas. This 42-day rolling window closure also applied to recreational salmon fisheries within the Fraser River and tributaries (including areas immediately off the Fraser River mouth). Commercial troll fisheries in the marine area and First Nations' Food, Social, and Ceremonial (FSC) salmon fisheries occurring within the Fraser River and tributaries downstream of Thompson and Chilcotin River Steelhead spawning areas were subjected to a 27-day moving window closure.

7.2.2 STOCK STATUS

The number of adult Chum Salmon returning to the Fraser River each fall (terminal return) is estimated inseason with a Bayesian model based on Albion test fishery catch.

The Fraser River Chum test fishery at Albion operated every other day from September 1 until October 19, alternating days with the Albion Chinook test fishery. From October 21 until November 9, the Chum net fished every day, and then every other day from November 11 until November 23. Total Chum catch for the Albion test fishery can be found in Appendix 2.

For fishery planning purposes, DFO provided a provisional in-season terminal return estimate on October 16 of 564,000 Chum Salmon. The estimated 50% migration date of the run was October 24. Because the model estimated a 50% migration date 9 days later than average, an alternate estimate was also provided that assumed the 50% migration date was the same as average (October 17). This resulted in a median run size estimate of 414,000 Chum Salmon.

A subsequent estimate of Fraser River Chum terminal return was provided on October 23. The estimated terminal return on that date was 518,000 (80% probability that the run is between 407,000 to 661,000), with a 50% migration date through the lower river of October 22. This peak date is later than that observed in recent years (average peak date from 1997-2018 is October 17). It was estimated there was a 1% probability that the run would exceed the escapement goal of 800,000.

Additional in-season terminal return estimates were not provided, as subsequent test fishing information was consistent with a run size of 518,000.

Fraser River Chum Salmon return to numerous spawning locations in the lower Fraser River and its tributaries. Spawning escapement for Fraser River Chum Salmon is currently assessed for five of the largest Chum producing systems, as well as for a number of smaller tributaries. The largest observed escapement of Fraser River Chum (greater than 3 million fish), was seen in 1998. From 1999 to 2010, Fraser Chum Salmon escapement (for the annually assessed systems) trended downward. The escapement decline was then halted and reversed with an estimated 1.1 million spawners reported in 2011. Spawning escapement had remained stable through 2016 and achieved the escapement goal in each year (2011-2016 estimated escapement averaged 1.3 million spawners). However, the escapements in both 2017 (660,000) and 2018 (690,000) were estimated at below the escapement goal of 800,000 Chum Salmon spawners. Current year Chum assessments are still ongoing and an escapement estimate is not yet available; though preliminary indications are strong that the escapement will be significantly below the escapement goal.

7.2.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

First Nations Food, Social and Ceremonial (FSC) Chum-directed gill net fisheries commenced October 25 (below Port Mann Bridge) and October 26 (above Port Mann Bridge), following closures to protect comigrating Interior Fraser River Coho (IFR Coho) and Interior Fraser River Steelhead (IFR Steelhead).

The total Fraser River Chum catch (either directed or bycatch) in First Nations FSC fisheries can be found in Appendices 5.

7.2.4 FIRST NATIONS COMMERCIAL HARVEST

In 2019, there were no Chum-directed economic opportunity or demonstration fisheries in the Lower Fraser due to a poor in-season Chum Salmon terminal return estimate. However, retention and sale of Chum Salmon was permitted during the Pink economic opportunity beach seine fishery for the Harrison Fisheries Authority and

the 16 signatory communities on September 17-21, and the Pink economic opportunity access from the Yale First Nation's fish wheel on September 19-25.

The total Fraser River Chum catch (either directed or bycatch) in First Nations Commercial fisheries can be found in Appendix 5.

7.2.5 COMMERCIAL FISHERIES

Area B

There were no Area B fisheries in Area 29 for Sockeye or Chum Salmon in 2019 and, therefore, no catch of Chum Salmon to report.

Area E

There were no Area E fisheries in the Fraser River for Fraser Chum in 2019 and, therefore, no catch of Chum Salmon to report.

Area H

There were no Area H fisheries in Area 29 for Sockeye or Chum Salmon in 2019 and, therefore, no catch of Chum Salmon to report.

7.2.6 RECREATIONAL FISHERIES

7.2.6.1 TIDAL RECREATIONAL FISHERIES

In most southern BC marine tidal waters, the daily limit for Chum Salmon was four (4) in 2019.

Tidal Fraser River:

January 1 to September 13, 2019, this area was closed to fishing for salmon.

September 14 to September 20, open to the retention of Chum Salmon with a daily limit of four (4).

September 20 to November 1, this area was closed to fishing for all species of salmon to protect Interior Fraser River Steelhead.

November 2 to December 31. Chum retention was not permitted following the end of the Interior Fraser River Steelhead window closure due to the low returns of Chum Salmon to the Fraser River in 2019.

An assessment of the in-river tidal Fraser River recreational fishery occurred from September 14 to September 20 and from Nov.2 to Nov.30. Catch estimates can be found in Appendix 5.

7.2.6.2 NON-TIDAL RECREATIONAL FISHERIES

Chum Salmon fisheries only take place in Region 2 of the Fraser River downstream of the Highway No. 1 Bridge at Hope, BC. Above Hope the number of Chum Salmon likely to be encountered is very low. Chum Salmon are not known to migrate into Regions 3, 5, 7 or 8.

Non-tidal Fraser River:

January 1 to November 2, 2019, closed to fishing for salmon.

November 3 to December 31, the non-tidal Fraser River from the CPR Bridge at Mission, BC to the Highway No. 1 Bridge at Hope, BC was open to fishing for salmon. The retention of Chum Salmon was not permitted, however, due to the low returns of Chum Salmon to the Fraser River.

Fraser River Tributaries

The following Fraser River tributaries were open to Chum Salmon retention during the dates noted in 2019.

- Alouette River October 1 to 17, daily limit of one (1) Chum Salmon.
- Chilliwack and Vedder Rivers July 1 to October 22, daily limit of one (1) Chum Salmon.
- Harrison River April 1 to October 17, daily limit of two (2) Chum Salmon.
- Nicomen Slough April 1 to October 17, daily limit of two (2) Chum Salmon.
- Stave River April 1 to October 17, daily limit of two (2) Chum Salmon.

The Chilliwack and Vedder rivers recreational fishery was assessed from September 1 to November 15 in 2019. Catch estimates can be found in Appendix 5. In 2019, no assessment was conducted on the Alouette, Harrison and Stave rivers fisheries; however, the Nicomen Slough/Norrish Creek fishery was assessed from October 1 to December 15, 2019. Catch estimates can be found in Appendix 5.

The following systems that flow into Boundary Bay were open to Chum Salmon retention during the dates noted.

• Serpentine River – October 1 to October 31, 2019, daily limit of one (1) Chum Salmon.

This fishery was not assessed.

7.2.7 EXCESS-TO-SPAWNING REQUIREMENT (ESSR) FISHERIES

There were ESSR fisheries at the Chilliwack hatchery in 2019 that harvested Chum Salmon.

There were ESSR fisheries at the Inch Creek hatchery in 2019 that harvested Chum Salmon.

There were ESSR fisheries at Chehalis hatchery in 2019 that harvested Chum Salmon.

All ESSR harvest information can be found in Appendix 7.

7.3 STRAIT OF GEORGIA CHUM

7.3.1 OBJECTIVES AND OVERVIEW

Strait of Georgia Chum fisheries consist of terminal opportunities for Chum returning to their natal spawning streams. Many of the terminal fishing areas have enhancement facilities and/or spawning channels associated

with adjacent river systems. Terminal fishery strategies consist of monitoring and assessing stocks (escapement and returning abundance), with the objective of ensuring adequate escapement and providing harvest opportunities where possible. Stock assessments may include test fisheries, escapement enumeration including swim surveys, stream walks, channel entry counts, fence counts, Sonar (DIDSON) counts and over flights. In some areas where stocks receive considerable enhancement or where stocks have above average productivity, limited fishing may occur prior to escapement objectives being reached.

7.3.2 STOCK STATUS

Historically, Chum returns have been highly variable relative to brood year escapements. For 2019, the forecasts were as follows:

- Jervis/Narrows Inlet Chum abundance was expected to be below the target level,
- Mid-Vancouver Island systems were expected to vary from well below to near the target level,
- Nanaimo was forecasted to be well above target levels,
- Cowichan was forecasted to be at target level,
- And Goldstream Chum abundance was forecasted to be above to well above the target levels.

All of these forecasted expectations are highly uncertain and a review of the procedures and data used for forecasting these systems will be conducted in the near future.

Conditions for returning Chum migration and spawning in October began with drier conditions followed by significant rainfall. The end of October through mid-November were marked by below average precipitation. River levels were moderate during the peak of migration and spawning providing suitable conditions in most systems.

Returns for the Jervis/Narrows Inlet aggregate (which includes Brittain River, Skwawka River, Deserted River, Vancouver River and Tzoonie River) continued to be poor following several record-low counts in 2018. Returns came in consistently below forecast for mid-Vancouver Island systems and escapement targets were not met. Puntledge River counts were less than 20% of the 4 year average while Little Qualicum escapements were similarly poor. Big Qualicum returns did not surpass 3,000 and were less than 5% of the 15 year average. South Island systems fared slightly better with Nanaimo River reaching about 50% of the escapement target at 20,000. Cowichan River escapement was stronger at 93K but still below the forecast and target of 160K (Table 7-1). Goldstream River was the only system to reach the escapement target but fell short of the forecast.

Table 7-1 Strait of Georgia Chum Spawning Escapements

System	Target Escapement Target	2019 forecast Expected range	Preliminary 2019 Escapement	% of target
Jervis Inlet	110K	43K – 64K	6K	6%
Mid-Island	230K	179K – 268K	22K	10%
Puntledge	60K		8K	13%
Little Qualicum	85K		11K	13%
Big Qualicum	85K		3K	4%
Nanaimo	40K	60K – 90K	20K	50%
Cowichan	160K	129K – 194K	93K	58%
Goldstream	15K	28K – 42K	20K	133%

7.3.3 FIRST NATIONS DOMESTIC AND FSC FISHERIES

First Nations fisheries for Chum Salmon were not restricted in 2019. There were few Chum Salmon fisheries in the marine mixed stock areas as well terminally and within rivers. FSC Chum Salmon catch reports from Tla'amin Treaty and non-Treaty First Nations in the Strait of Georgia can be found in Appendix 4.

7.3.4 FIRST NATIONS COMMERCIAL HARVEST

Area 14

Discussions with the K'omoks First Nation occurred around the harvest of surplus Chum for a Demonstration Fishery. Preparations were made, however the Chum returns were poor and no commercial demonstration fisheries occurred.

Area 17

Pre-season discussions with the Nanaimo First Nation occurred to identify potential triggers and develop fishing plans to harvest surplus Nanaimo River Chum. During the season communication happened on a day to day basis to discuss stock status and potential fishing opportunities in Area 17. In 2019 there were no First Nations commercial fisheries in Area 17.

Area 18

A bi-weekly conference call was held with the Cowichan Fisheries Harvest Roundtable to discuss stock status and potential fishing opportunities in Area 18. In 2019 there were no First Nations commercial fisheries.

Area 19

At pre-season meeting with Saanich Tribes potential triggers and fishing plans were made to harvest surplus Goldstream Chum. In 2019 there were no First Nations commercial fisheries.

7.3.5 COMMERCIAL FISHERIES

There were no commercial Chum fisheries in the Strait of Georgia in 2019. In all mid-Vancouver Island streams, except the Goldstream River, Chum returns did not reach target escapements.

Area 14

Chum returning to this area have been enhanced since the late 1960s and terminal fisheries have occurred in October and November since the 1970s. The returning Area 14 Chum abundance is forecasted pre-season using brood escapement, average survival and age composition. In-season run strength is assessed from any early catches, visual observations at river estuaries and by escapement counts to the three major river systems.

The Area 14 Chum fishery is directed at the enhanced stocks of three systems: Puntledge, Qualicum and Little Qualicum Rivers. The Qualicum River is often referred to as the 'Big' Qualicum River, to better distinguish it from the Little Qualicum River. The escapement goals for the three river systems are 60,000 for Puntledge River, 85,000 for Little Qualicum River, and 85,000 for Qualicum River, adding up to an overall interim escapement goal of 230,000 Chum, not including enhancement facility requirements (about 10,000 Chum, bringing the total escapement goal to 240,000).

Area 14 commercial Chum fisheries are managed based on forecasted abundance. In-season, the management strategy for considering fishery openings falls under one of two categories; Area 14 Pre-Season Forecast greater than or less than 340,000 Chum. When pre-season forecast is greater than 340,000 early Chum openings would target up to 65% of the anticipated surplus above 340,000. When pre-season forecast is less than 340,000 an early timed small fleet gillnet fishery may be used to evaluate the MVI aggregate abundance.

In 2019 the mid-Vancouver Island aggregate was managed based on the pre-season forecast of less than 340,000 Chum. Preparations for an Area D gill net assessment fishery were made should Chum returns perform better than expected. However, Chum returns were extremely poor and no assessment or commercial Chum fisheries occurred in Area 14 in 2019. Escapement targets were not met; Total Chum returns to the Puntledge, Qualicum, and little Qualicum, as of November 13, was 21,626.

Area 16

This fishery targets wild Chum stocks returning to river systems in the Jervis Inlet area. The main systems are Tzoonie, Deserted and Skwawka Rivers. The overall escapement goal for rivers in Jervis/Narrows Inlet is 85,000. These terminal fisheries occur when the individual or combined escapement goals have been assured. Fishing opportunities do not occur on a regular basis. There were no fisheries in Area 16 in 2019.

Area 17

This fishery is a terminal fishery targeting Nanaimo River stocks. The Nanaimo River Chum stocks are supplemented by the Nanaimo River hatchery (supplementation is on a sliding scale), where increased enhancement occurs during poor escapement years. Escapements fluctuate annually and fishery openings are

planned in-season based on escapement estimates. The overall escapement goal for the Nanaimo River is 40,000.

Nanaimo River assessments include swims by Nanaimo River Hatchery staff, a sonar counting system (DIDSON) and spot counts or helicopter counts by DFO during the peak of the return when possible. The DIDSON was installed and operational on October 2.

In 2019, there were no commercial fisheries for Nanaimo River Chum.

Area 18

This fishery is directed primarily at Cowichan River stocks; however, incidental catches of Goldstream bound Chum are also harvested. Fishery openings in mid- to late November are limited to Satellite Channel, to minimize impacts on Goldstream stocks. Chemainus River stocks could also be impacted if the fisheries are earlier in November, but likely to a lesser extent.

Fishery openings are planned in-season based on escapement estimates from a DIDSON counter. Management is also guided by advice from the Cowichan Fisheries Roundtable and the Mid-Vancouver Island (MVI) Chum Subcommittee, and an in-season Chum Escapement Forecast Tool based on the DIDSON count and date. The overall escapement goal for the Cowichan River is currently 160,000 Chum passing by the DIDSON counter.

A bi-weekly conference call was held with the Cowichan Fisheries Roundtable to discuss stock status and potential fishing opportunities in Area 18. In 2019 there were no commercial fisheries for Cowichan River Chum.

Area 19

This fishery is directed primarily at Goldstream River stocks, although some Cowichan River Chum Salmon are also harvested. Fisheries are planned in-season based on escapement estimates. Area 19 falls under the same management regime as Area 18. The overall escapement goal for the Goldstream River is 15,000. Weekly (or bi-weekly in 2018) stream walks are conducted on Goldstream River by Goldstream Hatchery staff to estimate Chum escapement. In 2019, enumerations began on October 2.

In 2019 there were no commercial fisheries for Goldstream River Chum.

7.3.6 RECREATIONAL FISHERIES

7.3.6.1 TIDAL RECREATIONAL FISHERIES

Marine recreational Chum fisheries are subject to the normal salmon daily and possession limits (limit of four per day and possession of eight), and are typically open throughout the area. The majority of the recreational effort directed at Chum Salmon in the Strait of Georgia occurs in the upper portions of Discovery Passage between Seymour Narrows and Chatham Point, not far from Campbell River. The annual Brown's Bay Charity Chum derby which took place on the weekend of October 25-27 is usually the most active Chum recreational fishery in the area. Catches in the derby were reported to be very low, likely based on the lower abundances of Chum observed in 2019. There was a creel survey during the month of October in the Strait of Georgia (Areas 13-14).

Marine Chum fisheries also occur in the approach waters of the Puntledge, Qualicum, Little Qualicum, Nanaimo and Cowichan Rivers on Vancouver Island, as well as in Howe Sound, largely based on abundance. Due to the poor Chum abundances observed in the marine area, effort in 2019 was minimal. Catch estimates for chum in the marine recreational fisheries can be found in Appendix 4.

7.3.6.2 NON-TIDAL RECREATIONAL FISHERIES

Chum fisheries in Region 1 were largely non-retention fisheries in 2019 due to low abundance. Normally the Courtenay, Cowichan, Nanaimo, Puntledge and Qualicum Rivers on Vancouver Island provide Chum opportunities but these all became non-retention fisheries commencing November 1, 2019. Recreational freshwater retention opportunities are typically based on escapement estimates from hatchery operations, and where escapement goals are expected to be met, opportunities are provided.

7.3.7 EXCESS SALMON-TO-SPAWNING REQUIREMENTS (ESSR) FISHERIES

The Qualicum First Nation was issued an ESSR Licence for Chum, Coho, Chinook and Pink on September 4, 2019 at the Big Qualicum Hatchery. No Chum ESSR was executed.

An ESSR licence for the Snuneymuxw First Nation for Chum and hatchery-marked Coho was developed; however, due to poor Chum returns the licence was not issued.

The K'ómoks First Nation was issued an ESSR licence to harvest Chum Salmon and Fall Chinook Salmon at the DFO Puntledge River Hatchery between September 27 and December 31, 2019. There were no surplus Chum Salmon available so an ESSR harvest did not take place.

There were no ESSR fisheries at the Capilano hatchery in 2019 that included Chum Salmon.

7.4 West Coast Vancouver Island Chum

7.4.1 OBJECTIVES AND OVERVIEW

Commercial Chum Salmon fisheries normally occur on the WCVI from late September to early November in years of Chum abundance. The majority of Chum fishing on WCVI takes place adjacent to Nitinat Lake (Area 21). In some years there have been limited effort gill net fisheries in Barkley Sound (Area 23), Clayoquot Sound (Area 24), Nootka Sound and Esperanza Inlet (Area 25) and Kyuquot Sound (Area 26).

Commercial fisheries for WCVI Chum employ a two-tiered strategy for controlling removals; either a constant harvest rate strategy or a surplus-to-escapement goal strategy.

1. Fixed Harvest Rate Strategy (fisheries targeting natural origin stocks, hatchery stocks at low abundance):

For those fisheries where a significant component of the target stock is from naturally spawning populations, a constant harvest rate strategy of 10 to 20% is implemented. The maximum harvest rate is set at a precautionary level relative to stock-recruit derived optimal exploitation rates for WCVI Chum; which are in the order of 30 to 40%. This approach allows limited harvest while protecting the biodiversity of Chum stocks and permitting

rebuilding when the population is low. In areas of low quality data or only naturally spawning stocks, including Barkley (Area 23), Clayoquot Sound (Area 24), Esperanza Inlet (Area 25) and Kyuquot Sound (Area 26), the maximum allowable harvest rate is 10 to 15%. In Nootka Sound, up to 20% harvest is permitted given the prevalence of hatchery stock in the area. The harvest rate is controlled by limiting effort (i.e. number and duration of openings and, in some areas, the number of permitted vessels) and limiting fishing areas to approach areas only (i.e. to those areas where fish are migrating not holding).

Since 2013, a fixed harvest rate strategy has also been used to harvest Nitinat Hatchery Chum when the stock abundance is considered above the lower fishery reference point but below the target fishery reference point. The maximum harvest rate for the Nitinat stock is 25% when it is below the target fishery reference point.

2. Surplus-to-Escapement Goal Strategy (fisheries targeting hatchery stocks at high abundance):

For fisheries that target primarily hatchery surpluses, the allowable harvest rate is determined by the escapement goal when it is determined the stock above the Upper Fishery Reference Point and broodstock capture targets have been or will be met. These fisheries occur only in 'terminal areas', defined as an area in close proximity to the origin watershed of the target stock where little or no interception of other stocks occurs. Surplus to escapement goal fisheries for Conuma Hatchery stock have occurred within the Tlupana Inlet portion of Area 25. Surplus to escapement goal fisheries for Nitinat Hatchery stock have occurred in Area 21 near the mouth of Nitinat Lake or in Area 22 in Nitinat Lake. All Nitinat and Conuma hatchery Chum are thermally marked, which allows for assessment of the hatchery contribution to fisheries and spawning.

7.4.2 STOCK STATUS

The current stock status is considered poor. Over the last three brood cycles, naturally spawning populations have been below target abundance in most years despite the precautionary harvest regime. In addition, hatchery production levels have declined in recent years partially as a result of low abundance (i.e. hatcheries have not been able to achieve brood-stock targets in some years). In recent years, overall catches have declined relative to historic levels. There was some improvement observed for the Nitinat Hatchery stock in 2016 and 2017 but returns in 2018 and 2019 were low.

7.4.3 FIRST NATIONS FSC AND TREATY FISHERIES

The 2019 WCVI FSC Chum reported catch (to date) can be found in Appendix 4 which includes fish retained for food, social and ceremonial purposes from Nuu-chah-nulth First Nations and Treaty harvests from Maanulth Nations.

7.4.4 FIRST NATIONS COMMERCIAL HARVEST

WCVI Economic Opportunity (EO)

In 2019, an agreement was reached with the Hupacasath and Tseshaht First Nations (Somass First Nations) for an Economic Opportunity (EO) fishery targeting Chum (Area 23). The pre-season forecast was 31,000, which was below the lower reference point of 48,000 and no commercial surplus was identified in-season; therefore, there was no EO fishery for Chum in 2019.

Five Nations Communal Sales Fishery

In 2019, the Department provided communal sale fishery opportunities for the Five Nations (five Nuu-chahnulth First Nations located on the West Coast of Vancouver Island - Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) that included WCVI Chum. These opportunities were categorized as Nearshore Integrated Hook and Line communal sale fisheries.

The Nearshore fishery targeted Nootka Sound Chum using troll and gillnet. One fishery opening occurred on September 25 however there was no effort and therefore no catch.

7.4.5 COMMERCIAL FISHERIES

Commercial fisheries on the WCVI targeted three Chum stocks in 2019: Nootka (Area 25), Esperanza (Area 25) and Kyuquot (Area 26).

Nitinat (Area 21/121)

In 2019, the preseason forecast for Nitinat Chum was of 362,000. This forecast allowed for commercial Area E gill net and Area B seine fisheries. Due to ongoing declines in Interior Fraser River (IFR) Steelhead escapement, and the recent designation of the Thompson and Chilcotin River Steelhead as Endangered by COSEWIC, DFO implemented a precautionary approach to the management of those fisheries in southern BC that are likely to impact this stock of concern. In Areas 21 and 121, a fishing window closure was in took place from September 11 to October 22 to address IFR Steelhead bycatch concerns. Following the window closure, fisheries were permitted within a two mile boundary of the shore line between Bonilla Point and Pachena Point. Due to an extremely low Chum return, escapement goals to the Nitinat system were not met in season; therefore, no commercial fisheries were authorized in 2019.

Nootka Sound (Area 25)

Based on pre-season forecasts no fisheries were planned in Nootka Sound. A stage 1 limited effort assessment fishery was initiated in-season due to higher than expected Chum bycatch in early September Chinook fisheries. Effort was limited to a maximum of 2 Area D gill net vessels and was open for 1.5 days per week during daylight hours. Catch rates were low and the fishery was discontinued after 2 weeks. The total catch for the Nootka Sound Area D gill nets can be found in Appendix 4.

Esperanza Inlet (Area 25)

Based on pre-season forecasts, a limited effort gill net Chum fishery opened in Esperanza Inlet on September 25, 2019. Effort was limited to a maximum of 5 vessels. The fishery was open for 1.5 days per week during daylight hours for 4 weeks. The total catch for the Esperanza Inlet Area D gill nets can be found in Appendix 4.

Kyuquot Sound (Area 26)

Based on pre-season forecasts, a limited effort gill net Chum fishery opened in Kyuquot Sound on September 25, 2019.

Effort was limited to a maximum of 4 vessels the fishery was open for 1.5 days per week during daylight hours for 3 weeks. The total catch for the Kyuquot Sound Area D gillnet fishery can be found in Appendix 4.

7.4.6 RECREATIONAL FISHERIES

7.4.6.1 TIDAL RECREATIONAL FISHERIES

The WCVI recreational fishery is open year-round with a daily limit of four (4) and possession of eight (8) Chum. Anglers are restricted to the use of barbless hooks and there is a minimum size limit of 30 cm. In both offshore and inshore areas of WCVI the recreational catch of Chum is minimal non-tidal recreational.

Chum retention fisheries took place in the Nitinat River on Vancouver Island from September 18 to September 30 and October 15 to December 31, with a limit of two (2) per day and four (4) in possession. Recreational freshwater opportunities are typically based on escapement estimates from hatchery operations, and where escapement goals are expected to be met, opportunities are provided. Chum returns to the WCVI were very low in all systems in 2019. Daily and possession limits are typically half of those provided in marine waters, with daily limits on most rivers being two (2) per day and four (4) in possession. Catch is not estimated in these freshwater fisheries. Chum catch and effort from this fishery is low.

7.4.7 EXCESS SALMON TO SPAWNING REQUIREMENTS (ESSR) FISHERIES

The Ditidaht First Nation was issued an ESSR Licence for Chinook, Coho and Chum at Nitinat Lake and Nitinat hatchery. The Mowachaht/Muchalaht First Nation was issued an ESSR licence to harvest Chinook, hatchery-marked Coho, and Chum from the Conuma River and hatchery; however no surplus was identified inseason for Chum.

The total Chum ESSR catch can be found in Appendix 7.

There were no other Chum ESSR fisheries on the WCVI in 2019.

8 APPENDICES

8.1 APPENDIX I: CATCHES IN CANADIAN TREATY LIMIT FISHERIES, 2003 TO 2019

Socion Chir	hinook	2019 16,213 5,228 570 21,486 12,239 5 653 10 37	2018 16,915 3,685 17,948 9,503 101,267	2017 41,749 5,502 593 788 30,209 7,726 246 88 644 - 74	2016 86,729 5,346 2,731 794 37,624 9,513 1,021 205 815 - 10	2015 60,046 5,619 4,157 1,537 19,747 7,886 868 - 1,084 - 87	2014 42,800 4,992 3,308 759 17,872 14,568 2,472 657 1,140 - 39	2013 36,146 4,835 3,415 1,594 21,163 10,374 738 N/A 508 29 73	2012 30,352 5,748 4,573 1,213 30,209 8,689 1,909 478 1,786 N/A	2011 55,623 4,703 2,307 1,165 24,012 6,102 2,333 514 2,110 29 214	2010 50,543 4,952 1,766 1,001 20,211 10,349 4,658 697 1,716 7 294	2009 48,049 5,061 2,330 714 11,057 5,649 7,031 1,183 717 3 125	2008 33,614 2,398 7,860 1,067 19,445 4,866 1,184 330 -	2007 59,237 47 10,576 1,735 16,564 5,399 862 337 1,340 1	2006 101,209 72 15,776 2,078 21,093 9,180 7,312 198 1,327	2005 85,890 276 18,997 2,177 21,932 6,860 7,534 821 594 71 114	2004 84,866 275 3,857 2,574 19,860 5,954 2,074 334 2,122 127 185	2003 58,784 190 1,396 1,052 32,730 3,168 1,894 547 2,795 192 228
Stikine River (all gears) Taku River (commercial gill net) Alsek River (commercial net)**** Area 1 (commercial troll)**** North Coast AABM** (troll + sport) Chir Coh Chir Chir Chir Chir Chir Chir Chir Chi	oho hinook-lg hinook-jk ockeye oho hinook-lg hinook-lg hinook-jk ockeye oho hinook ink	5,228 570 21,486 12,239 5 653 10 37 - 60,003 88,001	3,685	5,502 593 788 30,209 7,726 246 88 644 - 74	5,346 2,731 794 37,624 9,513 1,021 205 815 -	5,619 4,157 1,537 19,747 7,886 868 - 1,084 - 87	4,992 3,308 759 17,872 14,568 2,472 657 1,140	4,835 3,415 1,594 21,163 10,374 738 N/A 508	5,748 4,573 1,213 30,209 8,689 1,909 478 1,786 N/A	4,703 2,307 1,165 24,012 6,102 2,333 514 2,110	4,952 1,766 1,001 20,211 10,349 4,658 697 1,716	5,061 2,330 714 11,057 5,649 7,031 1,183 717 3	2,398 7,860 1,067 19,445 4,866 1,184 330	47 10,576 1,735 16,564 5,399 862 337 1,340	72 15,776 2,078 21,093 9,180 7,312 198 1,327	276 18,997 2,177 21,932 6,860 7,534 821 594	275 3,857 2,574 19,860 5,954 2,074 334 2,122 127	190 1,396 1,052 32,730 3,168 1,894 547 2,795
Stikine River (all gears) Taku River (commercial gill net) Alsek River (commercial net)**** Area 1 (commercial troll)**** North Coast AABM** (troll + sport) Chir Chir Chir Chir Chir Chir Chir Chi	hinook-lg hinook-jk ockeye oho hinook-lg hinook-jk ockeye oho hinook hinook ink	570 21,486 12,239 5 653 10 37 - 60,003 88,001	- - 17,948 9,503 - - - - - - - - - -	593 788 30,209 7,726 246 88 644 - 74	2,731 794 37,624 9,513 1,021 205 815	4,157 1,537 19,747 7,886 868 - 1,084 - 87	3,308 759 17,872 14,568 2,472 657 1,140	3,415 1,594 21,163 10,374 738 N/A 508	4,573 1,213 30,209 8,689 1,909 478 1,786 N/A	2,307 1,165 24,012 6,102 2,333 514 2,110	1,766 1,001 20,211 10,349 4,658 697 1,716	2,330 714 11,057 5,649 7,031 1,183 717 3	7,860 1,067 19,445 4,866 1,184 330	10,576 1,735 16,564 5,399 862 337 1,340	15,776 2,078 21,093 9,180 7,312 198 1,327	18,997 2,177 21,932 6,860 7,534 821 594	3,857 2,574 19,860 5,954 2,074 334 2,122 127	1,396 1,052 32,730 3,168 1,894 547 2,795
(all gears) Chir Taku River Cob (commercial gill Chir net) Chir Alsek River (all Gear Chir Areas 3 (1-4)* (commercial net)**** Area 1 (commercial troll)**** Pink Area 1 (commercial troll)**** Pink AbBM** (troll + sport)	hinook-jk ockeye oho hinook-lg hinook-jk ockeye oho hinook hinook	21,486 12,239 5 653 10 37 - 60,003 88,001	- 17,948 9,503 - - - - - - - - - - - - - -	788 30,209 7,726 246 88 644 - 74	794 37,624 9,513 1,021 205 815 -	1,537 19,747 7,886 868 - 1,084 - 87	759 17,872 14,568 2,472 657 1,140	1,594 21,163 10,374 738 N/A 508	1,213 30,209 8,689 1,909 478 1,786 N/A	1,165 24,012 6,102 2,333 514 2,110	1,001 20,211 10,349 4,658 697 1,716	714 11,057 5,649 7,031 1,183 717	1,067 19,445 4,866 1,184 330	1,735 16,564 5,399 862 337 1,340	2,078 21,093 9,180 7,312 198 1,327	2,177 21,932 6,860 7,534 821 594	2,574 19,860 5,954 2,074 334 2,122 127	1,052 32,730 3,168 1,894 547 2,795 192
Taku River (commercial gill net) Alsek River (commercial net)**** Area 1 (commercial troll)**** North Coast AABM** (troll + sport) Soci Chir Chir Chir Chir Chir Chir Chir Chi	ockeye oho hinook-lg hinook-jk ockeye oho hinook ink	12,239 5 653 10 37 - 60,003 88,001	17,948 9,503 - - - - - - - - 101,267	30,209 7,726 246 88 644 - 74	37,624 9,513 1,021 205 815 -	19,747 7,886 868 - 1,084 - 87	17,872 14,568 2,472 657 1,140 -	21,163 10,374 738 N/A 508	30,209 8,689 1,909 478 1,786 N/A	24,012 6,102 2,333 514 2,110	20,211 10,349 4,658 697 1,716	11,057 5,649 7,031 1,183 717	19,445 4,866 1,184 330 - 34	16,564 5,399 862 337 1,340	21,093 9,180 7,312 198 1,327	21,932 6,860 7,534 821 594	19,860 5,954 2,074 334 2,122 127	32,730 3,168 1,894 547 2,795 192
Taku River (commercial gill ent) Alsek River (all Cohi gear) Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	oho hinook-lg hinook-jk ockeye oho hinook hinook ink	12,239 5 653 10 37 - 60,003 88,001	9,503	7,726 246 88 644 - 74	9,513 1,021 205 815 - 10	7,886 868 - 1,084 - 87	14,568 2,472 657 1,140 - 39	10,374 738 N/A 508 29	8,689 1,909 478 1,786 N/A	6,102 2,333 514 2,110 29	10,349 4,658 697 1,716	5,649 7,031 1,183 717 3	4,866 1,184 330 - 34	5,399 862 337 1,340	9,180 7,312 198 1,327	6,860 7,534 821 594 71	5,954 2,074 334 2,122 127	3,168 1,894 547 2,795 192
(commercial gill net) Chir	hinook-lg hinook-jk ockeye oho hinook ink	653 10 37 - 60,003 88,001	- - - - - 101,267	246 88 644 - 74	1,021 205 815 - 10	868 - 1,084 - 87	2,472 657 1,140 - 39	738 N/A 508 29	1,909 478 1,786 N/A	2,333 514 2,110 29	4,658 697 1,716 7	7,031 1,183 717 3	1,184 330 - 34	862 337 1,340	7,312 198 1,327	7,534 821 594 71	2,074 334 2,122 127	1,894 547 2,795 192
net) Chir Social	hinook-jk ockeye oho hinook ink	653 10 37 - 60,003 88,001	101,267	88 644 - 74	205 815 - 10	1,084 - 87	657 1,140 - 39	N/A 508 29	478 1,786 N/A	514 2,110 29	697 1,716 7	1,183 717 3	330 - 34	337 1,340 1	198 1,327	821 594 71	334 2,122 127	547 2,795 192
Alsek River (all Coh gear) Chir Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	ockeye oho hinook ink	10 37 - 60,003 88,001	101,267	644 - 74	815	1,084 - 87	1,140	508 29	1,786 N/A	2,110 29	1,716 7	717	34	1,340 1	1,327	594 71	2,122 127	2,795 192
Alsek River (all Cohgear) Chir Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	oho hinook ink	10 37 - 60,003 88,001	101,267	- 74	- 10	- 87	39	29	N/A	29	7	3		1	-	71	127	192
Alsek River (all Cohgear) Chir Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	oho hinook ink	60,003 88,001	101,267	- 74	10	87	39				7 294	3 125		41	19			
gear) Chir Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	hinook ink ink	60,003 88,001	, , , , ,						85	214	294	125	7	41	19	114	185	228
Areas 3 (1-4)* (commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	ink	60,003 88,001	, , , , ,					,,,					-					
(commercial net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	ink	60,003 88,001	, , , , ,	704,450	430,435	80,266	450 671											
net)**** Pink Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	ink	60,003 88,001	, , , , ,	704,450	430,435	80,266	450 671											
Area 1 (commercial troll)**** Pink North Coast AABM** (troll + sport)	ink	88,001	, , , , ,	701,100	150,155	00,200		1.249.570	118,164	160,757	30,686	404,460	8,330	1,740,270	228,378	878,552	402,459	667,103
(commercial troll)**** Pink North Coast AABM** (troll + sport)		88,001	266				150,071	1,2 1,5,0 7 0	,	,,,,,,	,	,		-,,,=		0.0,000	,	
troll)**** Pink North Coast AABM** (troll + sport)		88,001	266															
North Coast AABM** (troll + sport)		88,001		38,763	32,343	41,551	31,775	84,216	57,013	52,221	19,948	60,402	29,295	61,276	34,854	39,430	27,751	98,347
AABM** (troll + sport)		,	106,976	143,330	190.180	158,903	221,001	115.914	120,305	122,660	136,613	109,470	95,647	144,235	215,985	243,606	241,508	191,657
sport)		42,801+	70,276 +	97,730 +	147,381+	106,703 +	172,001 +	69,264 +	80,256 +	74,660 +	90,213 +	75,470 +	52,147 +	83,235 +	151,485 +	174.806 +	167,508 +	137,357 +
• •		45,200	36,700	45,600	42,800	52,200	49,000	46650	40050	48000	46400	34,000	43500	61000	64500	68,800	74,000	54,300
West Coast Chir	hinook	66,992	76,958	103,260	93,294	113,293	178,558	108,710	130,719	206,569	137,660	125,488	143,817	139,150		195,791	210,875	179,706
Vancouver Island	miook	23,195+	28.840 +	54,411 +	55,168 +	60,572 +	127,177 +	43.043 +	62,573 +	123,930 +	79,123 +	53,191 +	89,704 +	87,921 +	103.978 +	175,771	210,075	177,700
AABM (troll +		35,418+	45,233 +	46,707 +	37,809 +	48,775 +	48,365 +	61,712 +	61,822 +	78,350 +	52,698 +	68,775 +	50,319 +	46,229 +	36,992 +	143,614 +	168,837 +	152,677 +
sport + FN)		8.378	2.885	2143	317	3.946		3955	4300	4289	5839	3381	3794	5.000	5.000	52.177	42.038	27.029
	ockeve	-	3,682,561	-	-		7,945,474	2,124	-	443,000	9,305,104	3301	16,942	5,000	4,633,623	137,000	1,993,800	1,042,986
	OCKEYE	-	3,082,301	-	_	-	7,943,474	2,124	-	443,000	2,303,104	_	10,742		4,033,023	137,000	1,773,800	1,042,700
Fraser River																		
Canadian										4 = 54 000		4 442 040		222 200	50 22 5	220 000		
Commercial Catch Pink		6	91,337	-	-	452	-	2,855,441	-	4,751,800	-	1,442,840	-	333,300	68,325	338,000	-	1,149,189
Soc	ockeye	-	989,459	-	-	44,100	691,000	4,609	105,100	266,000	1,970,000	-	49,800	3,900	701,300	-	192,200	244,000
Fraser River U.S.																		
Commercial Catch Pink	ink	232,904	-	105,930	-	334,700	-	3,057,222	-	2,893,400	-	2,726,230	-	377,600	-	-	-	773,000
West Coast																		
Vancouver Island																		
(commercial troll) Coh	oho	2,920	-	331	774	18,126	32,992	5,499	1,988	-	458	-	369	1,424	2,399	5,989	-	
Johnstone Strait																		
(commercial																		
catch)*** Chu	hum	-	52,139	401,957	1,333,478	492,841	318,984	597,003	391,324	751,560	62,510	510,708	298,931	494,944	800,363	787,226	1,089,100	1,026,029
*AR	AREA 5-11 CA	ATCHES INCL	UDED PRIOR	TO 1995 AN	ID EXCLUDED	FROM 1995-	1998 INCLUSIV	VE. NOT PART	T OF 1999 AN	NEX IV PROV	/ISIONS.							
					CLUSION CA STRAL COAST						0 ('96), 5,943 ('9	97), and 2,182 in	1998. NO TI	ERMINAL EX	CLUSION IN T	THE 1999 AGR	EEMENT -	
	*** CANADIAN CATCH INCLUDES COMMERCIAL, FSC AND TEST-FISH CATCHES IN AREAS 11-13 FOR 1991-94 INCLUSIVE, AND IN AREAS 12-13 FOR 1995 TO 2004 INCLUSIVE. 2002-PRESENT, CATCHES FROM FISHERIES MANAGED TO FIXED HARVEST RATE OF 20%.																	
) IN AREAS 3(1-4) AND ARI	EA 1 HAVE BE	EEN UPDATED	TO REFLEC	CT FINAL EST	IMATES.							
					ARE REPORTI	-						OOK YEAR ((OCT-SEPT)					
					G TO FISHERII						Jan Dr Chii	(1 523 1)					

8.2 APPENDIX 2: TRANSBOUNDARY CATCH TABLE

Licence Group	Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook Kept	Chinook Released
			F	irst Nation:	s FSC and	Treaty					
	Stikine	5,401								570	
	Taku	91		94						5	
	Alsek	648								32	
Total First Na	tions FSC Catch	6,140		94						607	
				Cor	mmercial						
	Stikine	10,812		5,228							648
	Taku	21,395		12,145							135
Total Com	mercial Catch	32,207		17,373							783
				Rec	reational						
	Alsek	5		10						5	
Total Recre	eational Catch	5		10						5	
TC	OTALS	38,352		17,477						612	783

8.3 APPENDIX 3: NORTHERN BC CATCH TABLE

Licence Group	Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook Kept	Chinook Released
			First	Nations FSC a	and Treaty	1					
	Skeena	36,705		625	-	8,021		43		4,525	
	Nass	46,615		2,691		1,002		89		4,735	
	Central Coast	162		18		5		206		2,045	
Total First I	Nations FSC Catch	83,482	-	3,334	-	9,028	-	338	-	11,305	-
	Commercial										
Area C Gillnet	Central Coast	-	1	-	-	-	1	852	-	787	-
Demo	Central Coast			2,388		1,456					
Area F Troll	Haida Gwaii AABM	-	952	22,002	27	3,723	1,311	891	827	42,801	4,425
Area F Troll	Haida Gwaii Pink/Coho	11	1,739	155,195	173	56,280	6,108		2,573		35,673
Total Co	mmercial Catch	11	2,691	179,585	200	61,459	7,420	1,743	3,400	43,588	40,098
				Recreatio	nal						
	Skeena/Nass	28		23,820		3,471		62		15,152	
	Central Coast			16,268		944		221		8,158	
	Haida Gwaii	125		36,100		910		700		45,200	
Total Red	creational Catch	153	-	76,188	-	5,325	-	983	-	68,510	-
	TOTALS	83,646	2,691	259,107	200	75,812	7,420	3,064	3,400	123,403	40,098

8.4 APPENDIX 4: SOUTHERN BC CATCH TABLE

Not including Fraser River – see Appendix 4^

Licence Group	Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook Kept	Chinook Released
		ito pr		tions FSC ar							Holousou
	WCVI - Inshore ISBM			1,019	46			1,174		4,016	10
	WCVI - Offshore AABM			2,330	7	99		14		1,255	
	Strait of Georgia	1		1,560		14		322	4	1,016	4
	Johnstone Strait		302	635	4	7,561		7,778	100	356	3
Total First Nations FSC Catch		1	302	5,544	57	7,674	-	9,288	104	6,643	17
First Nations Commercial											
EO	WCVI - Inshore ISBM			659						26,424	
Total First Nations Commercial	Catch			659						26,424	
Taaq-wiihak											
	WCVI - Offshore AABM	2	20	188	1,195	172	512	1	15	7,123	277
	WCVI - Inshore ISBM			94				38		3,058	
Total First Nations Commercial	Catch	2	20	282	1,195	172	512	39	15	10,181	277
				Commercia							
Area B	WCVI - Inshore			2,744			1		2	6,562	254
Area D	WCVI - Inshore		1	176	58			6,897	2	38,913	22
Area G	WCVI - Offshore		4		7,445	117	175	1	12	23,195	557
Total Commercial Catch			5	2,920	7,503	117	176	6,898	16	68,670	833
				Recreationa	l						
	Johnstone Strait	11	117	2,417	4,474	4,194	3,352	15	14	10,534	15,487
	Strait of Georgia	34	414	6,416	34,736	21,064	10,568	462	12	44,526	132,105
	Juan de Fuca	-	178	8,459	25,456	29,428	17,830	63	63	12,558	20,016
	WCVI - Inshore ISBM	26	16	19,609	11,047	1,004	1,290	7	-	52,700	31,103
	WCVI - Inshore AABM	570	-	8,398	8,526	242	54	1	-	19,970	29,283
	WCVI - Offshore AABM	-	9	9,649	23,518	1,770	2,832	1	-	15,448	8,776
Total Recreational Catch		641	734	54,948	107,757	57,702	35,926	548	89	155,736	236,770
TOTALS		644	1,061	64,353	116,512	65,665	36,614	16,773	224	267,654	237,897

8.5 APPENDIX 5: FRASER RIVER CATCH TABLE

Licence Group	Fishing Area	_	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook Kept	Chinook Released
		F	irst Natio	ns FSC a	nd Treaty						
	Fraser	9,069	3,655	203	383	37,054	15,056	15,432	27	29,057	149
Total First Nations FSC Catch		9,069	3,655	203	383	37,054	15,056	15,432	27	29,057	149
	First Nations Commercial										
	Fraser		377	30	1,005	220,669	15,035	30	133		932
Total First Nations Commercial Catch			377	30	1,005	220,669	15,035	30	133		932
			С	ommercia	ıl						
Area B*	Fraser										
Total Commercial Catch											
			R	ecreationa	al						
	Fraser									3,912	207
Total Recreational Catch										3,912	207
TOTALS		9,069	4,032	233	1,388	257,723	30,091	15,462	160	32,969	1,288
*Only two vessels fished - not permitte	ed to release catcl	n data du	e to priva	acy requir	ements.						

8.6 APPENDIX 6: TEST FISHING CATCH TABLE

Test-Fisheries				Sockeye	Sockeye	Coho	Coho	Pink	Pink	Chum	Chum	Chinook	Chinook	GRAND
	Start Date	End Date	Boat Days		released	kept	released	kept	released	kept	released	kept	released	TOTAL
Albion Chinook Gillnet	21-Apr-19	20-Oct-19	158	73	-	8	-	179	-	369	-	1,675	-	2,304
Albion Chum Gillnet	1-Sep-19	23-Nov-19	52	10	-	75	-	568	-	3,436	-	521	-	4,610
Mquqwin / Brooks Chinook Troll	20-Jul-19	27-Aug-19	16	-	3	368	-	15	53	-	-	339	5	783
Juan De Fuca Chum Seine	1-Oct-19	8-Nov-19	24	-	-	-	157	-	-	694	68	-	11	930
Area 12 Chum Seine	12-Sep-19	24-Oct-19	56	-	32	4	151	2	695	4,489	230	1	47	5,651
Naka Creek Sockeye Gillnet *	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area 13 Sockeye Seine	10-Aug-19	23-Aug-19	14	1,500	3,176	-	43	3,234	45,101	-	74	-	74	53,202
Area 23 Sockeye Seine	10-Jun-19	16-Jul-19	14	3,953	6	-	1	-	1	-	-	-	126	4,087
Blinkhorn Sockeye Seine	25-Jul-19	30-Aug-19	36	2,883	2,884	-	254	698	36,003	-	378	-	401	43,501
Round Island Sockeye Gillnet	11-Jul-19	11-Aug-19	32	172	-	57	49	221	-	13	-	29	16	557
Round Island Sockeye Gillnet AT 90			20											
Mesh Net Study **	1-Aug-19	30-Jul-19	20	133	-	56	51	223	1	12	-	32	22	530
San Juan Sockeye Seine	26-Jul-19	30-Aug-19	36	614	51	-	2,208	8,540	66,783	3	1	-	1,758	79,958
San Juan Sockeye Gillnet	10-Jul-19	13-Aug-19	68	236	-	52	150	721	-	9	-	162	315	1,645
Whonnock Gillnet	24-Jun-19	28-Sep-19	96	463	-	179	-	5,252	-	102	-	1,102	-	7,098
Cottonwood Gillnet	12-Jul-19	16-Sep-19	66	222	-	30	48	2,977	-	9	-	267	47	3,600
Qualark Gillnet	2-Jul-19	29-Sep-19	90	558	-	1	17	585	-	-	-	651	12	1,824
Туее				2,205		224		1,180		126		380		4,115
Grand	Grand Total						3,129	24,395	148,637	9,262	751	5,159	2,834	214,395

All test fish catches include assessment and non-assessment sets

Note: Jacks are included in the above test fishing catches, if encountered

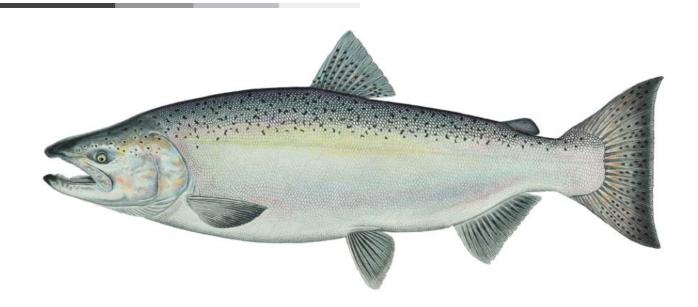
^{*} Did not operate in 2019

^{**} New for 2019

8.7 APPENDIX 7: ESSR CATCH TABLE

Hatcheries		Sockeye released		Coho released	Pink kept	Pink released	Chum kept	Chum released		Chinook released	
Robertson Creek	-	-	4,375	-	-	-	-	-	18,811	10104004	23,186
Quinsam River			.,		241,016				- 1		241,016
Puntledge River									6,840		6,840
Nitinat River	-	-	11	-	-	-	11,387	-	3,436	-	14,834
Conuma River	-	-	-	-	-	-	-	-	1,991	-	1,991
Weaver Spawning Channel											-
Chehalis Hatchery	-	-	-	-	-	-	457	-	103	-	560
Inch Hatchery	-	-	1,161	-	-	-	2,645	-	-	-	3,806
Chilliwack Hatchery	-	-	19,149	-	22	-	1,437	-	3,203	-	23,811
Capilano Hatchery	-	-	3,014	-	-	-	-	-	1,436	-	4,450
Tenderfoot Hatchery											-
Big Qualicum River			1,108		13,493		-		3,561		18,162
Little Qualicum River							-		1,367		1,367
											-
											-
Grand Total	-	-	28,818	-	254,531	-	15,926	-	40,748	-	340,023

Canadian Chinook Fishery Constraints – 2019 Season



PSC Post-season - Portland January 2020





Canadian Domestic Conservation Constraints

What were the key drivers for management of Canadian Chinook fisheries in 2019?

- Chinook conservation constraints
 - Fraser Chinook; primary driver
 - Skeena/Nass Chinook
 - WCVI Chinook
- Big Bar rockslide
- No additional management measures were implemented for PST CYER reduction obligations given substantial domestic conservation measures.



Canadian Domestic Measures for Stocks of Concern

Fraser Chinook:

- -Management target for Fraser Spring 4₂, Spring 5₂, and Summer 5₂ Chinook was to reduce overall Canadian fishery mortalities to near 5%
- -Additional actions announced in July 2019 to mitigate Big Bar rockslide.

Skeena/Nass Chinook:

–Additional management measures to address Chinook concerns (and inseason Skeena sockeye conservation);

WCVI Chinook:

-ER limit of 10% in key Canadian fisheries. Limit in NBC troll of 3.2%.





1. Fraser Chinook - COSEWIC Status Designations

- In November 2018, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) released the results for an assessment of 16 southern BC chinook designatable units (DUs).
 - 3 DUs outside the Fraser river, 1 DU (East Vancouver Island Stream Spring; Nanaimo River) was assessed as endangered and 2 Southern Mainland DUs were data deficient
- COSEWIC expected to submit these assessments
 to the Government of Canada via the annual report
 anticipated in November 2019. This annual report will
 initiate the formal process to consider whether or not
 to these DUs will be listed under the Species at Risk
 Act (SARA).
- COSEWIC assessments of the remaining southern BC chinook populations is planned for 2019.

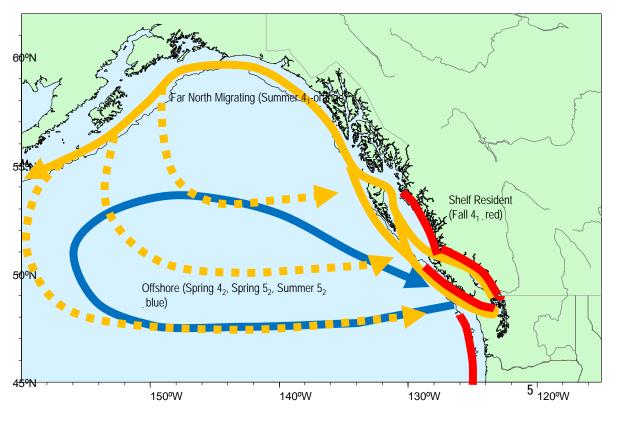
Mgmt Unit	# DUs	Designatable Unit Status
Spring 4 ₂	2	1 endangered, (1 not assessed)
Spring 5 ₂	6	4 endangered; 1 threatened; 1 special concern
Summer 5 ₂	5	2 endangered; 2 threatened; (1 not assessed)
Summer 4 ₁	2	1 not at risk; (1 not assessed)
Fall 4 ₁	1	1 threatened
Total	16	7 endangered; 4 threatened; 1 special concern; 1 not at risk; (3 not assessed)

https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife/assessments/wildlife-species-assessment-summary-nov-2018.html





Fraser Chinook - Ocean Distribution



Different Fraser
River origin
Chinook
populations
exhibit a range
of ocean
distributions
which influences
their exposure
to and impacts
by ocean
fisheries.





Fraser Chinook Management Objectives

Fraser Spring 4₂, Spring 5₂ and Summer 5₂

- These populations, include 7 *endangered, 3 threatened and 1 stock of concern,* which are at risk of extinction and requires precautionary actions to provide a high degree of protection to allow these Chinook to reach spawning areas. Continued low productivity means these populations will likely continue to decline even in absence of fisheries.
- The Department is taking a precautionary approach to protect these at risk Chinook. Overall, fishery mortality rates are expected to be very low (near 5%) and will be assessed based on post-season information.

Summer 4₁ chinook

- While South Thompson Chinook are not at risk, there are continuing concerns due to low productivity, declining fecundity and declining spawner abundance.
- High conservation concern for Maria Slough Chinook (Lower Fraser) given very low spawner abundance in 2018.
- Run timing overlaps with Summer 5₂ and Fall 4₁ Chinook will require consideration of lower fishery mortalities

Fall 4₁ chinook

Harrison Chinook is *threatened* and is experiencing low productivity. Spawner abundance has not achieved the escapement objective in 6 of last 7 years.





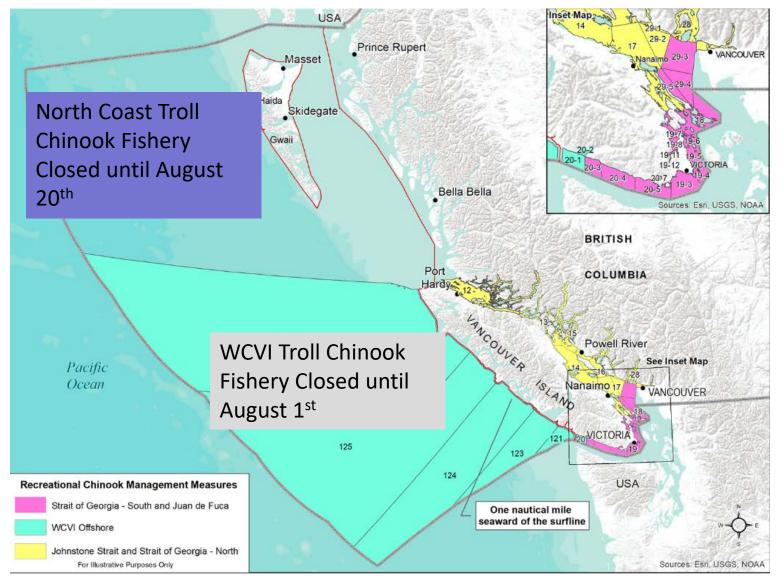
Fraser Chinook Management Measures

- Significant measures in place to avoid impacting Fraser chinook stocks and to support salmon allocation priorities
 - Details provided on later slides
- Additional actions announced in July 2019 to mitigate Big Bar rockslide
- Additional management measures in Juan de Fuca Strait, Gulf Islands and approach to the Fraser for Southern Resident Killer Whales (SRKW) conservation





Commercial







Recreational

Queen Charlotte through Strait of Georgia - North

- Apr. 1 to Jul. 14 chinook nonretention
- July 15 to July 31 1 chinook per day with a maximum size of 80 cm.
- Aug. 1 to Aug. 29 1 chinook per day
- Aug. 30 to Dec. 31 2 chinook per day



Nanaimo 17

123

One nautical mile

seaward of the surfline

WCVI offshore and portion of Juan de **Fuca Strait**

- Apr. 1 to Jul. 14 chinook nonretention;
- July 15 to July 31 2 chinook per day with a maximum size of 80 cm.
- Aug. 1 to Dec. 31 2 chinook per day

Strait of Georgia - South and 121 20 VICTORIA portion of Juan de Fuca Strait

* VANCOUVER

- Apr. 1 to Jul. 31 chinook nonretention
- Aug. 1 to Aug. 29 1 chinook per day (with option for terminal fisheries)
- Aug. 30 to Dec. 31 2 chinook per day





Recreational







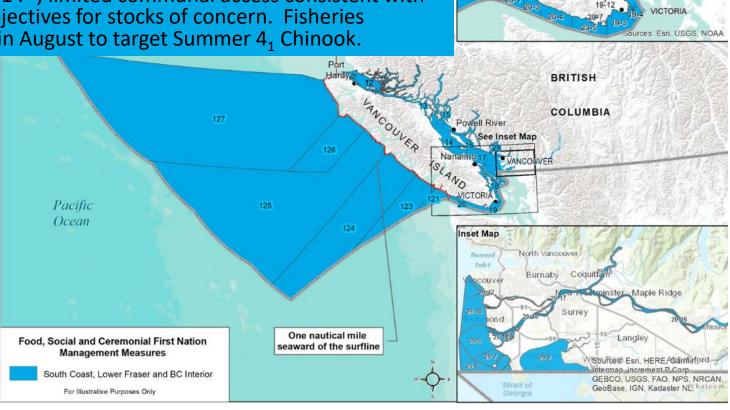
First Nations Food, Social and Ceremonial

Southern BC marine waters:

April 19 - July 14, 2019 chinook non-retention in effect

Lower Fraser and BC Interior:

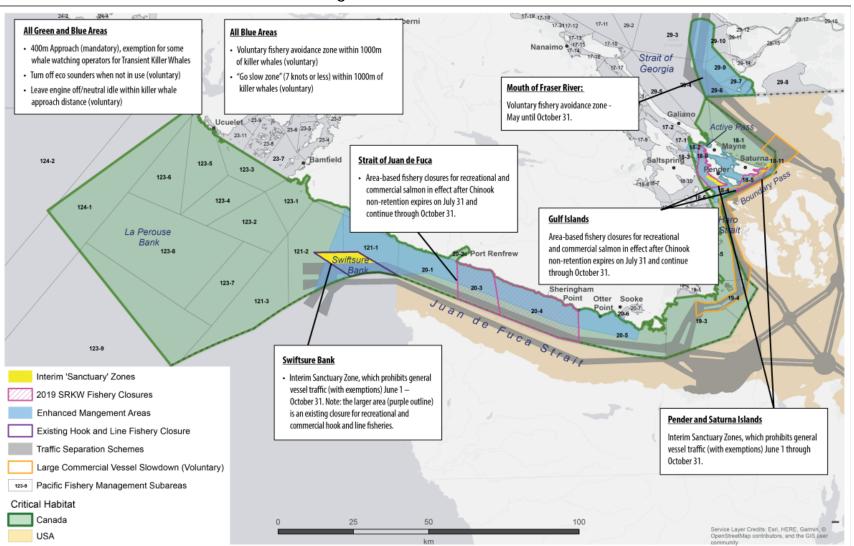
- Very limited access prior to July 14th.
- After July 14th, limited communal access consistent with fishery objectives for stocks of concern. Fisheries primarily in August to target Summer 4, Chinook.







Southern Resident Killer Whale Management Measures







What were the fishery implications?

Fishery	Pre-season TAC	Catch	% TAC
NBC AABM	124,800	88,001	71%
WCVI AABM	79,900	68,175	85%

• Further details on ISBM fisheries and stock status provided in the CDN postseason report.





2019 Fraser Chinook Outcomes

- Fraser River Preliminary Spawning Escapements
 - Spring 4_2 : 6,000 (brood year escapement ~11,500)
 - Spring 5_2 : < 3,500 preliminary (brood year escapement >28,000)
 - Summer 5_2 : < 5,000 preliminary (brood year escapement ~28,500)
 - Summer 4₁: 131,400 (brood year escapement ~176,650 very strong)
 - Fall 4₁: Preliminary estimates for 2019 not yet final but similar to BY (brood year escapement <50,000)
- Continued low productivity of Spring 4₂ Chinook (spawn below rockslide)
- High impact of Big Bar rockslide on Spring 5₂ and Summer 5₂ Chinook (historically >80% of Chinook in these groups spawn upstream of the rockslide)



Next Steps

- Assessment of fishery reductions will require information expected in coming months including catch, escapement, run reconstruction, CWT and DNA data.
- Analysis to assess impacts of 2019 fisheries will need to incorporate evaluation of impacts from Big Bar rockslide (e.g. how many salmon successfully passed rockslide?)
- Expect continued need for fishery management measures in 2020 to protect stocks of concern; specific management measures have not been identified and will be reviewed in domestic planning processes this Spring.
- Broader engagement also underway to identify actions to support recovery of Southern Chinook stocks of concern.





Management Along the Migration

 ESA-Impact Limits Severely Constrain Fisheries

- Mixed Stock Fisheries Incidental Only
- Environmental Variability New Challenges
- Intensive Management Preseason & Inseason

Annual Management Process

- 1. Forecast abundance and determine status
- 2. Identify stock specific impact limits
- 3. Model proposed fisheries & identify constraining stocks
- 4. Negotiate among the parties for fair sharing of catch and impacts
- 5. Pacific Fishery Management Council provides recommendation to NOAA for approval of an annual fishery package
- 6. Document "List of Agreed Fisheries"
- 7. Intensive inseason management

Puget Sound Wild Chinook Forecasts: 2019 vs. 2018

Basin		Wild	
Dasiii	2018	2019	Comparison
Hoko	1,071	1,734	1.62
Dungeness	89	282	3.17
Elwha	238	333	1.40
Nooksack springs	202	248	1.23
Skagit springs	2,317	2,003	0.86
Skagit summer/falls	13,340	13,825	1.04
Stillaguamish	487	378	0.78
Snohomish	3,460	3,696	1.07
Lake Washington	1,461	1,063	0.73
Green	2,110	4,833	2.29
Puyallup	672	1,724	2.57
White River springs	528	573	1.09
Nisqually	586	824	1.41
Skokomish	3,532	818	0.23
Mid Hood Canal	358	285	0.80
Total (others included)	29,380	29,796	1.01

2019 LIMITING STOCKS

LAT = Low Abundance Threshold

Below LAT

- Nooksack
- Stillaguamish
- Snohomish
- Mid Hood Canal

Near LAT

- Skagit Spring
- Skagit Fall
- Dungeness



Other ESA Stocks

 Lower Columbia River Tules

Stock-Specific Limits

	Management Criteria			Model Prediction			
Stock	Abundance Tier	ER Ceiling	ER Type	Escapement	Total ER	SUS ER	PT-SUS ER
Spring/Early:							
Nooksack - Total		10.5%	SUS		33.2%	10.5%	5.8%
North/Middle Fork	< LAT			167			
South Fork	< LAT			75			
Skagit - Total	> LAT	37.5%	Total	1,616	<u>32.1%</u>	21.2%	4.6%
Upper Sauk	> LAT			957			
Upper Cascade	> LAT			182			
Suiattle	> LAT			478			
White	>UMT	22.0%	SUS	1,834	24.3%	<u>16.7%</u>	5.1%
Dungeness	> UMT	10.0%	SUS	945	5.5%	<u>1.2%</u>	1.1%
Summer/Fall:							
Skagit - Total	> LAT	48.0%	Total	12,504	<u>36.7%</u>	16.4%	3.8%
Upper Skagit	> LAT			9,274			
Sauk	> LAT			587			
Lower Skagit	> LAT			2,363			
Stillaguamish - Total	900-1200	24.0%	Total	943			
Unmarked ER		8.0%	UM SUS		<u>18.0%</u>	<u>8.0%</u>	5.2%
Marked ER		12.0%	M SUS		20.4%	<u> 10.9%</u>	8.2%
Snohomish - Total		21.0%	Total	3,208	<u>15.8%</u>	<u>6.5%</u>	5.0%
Skykomish	< LAT	15.0%	SUS	2,414			
Snoqualmie				794			
Lake WA (Cedar R.)	>UMT	13.0%	PT-SUS	1,217	33.2%	22.0%	<u>12.9%</u>
Green	> UB	13.0%	PT-SUS	5,842	53.8%	42.6%	<u>12.9%</u>
Green	∨ UB	13.0%	F1-303	9,500			
Puyallup	> UMT	13.0%	PT-SUS	2,695	51.1%	39.9%	<u>12.9%</u>
тиуанир				4,613			
Nisqually	> LAT	47%	Total	11,467	<u>48.7%</u>	41.9%	15.3%
Western Strait-Hoko	>UMT	10%	SUS	2,315	20.7%	<u>2.4%</u>	2.4%
Elwha	>UMT	10%	SUS	6,662	5.8%	<u>1.4%</u>	1.4%
Mid-Hood Canal	< LAT	12%	PT-SUS	286	21.8%	12.1%	<u>11.8%</u>
Skokomish	> UMT	50%	Total	2,667	<u>48.2%</u>	38.6%	12.4%
SKOROIIISII	> UMI	30 /0	70 I Otal	22,568			
Model Run: SLC-Chin2719			SRFI =		58.7%		Ceiling)
Run Date & Time: 04/15/1	9 15:42		Lower Col N	at Tule ER =	36.0%	(38%	Ceiling)

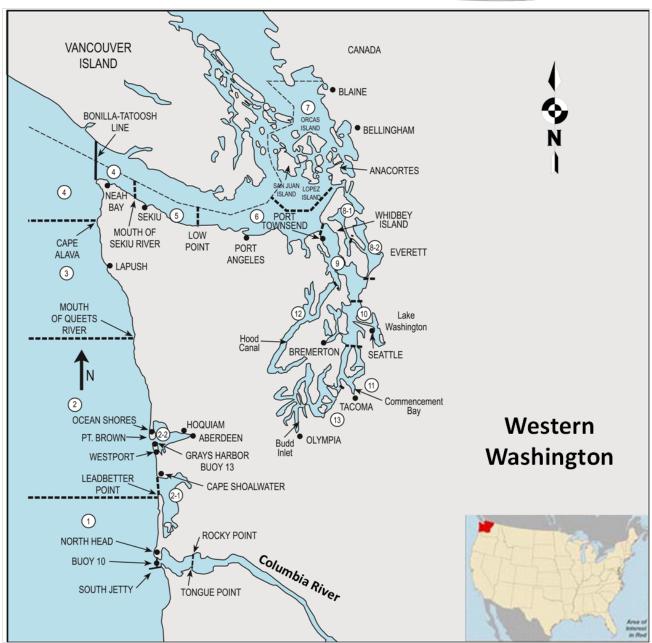
Nooksack Detail

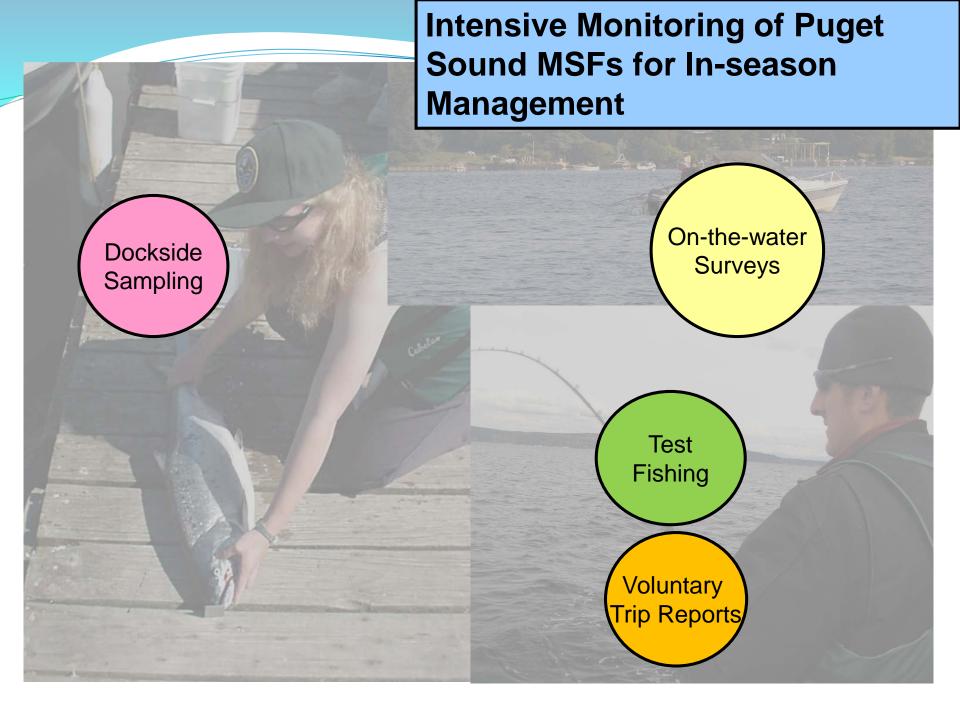
	Management Criteria			Model Prediction			
Stock	Abundance Tier	ER Ceiling	ER Type	Escapement	Total ER	SUS ER	PT-SUS ER
Spring/Early:							
Nooksack - Total		10.5%	SUS		33.2%	<u>10.5%</u>	5.8%
North/Middle Fork	< LAT			167			
South Fork	< LAT			75			

2019 – PRESEASON OVERVIEW

- More restrictive fishery measures in place due to Puget Sound stocks below their Low Abundance Thresholds
- Puget Sound Recreational Fishery
 - San Juan Sport
 - New closures in August and January
 - Winter MSF fisheries reduced in duration in most areas in PS
- Total (Tribal/Non-Tribal) Ocean Chinook quotas
 - Down in 2019 compared to 2018, lowest since 2009
 - 2018 = 95,000 and 2019 = 87,5000 (2019 was 8% lower than 2018 levels)

Map of Washington Fishing Areas

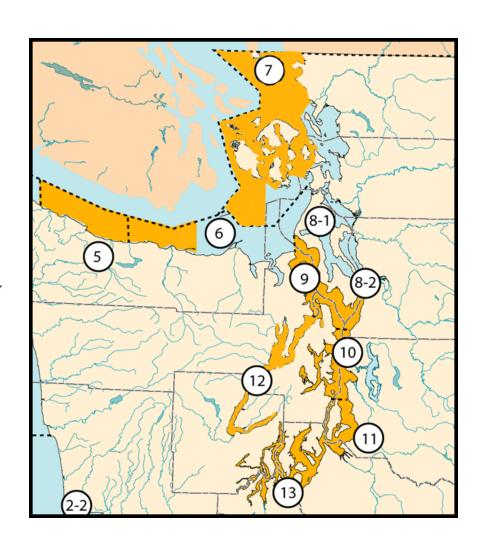




	2019			Prior Years -	
Tit I .	Pre-season modeled		Actual	Landed	
Fisheries	Total		Preliminary	2010	2015
	Mortality	Landed	Landed	2018	2017
OCEAN F	ISHERIES	3			
Commercial Troll					
Neah Bay and La Push (Areas 3, 4, 4B)	51,300	45,000	39,100	34,000	35,200
Columbia Ocean Area and Westport (Areas 1, 2)	24,400	16,200	3,400	13,800	24,700
Sport					
Neah Bay (Area 4)	6,200	5,500	3,900	3,000	7,300
La Push (Area 3)	1,000	900	600	400	500
Westport (Area 2)	14,200	12,700	2,300	4,900	6,600
Columbia Ocean Area (Area 1)	9,200	7,100	4,000	2,200	7,600
	ISHERIES	5			
Sport					
Strait of Juan de Fuca (area 5,6)	20,300	11,100	na	16,700	9,810
San Juan Islands (area 7)	7,500	4,700	na	7,500	7,000
Puget Sound Marine (area 8-13)	29,100	17,200	na	34,400	21,600
Puget Sound Rivers	19,400	18,600	na	8,000	23,700
North WA Coastal Rivers	-	-	na	1,600	1600
Grays Harbor	3,400	2,700	na	3,700	2,700
Columbia River (Spring)	-	-	2,000	9,100	9,100
Columbia River (Summer)	-	-	na	1,300	3,800
Columbia River (Fall) (incl. Buoy 10)	-	-	21,800	22,400	60,400
Commercial					
Strait of Juan de Fuca net and troll (Area 4B, 5, 6C)	7,700	4,700	1,500	3,100	1,900
San Juan Islands (Area 6, 7, 7A)	8,500	8,400	3,600	3,900	2,600
Puget Sound Marine (Area 8-13,7B-D)	45,800	45,000	62,300	70,600	90,600
Puget Sound Rivers	34,600	34,600	37,500	41,600	53,900
North WA Coastal Rivers	-	-	11,100	11,000	14,200
Grays Harbor (Areas 2A-2D)	1,800	1,600	2,400	2,700	3,700

Examples of 2019 In-season Actions

- Puget Sound Recreational:
 - Area 9 Summer MSF: Managed to a harvest quota of 3,491 marked (hatchery) Chinook
 - Fishery conservatively scheduled for 4 days of Chinook retention July 25-29
 - Based on in-season monitoring, reopened and extended gradually July 31-Aug 9
 - Area 8-1/8-2 winter MSF daily limit reduced and closed early (Feb 2 limit change, Apr 11 closed)
 - Area 10 winter MSF closed Jan 19 (Scheduled Jan 1 – Mar 30)



Examples of 2019 In-season Actions

- WA Ocean Recreational (Areas 1-4)
 - Similar thorough sampling programs, in-season management.
 - Area 4 (Neah Bay) closed to Chinook on 7/14 after catching 75% of quota.
 - Remaining quota used to cover release mortality for remainder of coho season.



Examples of 2019 In-season Actions

- Tribal and Non-tribal troll fisheries:
 - E.g., In-season management of commercial troll and tribal troll in the Ocean; tracking harvest quotas with regularly updated fish ticket information.
- In-river management: terminal areas are last in line; therefore, if returns are significantly below forecasts, there can be reduced or no fishing to meet escapement objectives.

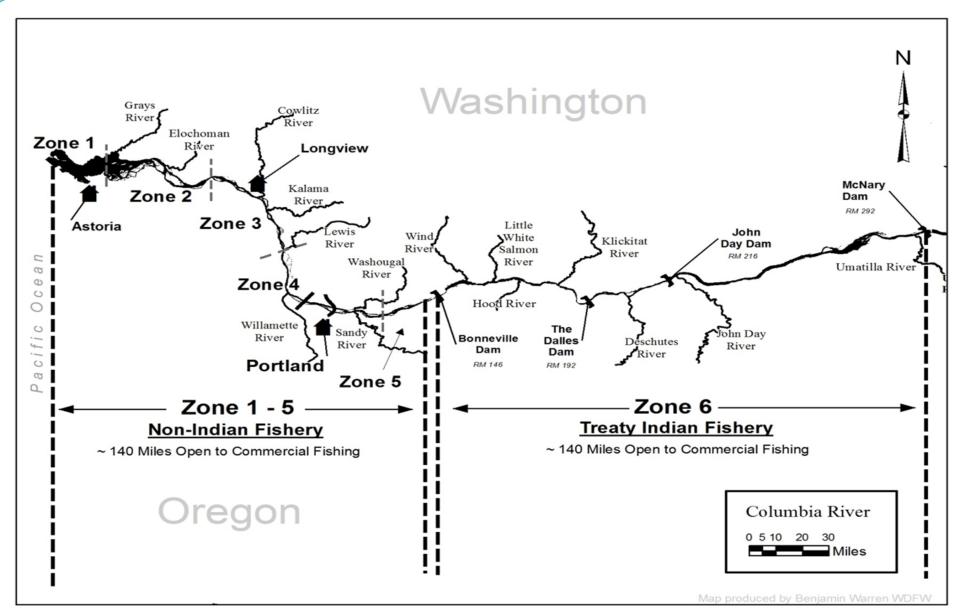




Columbia River Chinook Management



Columbia River Fisheries



Columbia River Spring & Summer Chinook 2019 Actual Return down vs. forecast

Stock Group	Return River/Area	2019 Forecast		Ratio (Return/ Forecast)
Spring Chinook -Lower Columbia	Cowlitz, Kalama, Lewis, Willamette, Sandy, Select Areas	52,700	33,447	0.63
Spring Chinook -Mid/Upper Columbia	Wind, Drano Lake/Little White Salmon, Hood River, Klickitat, Yakima, Umatilla, Snake River	99,300	73,101	0.74
Summer Chinook	Upper Columbia	36,340	34,619	0.95

Columbia River Fall Chinook 2019 Forecasts Relative to 2018

	Stock Group	Return Area	2018 Returns	2019 Forecast
LRH	Lower River Hatchery (tules)	Grays, Eloch, Cowlitz, Toutle, Coweeman, Kalama, Wash	50,400	54,500
LRW	Lower River Wild	Lewis River brights	8,300	13,700
URB	Upriver Bright	Hanford, Snake	149,000	159,200
ВРН	Bonneville Pool Hatchery (tules)	Spring Creek Hatchery	28,900	46,000
PUB	Pool Brights	Brights above Bonn	36,000	56,700
SAB	SAFE Brights	Oregon areas	4,100	3,100

Columbia River:

Management Along the Migration

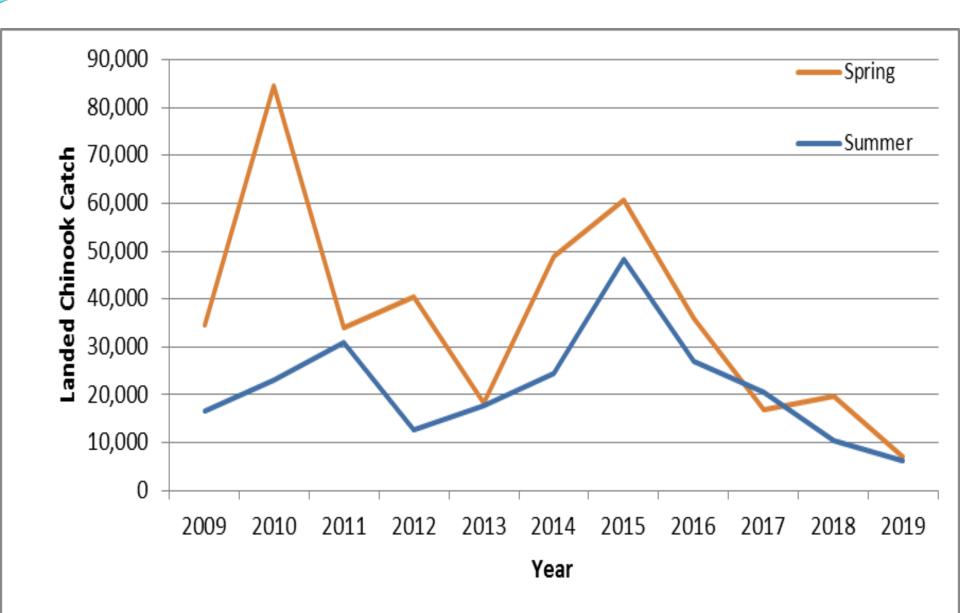
- Summer Management Period
 - 2019 forecast was for 36,340 adult summer Chinook at Columbia River mouth
 - Actual run was 34,619 (lowest adult run since 2007, lowest jack return since 1999) and 6,521 jacks
 - 2020 pre-season forecast is 38,300 (third lowest run since 2000)
- Fisheries:
 - Chinook catches managed in-season according to total allowed catch limit (impacts from NT PFMC ocean fisheries are included for abundance and fish available for in-river non-treaty fisheries).

Columbia River:

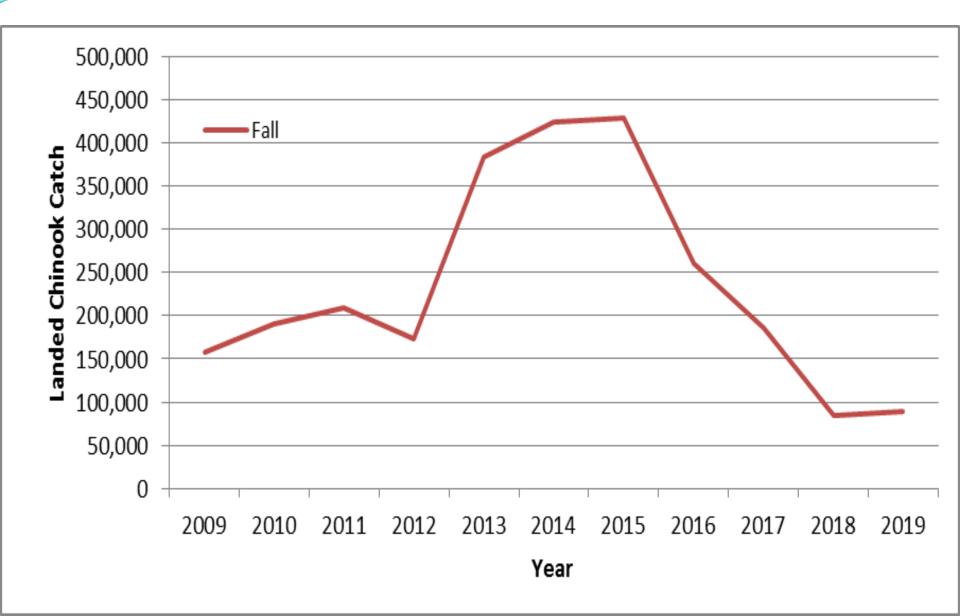
Management Along the Migration

- Fall Management Period
 - 2019 forecast was for 159,200 Upriver Bright (URB) Fall Chinook
 - Preliminary URB run size was 182,000 adults (114% of forecast
 - >50,000 jack fall Chinook passed Bonneville Dam
 - 25,700 tule-stock Chinook
 - Outlook for fall chinook returns in 2020 is similar to this year
- Fisheries:
 - Fall season fisheries mainly constrained by listed Snake River fall Chinook, upriver summer steelhead, and listed lower Columbia tule fall Chinook
 - E.g., Treaty fisheries closed early October; Non-treaty closure of steelhead retention and fall chinook fishery for URB allocation.

2009-19 Harvest: All Fisheries



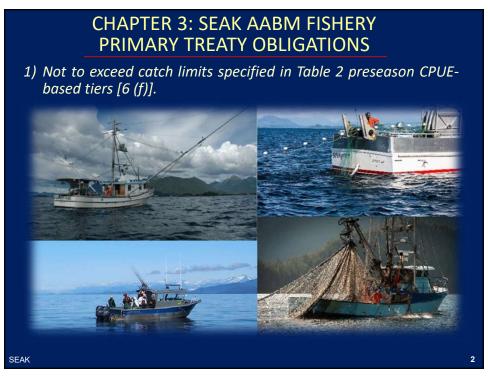
2009-19 Harvest: All Fisheries



Conclusions

- SUS fisheries limited by conservation of weak stocks
- Sampling and management are intensive to be as precise as possible to allow for fishing opportunity in the face of:
 - Freshwater habitat loss
 - Climate change and diminished/more erratic marine survival
 - Forecast and preseason model imprecision





CHAPTER 3: SEAK AABM FISHERY PRIMARY TREATY OBLIGATIONS

- 2) Manage SEAK fisheries to achieve agreed escapement objectives for 6 SEAK and TBR Chinook stocks [6 (b)(iv)].
- 3) Payback any overages relative to the preseason AC the following year [6 (h)(i)]
- 4) Manage incidental mortality to not exceed 59,400 [4 (a) and (f)]



SEAK

3

2019 SEAK Winter CPUE

District 113 power troll harvest from statweeks 41–48

(Oct 11 - Nov 30)

- Catch = 709
- Effort = 210
- CPUE = 709/210 = 3.38
- Tier = 3
- Catch Limit = 140,323



SEAK

2019 Table 2 Catch Limits

CPUE-based Tier	Al-based Tier	Catch Limit
Less than 2.0	Less than 0.875	Commission Determination
2.0 to less than 2.6	Between 0.875 and 1.0	111,833
2.6 to less than 3.8	Between 1.005 and 1.2	140,323
3.8 to less than 6.0	Between 1.205 and 1.5	205,165
6.0 to less than 8.7	Between 1.505 and 1.8	266,585
8.7 to less than 20.5	Between 1.805 and 2.2	334,465
20.5 and greater	Greater than 2.2	372,921
EAK		

Winter Troll Management

- Guideline harvest limit = 45,000 non-AK hatchery-produced fish
- Season length = Oct 11 April 30 or until GHL reached



In 2019, fishery was closed on March 16 (~6 weeks early), prior to reaching the GHL to conserve SEAK/TBR wild stocks.

SEA

7

7

2019 ADF&G Preseason Management Directives

- 1. Manage to 98% of allowable catch to avoid payback provision in 2020
- 2. Conservatively manage fisheries based on production concerns for SEAK and TBR stocks



SEAK

2019 Management Actions to Conserve Wild Stocks

COMMERCIAL FISHERIES:

- ✓ All TBR 'directed' fisheries: (Stikine & Taku rivers) remained closed
- ✓ Spring troll: May & June restricted to outer coast and/or near hatchery release sites; all inside waters outside terminal harvest areas closed.
- ✓ Delayed initial openings of Chinook terminal harvest areas
- ✓ Summer troll: All waters of District 8 (adjacent to terminus of Stikine River) and select areas of District 1 (migration corridors for Unuk River) closed to retention during 1st summer Chinook opening, July 1-5.
- ✓ Purse seine: delayed Chinook retention outside terminal harvest areas until July 20, limited to two 15-hour and one 39-hour retention periods for season
- ✓ Drift gillnet: delayed openings, reduced area, and mesh restrictions were implemented.

SEAK

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2019 Management Actions to Conserve Wild Stocks

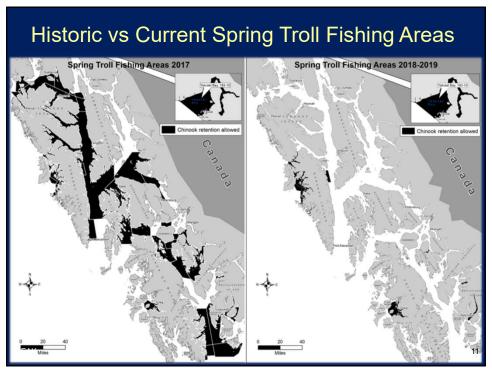
• SPORT FISHERIES:

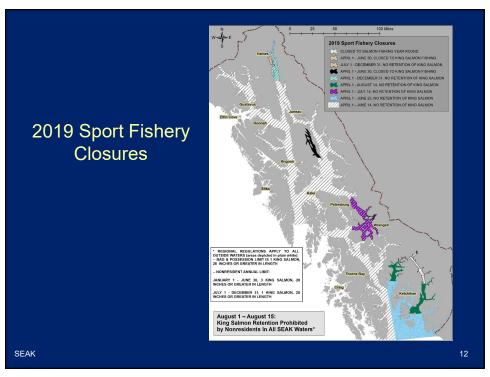
✓ Waters of the inside sport fishery outside terminal harvest areas were closed to retention April 1–June 14, extending through July 14 in the Petersburg/Wrangell area, through August 14 in the Ketchikan areas, and through Dec. 31 in the Upper Lynn Canal area.

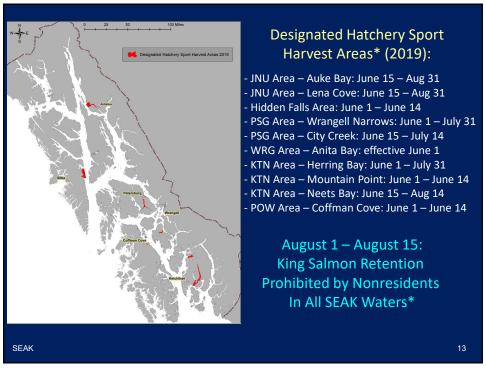
• SUBSISTENCE AND PERSONAL USE FISHERIES:

- ✓ Chilkat River: Delayed opening Chilkat Inlet Chinook fishery from June 15 to
 July 19, reduced area when opened July 20. Chilkat inriver fishery closed
 June 15-July 31, with exception of small area which opened 4-days/week.
- ✓ Taku River personal use fishery delayed two weeks, opened July 15.
- ✓ Stikine River: directed Chinook subsistence fishery closed, general subsistence fishery delayed until June 21.

SEAK



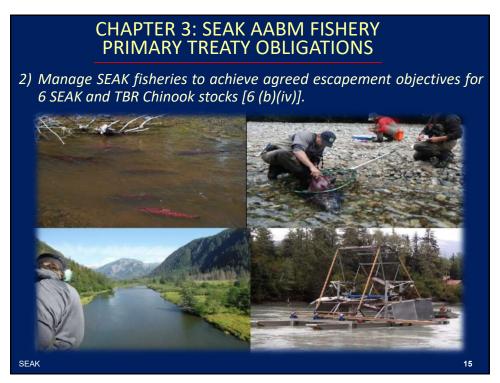


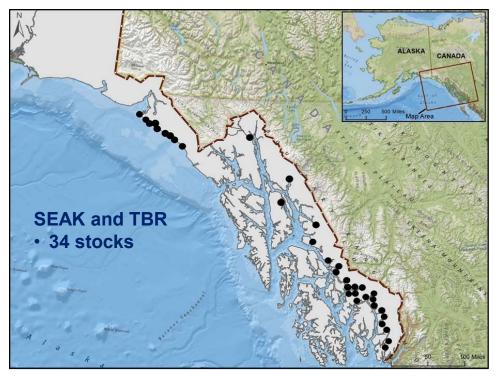


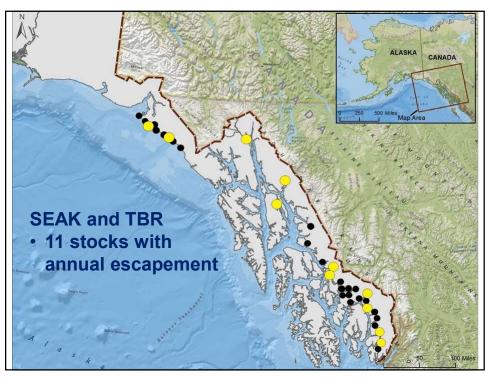
Summer Troll Management

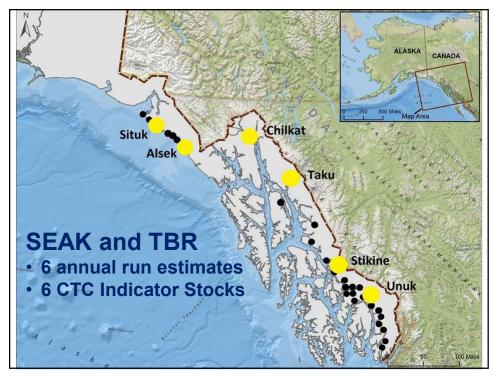
- Traditionally summer troll Chinook fishery limited to two retention periods.
- ➤ If the number of Chinook remaining on annual troll treaty allocation following the 2nd summer retention period is not sufficient to prosecute a competitive fishery, a "limited harvest" fishery may open.
 - In 2019 a 3rd, allocated/non-competitive, "limited harvest"
 Chinook fishery opened for 10-days, from Sept 1-10.
 - Permit holders were allowed to harvest a maximum of two Chinook over the 10-day fishing period.

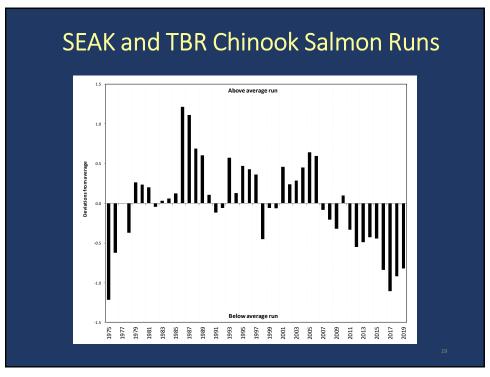
SEAK











SEAK and TBR Chinook Escapements

	Escapem	ent goal												Percent
Year	Lower	Upper	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	ma de
Situk	500	1,000	902	197	240	322	912	475	174	329	1,187	420	623	36%
Alsek	3,500	5,300	6,239	9,526	6,850	3,027	4,992	3,357	5,697	2,514	1,762	4,312	6,364	64%
Chilkat	1,750	3,500	4,406	1,797	2,674	1,723	1,719	1,529	2,452	1,380	1,173	873	2,028	45%
Taku	19,000	36,000	22,761	28,769	27,523	19,538	18,002	23,532	28,827	12,381	8,214	7,271	11,558	55%
Stikine	14,000	28,000	12,803	15,116	14,482	22,327	16,783	24,366	21,597	10,554	7,206	8,344	13,629	55%
Unuk	1,800	3,800	3,157	3,835	3,195	956	1,135	1,691	2,623	1,463	1,203	1,971	3,115	55%
	Per	cent made	83%	83%	83%	33%	50%	33%	83%	0%	17%	33%	67%	

- Poor production since 2012
- Most escapement goals not achieved 2016-2018
- Most escapement goals achieved in 2019 owing to restrictive management measures

SEAK and TBR Chinook Harvest Rates

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Situk	34.5%	48.9%	3.1%	22.0%	29.3%	7.4%	10.3%	3.0%	3.0%	0.5%	0.0%	17.5%
Alsek	16.2%	6.3%	10.5%	22.8%	10.0%	25.4%	6.2%	8.4%	10.2%	2.0%	1.4%	10.2%
Chilkat	10.0%	38.2%	26.8%	33.9%	18.6%	38.6%	18.2%	10.2%	11.5%	12.3%	4.5%	21.3%
Taku	40.8%	27.4%	22.6%	30.3%	15.0%	19.7%	14.6%	24.1%	12.0%	1.2%	3.3%	23.1%
Stikine	36.6%	36.4%	37.2%	32.4%	29.1%	22.5%	25.7%	36.3%	20.4%	2.1%	5.5%	28.2%
Unuk	26.4%	29.1%	31.8%	71.1%	55.9%	44.3%	56.3%	48.1%	29.7%	30.6%	15.8%	39.7%

- Harvest rates peaked in 2012 ranging 22% to 71%
- · Restrictive management measures beginning in 2017
- Harvest rates decreased beginning in 2017
- · Lowest harvest rates on record in 2019
 - Unuk decreased from 71% (2012) to 16% (2019)
 - Taku/Stikine decreased from 38-41% (2009) to 1-2% (2018)
 - Situk decreased from 49% (2010) to zero (2019)

21

21

2019 Season Summary

- Lowest SEAK/TBR Chinook production on record
- SEAK fisheries management was conservative
 - Restrictive measures to protect SEAK/TBR wild stocks
 - Managed to 98% of the allowable catch
 - Actual Treaty catch was below the preseason allowable catch
- TBR management actions were a cooperative effort by the U.S. and Canada
 - Most conservative measures since mid-80s
 - Resulting harvest rates were the lowest on record
- 2020 forecasts are for continued poor production
 - 3 of 5 forecasts are for runs less than the escapement goal

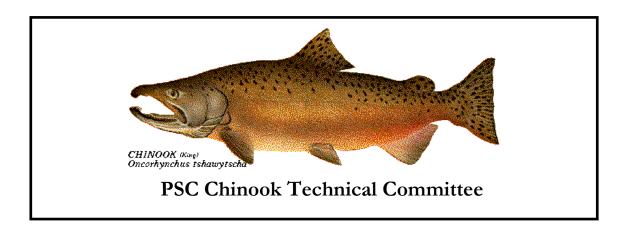


CIG Report to Commission

Tables 1 and 2 and Appendix C have been revised by the CTC consistent with the new Chapter 3 adopted by the Parties in 2019. These are supported as the final versions and recommended to the Commission to be included in the agreement.

- 1) **CIG membership**. It is intended to continue 3 participants from each Party. There is no intention to enlarge the group; however, the participants agree that others may sit in and be consulted by the CIG members during the meeting.
- 2) CTC membership. The CIG exchanged information on the current changes for Canada and the United States; however, succession planning for the CTC was identified as a key matter. CIG proposes to the Commission that Succession Planning become an annual agenda item, aligned with the review of the workplan. CIG members will bring succession plans, as may be available from the Management Entities, and issues to the table. The CIG will review the succession updates each year with the CTC workplan.
- 3) Okanagan workplan. The document is being edited by the work group to address CIG concerns: to further clarify and separate immediate tasks and better align with the group's October report. This report would return to CIG if possible this week or in February for recommendation to the Commission.
- 4) **CTC workplan**. The CIG recommends the CTC workplan with the following instructions.
 - a. Ensure <u>CYER workplan items are integrated</u> into the relevant CTC workplan items.
 - b. Ad Hoc Tasks Priorities: 1. timely documentation, 2. standards for IM data,
 3. CYER projects linked to the CTC. Recognition that the MSF algorithms work will begin late spring 2020

- c. <u>Incidental Mortality task</u> The CIG recommends that the CTC Jan 14, 2020 memo "CTC response on incidental mortality standards assignment" be adopted by the Commission (attached).
 - The task timelines notify the Commission that the February 2020 deadline to develop standards will need to be delayed.
 - Task 1 by February review literature and report to CIG
 - Task 2 develop the standards anticipated by the end of 2020.
 - A question was raised and remains outstanding about if and how standards may be applied to past and future data. This will be addressed after task 1 and 2.
- 5) **CYER workgroup and status with respect to CTC**. This item is a concern and will be added to the February CIG agenda and is being actively discussed within the national sections.
- 6) **CEII and CWT work group**. CIG requests that the Secretariat send to CIG chairs templates of the CWTIT and Sentinel Stock groups to determine any guidance for the formation of this work group. This will be discussed in February. Tools will be considered for the work of the group.
- 7) **MSF fund procedures**. This item has not been discussed in this session. It is delayed to the February agenda.



CHINOOK TECHNICAL COMMITTEE WORK PLAN 2019-2020

<u>Panel / Committee:</u> The Chinook Technical Committee reports to the Pacific Salmon Commission.

Date: October 15-18, 2019

<u>Update on Bi-lateral Tasks Assigned Under Current PSC Agreement:</u>

CTC Work Plan Tasks Assigned for 2019

1. 2019 Annual Tasks

- 2019 Chinook exploitation rate analysis (ERA) *Completed*
- 2019 Chinook model calibration *Completed*
- 2019 Catch and Escapement (C&E) report Completed
- 2018 Calibration and Exploitation Rate Analysis (CLB&ER) report *Nearing completion*
- 2019 Calibration and Exploitation Rate Analysis (CLB&ER) report *In Progress*

2. 2019 Ad Hoc Tasks

- Phase 2 of the base period recalibration of the PSC Chinook Model *Complete, pending Commission adoption*
- Documentation of the Phase 2 base period recalibration *In progress*
- Translation of Tables 1 and 2 for use with the Phase 2 model—*Pending Commission adoption*
- Investigation and implementation of mark-selective fishery algorithms in the annual exploitation rate analysis *In Progress*
- Escapement goals presented for review and acceptance will be evaluated by the CTC *None have been brought forward for review*
- Testing and validation of the DGM *In Progress*

- Selection of maturation rate and environmental variable (EV) assumptions for use in the Phase 2 model projections *Completed*.
- Review of tasks, analyses, and assignments contained in Appendix A of the 2019 PST Agreement Completed; the CTC developed an implementation plan and submitted it to the Commission in January 2019.

CTC Work Plan Tasks Proposed for 2020 – see Appendix I – Updated CTC Implementation Plan.

1. Legacy Annual Tasks

- 2020 Chinook exploitation rate analysis (ERA) *Planned for February and March.*
- 2020 Chinook Model Calibration *Planned for March*.
- 2020 Catch and Escapement (C&E) report Anticipated completion in June
- 2020 Calibration and Exploitation Rate Analysis (CLB&ER) report *Anticipated initiation in June*.
- 2018 and 2019 Calibration and Exploitation Rate Analysis (CLB&ER) reports *Anticipated completion in February (2018 report) and April (2019 report).*

2. New Annual Tasks

- Report stock-specific MSF impacts, starting 2020 *Pending development and implementation of MSF algorithms*.
- Summarize CEII and CWT&R programs, starting 2020 Deferred; work on this task cannot occur until funding is secured for the CEII and CWT&R programs.
- Report on IMs Planned for June 2020; the CTC will report annually on IMs in the catch and escapement report, and if necessary, evaluate the causes of significant changes in rates or patterns.
- Report data underlying the hatchery add-on calculations *Planned for June 2020; the CTC will provide a summary of information used to determine the allowable exclusion or hatchery add-on, in the annual catch and escapement report.*

3. Ad-hoc Tasks

- Restructuring of Annual Reports – In Progress; the CTC is working to (1) restructure existing annual reports to align with new reporting requirements specified in the 2019 PST Agreement; (2) to develop a new summary annual report; and (3) to automate generation of tables and figures where possible to increase the efficiency of report production and reduce the time consumed each year by the CTC. The CTC has formed workgroups to address these tasks. This may require additional resources in the near term to meet CTC obligations under the new PST Agreement.

- Completion and documentation of Phase 2 base period calibration (BPC) of the PSC Chinook Model – In progress; the CTC-AWG+ will meet in December to work on documentation.
- Documentation of Selection of Maturation Rate and Environmental Variable (EV) Assumptions for Use in the Phase 2 Model Projections *In Progress; the purpose of this task is to document an analysis that arose in 2019 as part of the Phase 2 base period calibration process.*
- Standards for IM data In Progress; the CTC has formed an IM Standards workgroup. This workgroup will meet in December, January, and February. This task is scheduled for completion in February 2020.
- Investigate and implement MSF algorithms in the annual ERA In Progress; this task is a carry-over from the 2019 Workplan, and is a necessary precursor to Appendix A, task 1 (g). The CTC-AWG met with SFEC-AWG in June 2019 to begin developing methods for incorporating MSF algorithms into the exploitation rate analysis. This meeting was productive and the CTC sees value in an additional joint meeting between the two groups in 2020, in either May or October. Because of competing priorities and heavy workloads, work will not resume on this task until late spring 2020.
- Implementation of CYERs *Pending*;
 - Appendix A tasks the CTC to develop data standards for the application of CYER as metric; this work will begin in 2020 with anticipated completion in 2021.
 - Appendix A also tasks the CTC to describe any adjustments of terminal fishery impacts for exploitation rate indicator stocks; the CTC understands this is a priority and intends to initiate work following the annual model calibration.
 - Additionally, the Ad-hoc Workgroup on Calendar Year Exploitation Rates submitted a report to the CIG on September 12, 2019 that contained several recommendations that will require CTC involvement pending Commission direction.
- Complete Data Generation Model *In Progress; the CTC is currently gaining familiarity with the software, parameterizing inputs, and producing and evaluating output.*
- Escapement goals presented for review and acceptance will be evaluated by the CTC While none were brought forward in 2019, the CTC anticipates that agencies may submit goals for review in 2020.

Obstacles to Completing above Bi-lateral Tasks:

Loss of Experienced Membership

The CTC has recently experienced many retirements and departures of long-standing members with substantial institutional knowledge. These include Larrie LaVoy, Marianna Alexandersdottir; John H Clark, Robert Clark, and Robert Kope. This trend is expected to continue with the imminent departure of Gayle Brown, Dawn Lewis, and Richard Bailey. While the CTC continues to be comprised of talented members, there is a concern for loss of institutional knowledge and expertise. These losses are anticipated to delay some annual tasks and anticipated tasks within the new agreement.

Time Constraints

As in previous years, the primary obstacle is the amount of time and effort required to complete the large number of tasks assigned to the CTC under the 2019 agreement and the technical complexity of those tasks. Although the formation of smaller CTC workgroups to address individual assignments creates some efficiency, the necessity of assigning CTC members to multiple workgroups creates bottlenecks.

Funding Constraints

Meeting costs have the potential to impact the CTC's ability to complete the ERA, PSC Chinook Model calibration, and annual reporting and anticipated tasks within the new agreement.

Policy Issues

The CTC anticipates several new policy issues may emerge with the implementation of the new 2019 PST Agreement.

Outline of Other Panel / Committee Tasks or Emerging Issues:

Highlight issues that have significance to the Treaty and that may have to be considered by this Panel/Committee in future work plans.

<u>Potential Issues for Commissioners, including enhancement activities reported under Article V:</u>

Succession Planning and Training

2019 follows 2018 as another year with retirements of senior CTC members and more departures are expected in 2020. A transition plan to train new CTC members and transfer knowledge and expertise is needed to maintain understanding of the PST management framework for Chinook salmon and of the tools used to implement it. Severe time constraints imposed by ongoing work often interfere with this important activity. Succession planning is another task that needs to be an explicit element of the CTC workplan.

The CTC has identified some activities to improve transfer of knowledge and responsibilities to new CTC members. These would contribute to succession planning and are outlined below:

- 1. Improve documentation of the quantitative methods, data and host of computer programs employed by the CTC as existing documentation is incomplete or out-of-date.
 - A proposal has been submitted to the NEF and SEF by PSC staff and CTC cochairs to support CTC programming needs and production of documentation is an element of the proposal.
- 2. Increase the efficiency of report production and reduce the time consumed each year by the CTC.
 - The CTC is exploring ways to streamline and automate annual reports, by building on recent CoTC experience and new server capacity made available by the PSC.
- 3. Complete projects currently underway that are aimed at greatly increasing efficiencies in annual work and in carrying out special investigations (i.e., CIS database, ForecastR, and the DGM).

- Support provided by the Commission through dedicated assistance by Mark MacMillan, the new PSC database programmer hired in May 2018 for a 2-year term, has already enabled significant progress toward completion of the CIS database.
- 4. Look for training opportunities that could improve the functioning of the CTC and the ability to make the most of time spent in meetings.
 - The course being offered to PSC committee chairs on running successful meetings is an example of a training opportunity that would be useful to make available to all CTC members.
- 5. Develop an easily accessible description of the PST Chinook management framework, its history and key elements.
 - A plan for development of such a document is not known by the CTC. Has the Commission considered the need for this project?

Development of New Tools

The model currently used by the CTC was initially developed about 30 years ago and relies on base period data that is nearly 40 years old. Chinook populations are experiencing changes in life-history parameters, stock distributions, productivity, and increased environmental variability resulting in degraded performance of the current model. Some of the recently appointed CTC members bring with them skills with innovative analytical tools and applications that could potentially improve the management of Chinook fisheries. The CTC will encourage the development and evaluation of alternative tools and management strategies that may offer better performance than the current management regime.

Development of a Research and Development Team

Given the changing environment and duration of the PST, the modeling approaches used by the CTC need to be continuously tested, updated and new methods (such as MSE) may need to be developed. Ideally, the CTC would like to find time for some members to explore and test new techniques to improve the current methods. This research effort is necessary to ensure better understanding of Chinook populations and that management outcomes are based on the best available science and technology.

Documentation

Due to tight timelines for producing yearly analyses and reports the CTC has been remiss in the past in adequately documenting new computer programs and analyses as well as changes to existing programs and analyses. This has slowed the progress of developing new tools and techniques due to the necessity of retracing our steps to identify the current algorithms in use. The CTC will endeavor to make documentation higher priority going forward.

Potential Issues for Committee on Scientific Cooperation

The CTC has identified two areas where assistance from the Committee on Scientific Cooperation would be beneficial:

Under the 2009 PST the CTC has observed an increase in the magnitude of error in the
preseason abundance forecasts produced by the PSC Coast Wide Chinook Model
compared to the postseason estimates. Recent studies and presentations at workshops
have provided evidence of various types of demographic changes in Chinook populations

such as declining mean size at age, increasing mean maturation rates, and even decreasing fecundity at age in females. A review of the accumulating evidence for these types of population level changes, the geographic extent of such changes, the occurrence of discernible trends, the possible causal factors such as long-term environmental changes and their influence on output from management models would be helpful to the CTC. The ability of the Chinook Model to generate accurate abundance forecasts is tied to algorithms that generate age compositions of fish vulnerable, by size, in fisheries. It is crucial to understand whether historical methods can no longer be expected to work as they once did and whether alternative methods must be developed or new approaches to generating inputs to forecasting procedures are needed.

2. The PSC should consider establishing a coastwide, multi-species forum under the oversight of the Committee on Scientific Cooperation to share developments and advice regarding adaptation of Pacific salmon management approaches to environmental change. There is strong evidence that environmental change is occurring and accelerating to a degree such that past experience cannot be expected to serve as a reliable basis to forecast the future. Increases in uncertainty, variability and directional change are expected to alter hydrologic, precipitation, temperature and growth patterns which, in turn, are likely to affect the survival, productivity, abundance, distribution, and migration patterns of Pacific salmon. The forum should provide reporting of significant developments in the knowledge base as well as vetting of recommendations for monitoring and reporting systems, and potential adaptation strategies.

Proposed Meeting Dates and Draft Agendas:

Additional CTC meetings may be required, depending on the number and scope of additional tasks assigned.

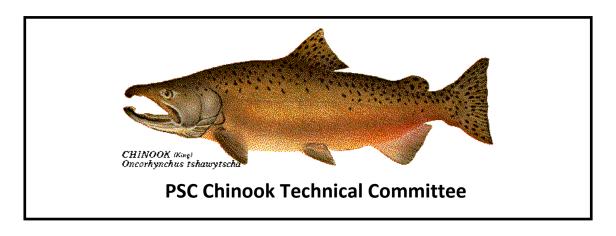
Meeting	Dates	Location	Meeting Objectives
2019			
PSC Fall Session	Oct 15-18	Spokane, WA	CTC co-chairs attend
US CTC LOA	Dec 3-4	Portland, OR	LOA project presentations, RFP
CTC-AWG+	Dec 4-6	Portland, OR	BPC Documentation; IM Standards
2020			
PSC Post-season	Jan 13-17	Portland, OR	IM Standards; Clb & ERA
PSC Annual	Feb 18-21	Vancouver, BC	IM Standards; report restructuring; ERA
CTC-AWG	Feb 21-27	Vancouver, BC	ERA
CTC-AWG	Mar 16-20	Seattle, WA	Model Calibration
CTC Bilateral	Apr 20-24	Olympia, WA	C&E report restructuring; CYERs
CTC -AWG+/SFEC?	May 10-15	Juneau, AK	2 nd model clb; MSFs, coding ERA in R
CTC Bilateral	Jun 1-5	Bend, OR	C&E CYERs; Clb&ER report; CYERs;
			IM changes; hatchery addon
CTC Bilateral	Sept 21-25	Kelowna, BC	Clb&ER report; Workplan;
CTC-AWG/SFEC?	Oct 5-9	Seattle, WA	MSFs, coding Coshak in R
US CTC-LOA	Dec 1-2	Portland, OR	LOA project presentations, RFP
PSC Fall Session	Oct 19-22	Vancouver, BC	CTC co-chairs attend

Status of Technical or Annual Reports:

The 2019 C&E report is complete. The 2018 and 2019 CLB&ER report will be completed in 2020. Obstacles to completing annual reports in a timely manner include workloads, competing priorities, and changeover in CTC membership. An additional obstacle for 2020 reports is the need to incorporate new reporting requirements associated with the 2019 PST Agreement.

Comments:

The CTC has assessed tasks listed in Appendix A of Annex IV, Chapter 3 of the recently completed 2019 PST Agreement to assess timelines and workload. The updated CTC Implementation Plan (Attachment I) represents the CTC's understanding of the timeline for completion of the CTC tasks identified in Appendix A.



CHAPTER 3 IMPLEMENTATION PLAN 2019-2028

The CTC has organized the Chapter 3 Appendix A tasks into 4 categories: legacy annual tasks, new annual tasks, ad-hoc tasks, and conditional tasks. A 10-year plan is also provided.

1. Legacy Annual Tasks.

The CTC will discuss changes to the structure of annual reports to reflect new obligations in the 2019 PST Agreement. We will also strive to reduce the size of annual reports, improve readability, and explore strategies to expedite production.

Арр А	Task	When
9	Report fishery performance at Annual Meeting	Feb
1(h), 8, 6	Provide annual calibration, post-season Als, pre-season	1 Apr
	comparisons, and catch deviations for AABM fisheries	
1(b), 3(a),	Report on catches, terminal exclusions, hatchery add-ons, HRIs, IMs,	June
3(b)	and ERs	
4, 11	Evaluate ISBM fishery performance, and starting in 2023, CYER	
	average, and overages	
1(c)	Report escapements and evaluate stock status	

2. New Annual Tasks

A	рр А	Task	When
1	L(g)	Report stock-specific MSF impacts, starting 2020	May
1	1(i)	Summarize CEII and CWT&R programs, starting 2020	June
3	3(c)	Describe the causes of significant changes in IMs	June
	7	Report data underlying the hatchery add-on calculations	June

3. Ad-hoc Tasks

Арр А	Task	When
14	Complete BPC Phase 2	Feb 2019
2	Standards for IM data	Feb 2020
5	Complete Data Generation Model	2020
5	Evaluate alternative metrics for ISBM	2021
	Investigate and implement MSF algorithms in the annual ERA*	2020

Арр А	Task	When
	Evaluate representativeness of CWT indicator stocks of	
	wild/hatchery stocks they are intended to represent*	
5	Procedures to adjust CYERS for MSFs by 2021. Add to Annual Report.	2021
5	Describe adjustments of terminal fishery impacts for ER stocks	2021
13	Draft outline for 5-year review	Jan 2023
14	Complete BPC Phase 3	2023
1(e)	Recommend standards for the minimum assessment program	TBD
	required to effectively implement Chapter 3	
1(f)	Recommend research 3(c), 7, and associated costs, to improve	TBD
	implementation of Chapter	

^{*} Workplan tasks not included in App. A.

4. Conditional Tasks

Арр А	Task
11(b)	If ISBM overage, provide plan to improve performance in meeting objectives
10(b)	If AABM overage, provide plan to improve performance in meeting objectives
1(a)	ID concerns with Chapter or effectiveness of actions in reaching objectives, as requested
1(d)	Evaluate, review or recommend escapement objectives; as requested
12	Up to 2 review(s) of CPUE based approach, if requested

10-Year Implementation Plan:

The CTC has made a preliminary assessment of tasks listed in Appendix A of Annex IV, Chapter 3 of the recently completed 2019 PST Agreement to assess timelines and workload. The table following on the next page is the CTC's understanding of the timeline for completion of CTC tasks identified in Appendix A.

Аррх	Task	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
9	Report to PSC @ Annual meeting on (a) and (b) AABM performance, (c) recommendations for minimizing deviations between pre- and post-season fishery limits, and (d) status towards achieving stock-specific management objectives.	Feb									
1 (h)	Provide annual calibrations of the Chinook model with preseason and post-season abundance indexes by April 1 of each year;	1-Apr									
8	Provide the first post-season AI estimates for AABM fisheries using the Chinook model and compare (a) CPUE-based tiers for SEAK and (b) AIs for NBC and WCVI AABM fisheries	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
6	Determine annually if deviations have occurred between the observed catches and both the pre-season and post-season allowable catches for the SEAK, NBC, and WCVI AABM Treaty Chinook catches.	х	х	х	х	Х	х	х	Х	x	х
1(b)	Report annually on catches, terminal exclusions, hatchery add-ons, harvest rate indices, estimates of incidental mortality, and exploitation rates that apply best available information to account for MSF impacts for all Chinook fisheries and stocks harvested within the Treaty area;	х	х	х	Х	Х	х	х	х	х	х
1(c)	Report annually on naturally spawning Chinook stocks in relation to the agreed MSY or other agreed biologically-based escapement objectives, rebuilding exploitation rate objectives, or other metrics and evaluate trends in the status of stocks and report on progress in the rebuilding of naturally spawning Chinook stocks;	х	х	х	х	Х	х	х	х	х	х
1 (g)	Annual report on stock-specific MSF impacts		Х	Х	Х	Х	Х	Х	Х	Х	Х
1 (i)	Annual summary of CEII and CWT&R programs		Х	Х	Х	Х	Х	Х	Х	Х	Х
3 (a)	An evaluation of estimates of encounters and incidental mortalities in all fisheries subject to this Treaty;	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
3 (b)	Post-season estimates of incidental mortality that includes incidental mortality from MSF, and total mortality; and	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
3 (c)	Description of the causes (if identifiable) of significant changes in rates or patterns of incidental mortalities in fisheries relative to paragraph 4(a) and 4(f) of this Chapter for AABM fisheries (1999-2016) and paragraph 5 of this Chapter	Х	Х	Х	x	X	Х	Х	х	x	x

Аррх	Task	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	for ISBM fisheries (1999-2015).										
4	Evaluate the ISBM fishery performance relative to the obligations set forth in paragraph 5 of this Chapter and report annually to the Commission.	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
7	Provide detailed information concerning any catches of Chinook associated with paragraphs 6(i) and 6(j), and a summary of information used to determine the allowable exclusion or hatchery add-on, in the annual catch and escapement report.	X	х	х	х	X	х	х	х	х	х
11	For ISBM fisheries, the CTC shall annually compute and report metrics described in paragraph 5 (a) and	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
11	Provide 3-year running avg for CYERs and evaluate performance (by 2023)				TBD	х	х	Х	Х	х	Х
11 (b)	If ISBM overage, shall provide to the Commission a plan to improve the performance of pre-season, in-season and other management tools so that the deviations between the CYERs and the CYER limits are narrowed to a maximum level of 10% when limits apply (Attachment I)				TBD						
10 (b)	If AABM fisheries have overages for 2 consecutive years, the CTC shall recommend to the Commission a plan to improve the performance of pre-season, in-season and other management tools so that the deviations between catches and post-season fishery limits to AABM fisheries are narrowed to a maximum level of 10%.	TBD									
14	Complete BPC Phase II by February 2019	Feb									
14	Complete BPC Phase III by 2023	Х	Х	Х	Х	Х					
2	Standards for the desired level of precision and accuracy of data required to estimate IM		Feb								
5	Complete the Data Generation Model Complete evaluation of alternative metrics for the evaluation of ISBM fisheries Develop data standards for the application of CYER as metric		X	X							
	Description of procedures used to adjust CYERS in order to capture MSFs (by 2021). Add to Annual Report.			Х							

Appx A	Task	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Describe any adjustments of terminal fishery impacts for the exploitation rate indicator stock			Х							
13	By January 2023, develop a draft outline for a five-year review to evaluate the effectiveness of harvest reduction measures that are taken for AABM and ISBM fisheries				Х						
1 (a)(i)	Upon request, ID concerns with consistency in Chapter.	TBD									
1 (a)(ii)	Upon request, ID concerns on the effectiveness of the actions in attaining the specified objectives.	TBD									
1 (d)	Evaluate and review existing escapement objectives; when requested, recommend goals	TBD									
1 (e)	Recommend standards for the minimum assessment program required to effectively implement Chapter	TBD									
1 (f)	Recommend research projects, and associated costs, to improve implementation of Chapter	TBD									
12	Up to 2 review(s) of CPUE based approach, if requested	TBD									

<u>Report from the Fraser Strategic Review Committee (FSRC) on In-River Assessment</u> of Fraser River Sockeye and Pink

Members: P. Sprout, R. Allen, K. Hughes, & B. Riddell (L. Loomis participated)

A. FSRC charge from the PSC:

On February 14, 2013, the Commission tasked the Fraser Strategic Review Committee (FSRC) to provide advice on potential modifications to the hydro-acoustic operations in the lower Fraser River based on the following:

- Clarification of in-river assessment objectives.
- Review of technological options¹ (alternative or complementary) for providing accurate, precise and timely information to satisfy obligations under the *Pacific Salmon Treaty*.
- Effectiveness and affordability related to levels of risk tolerance and objectives.

The FSRC was to examine alternative hydro-acoustic monitoring configurations for the Mission Bridge and Qualark Creek locations – both as independent and as complementary operations, as well as other assessment methodologies. The examination was to include:

- a) Clarification of the fisheries management objectives for lower Fraser River in-river assessment.
- b) Evaluation of configurations at the two existing hydro-acoustic locations, as well as new alternatives or additions, in terms of whether they meet fisheries management objectives, value for money, bilateral management application, and the appropriate distribution of funding responsibilities as may be applicable.

The FSRC was to provide recommendations for the next 5 to 10 years.

B. Fishery Management Objectives ... provided by the Fraser River Panel, May 8, 2015

The Fraser River Panel and its technical committee (May 8, 2015) provided the following comments on objectives required from a lower Fraser River assessment program and the linkages to in-season information.

- 1. The primary purpose of the lower Fraser River hydro-acoustic program(s) is to provide accurate and timely daily escapement estimates of Fraser sockeye and pink salmon in the most cost effective manner.
- 2. For sockeye, daily escapement estimates are required to be identified at the stock level (stock ID samples from associated test fisheries) to assist in meeting the management objectives for the four run-timing groups in the Fraser.

¹ The topic of new and/or alternative technologies was examined early in the FSRC process and did not identify any new opportunities. Both PSC and DFO already are using ARIS hydro-acoustic systems.

- Information at this level is required primarily to achieve identified escapement objectives for the run-timing groups as well as inclusion in the post season determination of the difference between the estimates otherwise known as the Management Adjustment.
- 3. This information must be available to the Fraser Panel in a timely manner in order to inform the decisions made regarding fisheries in marine and freshwater areas.

In order to develop the most efficient and cost effective hydro-acoustic program going forward, a thorough evaluation which explores all of the component parts of each existing program at Mission and Qualark is required. Among other elements this work should explore whether there are biases associated with the gillnet test fisheries used for stock and species composition that may be affecting the relative accuracies from the Mission and Qualark sites.

Canada and the United States must be able to identify the total allowable catch available for international sharing, for sockeye run-timing groups (Early Stuart, Early Summer, Summer runs, and Late sockeye) and pink salmon. This information must be provided in a timely way such that fish are still available to fisheries in US and Canadian marine waters.

C. Technical Reviews and Research

While there is no question that this review has taken much longer than the Commission likely expected, the technical staff in the Pacific Salmon Commission (Mission Bridge site) and the Department of Fisheries and Oceans (Qualark Creek site) have done extraordinary work to improve assessments, undertake evaluations of each site, and greatly improve the collaboration amongst investigators. Since 2015, evaluations have continuously improved their understanding of each hydro-acoustic site.²

Following from these studies, the FSRC has prepared a summary table (below) of the Pro's and Cons of the Mission Bridge and Qualark Creek sites. We note though that the Hydroacoustics Review Technical Summary provided by the Pacific Salmon Commission and the Fraser River Panel (August 2017, Section 5.8, pg. 18) concluded that "Qualark alone would not be an acceptable hydro-acoustics configuration due to missing sockeye stocks, inability to assess pinks, and delay in in-season management decisions, and that continued work should fund only Mission." However, this Committee recommends that if methods are developed to:

- i) compensate for the time delay between Mission and Qualark (2-3 days difference), and
- ii) to account for stocks and species not assessed at Qualark, and
- iii) the uncertainty of the estimates at Qualark are comparable to that currently provided by Mission;

² Conrad, B., A. Dufault, M. Hawkshaw, A. Huang, E. Jenkins, C. Lagasse, M. Lapointe, M. Litz, F. Martens, C. Michielsens, J. Scroggie, M. Staley, T. Whitehouse, C. Wor, and Y. Xie. 2019. Hydroacoustics Review Technical Summary. Pacific Salmon Comm. Tech. Rep. No. 41

then a transition to Qualark as the PSC's in-river acoustic monitoring program should proceed. Evaluation of the methods developed would involve the Fraser Panel and Technical Committee.

	MISSION	QUALARK	COMMENTS
PROS	 Earlier in-season information for sockeye; by 2-3 days travel time for sockeye to Qualark. Lower river sockeye stocks are included in fish counts (Harrison, Chilliwack, Birkenhead) Pink salmon escapement monitoring but no verification conducted todate. Longer historical time series than Qualark but consistent hydro-acoustic configuration from 2010 to present. 	 A preferred acoustic site compared to Mission, and is a confined space for test fish sampling. Considerably lower cost to operate (~50% in materials provided). Less "interference" problems with pinks. Provides 'cross-check' information for annual sockeye escapements at Mission. Important in years where uncertainty is created by different abundance indications between marine test fisheries and Mission estimates. Provides additional data for management of upper river FN fisheries. 	Following extensive reviews and studies, and from a hydro acoustics perspective, Qualark is a preferred hydro-acoustic site to Mission.
CONS	 Very complex environment for hydro-acoustics and more susceptible to environmental change. Greater uncertainty of estimates than at Qualark. Approx. twice as costly to operate. Evidence of significant under- and over-estimation of recent Late-run sockeye returns in Adams dominant years, although not in 2018. Higher occurrences of direct interference from in-river fisheries than at Qualark due to the larger number of fisheries near/below Mission. 	 Information delay (2-3 days) compared to Mission site, continues to be a management concern; related to the timeliness of data to provide fishing opportunities for the Parties. Qualark requires additional data to assess sockeye stocks spawning between Mission and Qualark and pink salmon. 	An outcome of recent studies is that both sites are affected by in-river fisheries. Evidence at Qualark is that fish behaviour is impacted, but the ability to enumerate fish is not. This is less likely to be true at Mission. Continued lower river test fisheries and DNA sampling will address the lower river sockeye populations.

Based on the comparisons conducted it is apparent that both sites can provide very similar estimates of sockeye returns, as presented in Appendix 1 (which is an extension of Appendix 13, PSC Tech. Rept. 41). For the years 2008 – 2018, the average difference estimated between Mission and Qualark (for comparable periods) is less than 1% (since there have been positive and negative deviations) and annual absolute deviations average 10.5%. Further, the technical comparisons to-date have not revealed any consistent environmental factor contributing to the observed differences across years.

Consequently, when this Committee considers the stability (or repeatability) of configurations and use of direct counts, the relative affordability, and the stability of the hydro-acoustic sites over time and environmental conditions; we are in full agreement that the Qualark site is the preferred hydro-acoustic site. However, before the transition, we emphasize the two critical technical concerns identified on page 2:

- That accurate in-season assessment of the stocks of sockeye and pink salmon entering spawning areas between Mission and Qualark can be done without a facility at Mission, and
- ii) that a means (i.e. alternative technical techniques) to compensate for the 2-3 day time delay for assessment information within a season can be developed.

US members wished to emphasize the necessity of ensuring that these two concerns are fully investigated and demonstrable.

We are also of the opinion that the hydro-acoustic estimates that are provided today may be only a minor component of the uncertainties involved with in-season decision processes. Other sources of uncertainty for in-season management and fishery decisions including ocean test fisheries and run timing, in-river gillnet test fisheries ... accuracy of species composition (catchability of species), stock identification of sockeye, environmental adjustments (expected in-river losses), and in-river catches and accounting.

Recommendations for Commission Discussion

- 1) Decision processes for in-season management should consider all sources of uncertainty and timeliness of data. Over the next 3 years, establish a comprehensive in-season model to incorporate all sources of variation within a cumulative run-timing model. (These initiatives are similar to the contractor report, see Appendix 6 in PSC Tech. Rept. 41).
- 2) Over the next 3-5 years and after ensuring that the concerns noted above in (i) and (ii) have been addressed (i.e., accepted by the Panel and the Fraser technical committee), transition to Qualark Creek as the PSC's hydro-acoustic enumeration site.
- 3) Within the overall costs projected for enumeration, include an annual estimation program for Fraser River pink salmon including costing of radio-tagging applications using Qualark as the mark-sampling facility (as conducted in the past for sockeye salmon).
- 4) Examine the use of fixed-effort marine test fishing to provide timely information on inseason run-size and run-timing while fish remain in the fishing areas and still provide fishing

- opportunities for both Parties. And, depending on future funding availability, consider additional marine hydro-acoustics programs to compensate for the timeliness concern (item (ii) above).
- 5) The FSRC now recommends that the Fraser River Panel, the Fraser technical committee, and staff within the PSC be tasked to develop a comprehensive workplan/studies to address points (i) and (ii) above, and to commence examination of these investigations within 2020 (providing that adequate funds can be made available).

NOTES:

Costs: With consideration of transition to the Qualark Creek site, there would be a substantial cost savings³ (~50%) to the PSC that could be directed to pink salmon in-river assessment, financing marine test fisheries designed to compensate for the 2-3 day delay, improved sockeye stock identification, and sockeye migration under increasingly stressful thermal conditions.

Reported costs for comparison are (Appendix 8):

Mission Bridge site, Enhanced (2014 example, 104 days of operation) = \$750,272

Mission Bridge, Enhanced (Odd yr. Pinks, 104 days of operations) = \$753,657

Qualark Enhanced (late run sockeye or Pink year, 104 days operations) = \$335,224

Test fishing: Test fishing in the Fraser River and the subsequent application of DNA methods for stock identification are critical information sources used to allocate hydro-acoustic results to Fraser River species composition and stock origins. The Fraser River panel and advisory staff have completed a review of test fishing and their administration⁴. There is a need to continue these considerations within the overall in-season management process that incorporates all sources of data and uncertainties; as presented by C. Michielsens (May 2016 memo⁵ to FSRC).

³ Appendix 8 in the technical summary documents (Aug2017 docs.zip)

⁴ Nelitz, M., A. Hall, C. Michielsens, B. Connors, M. Lapointe, K. Forrest, and E. Jenkins. 2018. Summary of a Review of Fraser River Test Fisheries. Pacific Salmon Comm. Tech. Rep. No. 40: 155 p.

⁵ Evaluation of alternative hydro-acoustic estimates for in-season run size assessment of Fraser sockeye salmon.

Appendix 1. Comparison of hydro-acoustic estimates for sockeye salmon at Mission and Qualark sites, 2008 -2018. Data were provided by staff of the Pacific Salmon Commission (Mission) and by the Department of Fisheries and Oceans (Qualark). Sockeye spawning populations between Mission and Qualark include: Chilliwack, Cultus, Weaver, Harrison, and Birkenhead. In this table, and during the fishing season, the sockeye return to these systems is estimated through stock identification of sockeye sampled in test fisheries. The 'Qualark estimate' in this table is calculated as the Mission post-season estimate minus the catch between Mission and Qualark and then reduced by the estimated stock composition for the 5 stocks ('Difference' in this table). The Qualark counts during a comparable period (Mission dates plus 3 days) is then subtracted from the 'Qualark estimate' and this deviation is divided by the 'Qualark estimate'. For the Odd-years, periods dominated by pink salmon abundance are not used in the estimation of PEDs. For comparison only, the full count of sockeye at Qualark for each year is included, and the proportion of sockeye included in the PED estimates is provided in the last row.

A negative PED indicates that the 'Qualark estimate' was less than direct counts at Qualark for the same sampling periods, and the magnitude of the % is a measure of the deviation between estimates relative to the Mission estimation. For these data, the average %PED is 0.6% over 10 years, and the magnitude of annual deviations averages 10.5%.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Proportion of pote	ntial Fraser so	ckeye spawr	ning escapeme	nt up-stream	of each site:						
Mission	98%	97%	100%	99%	93%	91%	99%	94%	92%	92%	100%
Qualark	79%	74%	89%	55%	62%	76%	88%	81%	66%	82%	98%
Number of sockeye estimated at Mission (post season) and projected to Qualark based on stocks identification in test fisheries. Catch between sites is deducted.											ted.
Mission	1,247,686	885,804	13,582,744	1,981,234	1,474,893	1,909,479	9,507,124	1,449,555	665,766	976,347	5,271,194
Qualark estimate	1,002,171	680,047	12,146,312	1,098,080	974,131	1,599,562	8,365,019	1,255,051	474,416	869,458	5,176,585
Difference	245,515	205,757	1,436,432	883,154	500,762	309,917	1,142,105	194,504	191,350	106,889	94,609
Passage estimated	difference (PE	D) is estima	ted for time pe	eriods when l	ooth sites wer	e operating a	nd pink salm	on did not do	minate the mig	ration:	
%PED estimated	9.09%	16.35%	-15.23%	-21.36%	-6.81%	-0.32%	16.74%	15.09%	-7.37%	-2.95%	3.80%
Qualark counts											
included in PED	911,054	568,887	13,995,685	1,332,647	1,040,476	1,604,603	6,964,298	1,065,633	509,403	895,106	4,979,807
Total count at											
Qualark for year	922,058	809,183	13,995,685	1,431,763	1,057,133	2,391,120	6,965,904	1,253,153	527,088	1,084,334	4,998,238
% sockeye count											
included	98.8%	70.3%	100.0%	93.1%	98.4%	67.1%	100.0%	85.0%	96.6%	82.5%	99.6%

Feasibility, costs, and accuracy of a Qualark-only scenario for hydroacoustics monitoring

Final authors of the memo: Kirt Hughes, Les Jantz

First drafts provided by PSC staff: Cory Lagasse, Erica Jenkins, Catherine Michielsens, Fiona Martens, Yunbo Xie

Additional input/feedback provided by: Bob Conrad, Aaron Dufault, Mike Hawkshaw, Kirt Hughes, Les Jantz, Lorraine Loomis, Jennifer Nener, Jamie Scroggie, Mike Staley, Timber Whitehouse

January 9, 2020

Summary

The FSRC report recommended to transition from Mission to Qualark as the preferred hydroacoustic site over the next 3-5 years provided the Fraser River Panel and Technical Committee can ensure the two major assessment challenges can be overcome: 1) compensation for the 2-3 days time delay, and 2) accurate assessment of Fraser River sockeye and pink salmon stocks not migrating past Qualark. This document examines the potential feasibility, costs, and accuracy of the additional program components that would be required for the PSC to perform in-season assessments under a Qualark-only scenario for hydroacoustics monitoring. In addition this document highlights some of the logistical and administrative issues that must be considered if the Qualark data are to be used in real time to inform in-season assessments.

Currently, no options exist to **compensate for the 2-3 day delay in the availability of escapement estimates** without deteriorating the accuracy and precision of the daily estimates. The most viable option to compensate for the 2-3 day delay is to initiate an additional marine test fishery in Juan de Fuca Strait to confirm the current marine abundance estimates from test fisheries, similar to the use of the Area 13 purse seine test fishery to confirm Area 12 abundance estimates. Based on results from test fisheries in Johnstone Strait, we expect that an additional test fishery could improve our ability to confirm low run sizes and keep fisheries closed when needed, but it would not necessarily help confirm higher run sizes or increase the probability of accessing the entire TAC. While it is feasible to initiate an additional test fishery, the associated costs (\$127,000) cannot be fully covered through the use of fish (~5,500 sockeye) unless pay fish is taken. Over the past decade, sufficient pay fish catches have only occurred on 2018 cycle lines. Any remaining deficit would need to be covered by the revolving fund.

It is feasible and cost-effective to assess the in-season abundance of Fraser River sockeye stocks not migrating past Qualark based on relative stock proportions in the lower Fraser River, but the resulting estimates are substantially less accurate and precise. This is well documented based on various analyses for Pitt, one of the few stocks that does not migrate past Mission. It is unlikely that the additional options explored in this document would significantly improve the accuracy and precision of in-season estimates.

It is possible to accurately **assess Fraser River pink salmon stocks not migrating past Qualark** using stream-specific spawning ground surveys or mark-recapture programs but both have been discontinued by DFO in the past due to their high costs. The remaining alternative is to use marine test fishery data, however, this method produces pink salmon run size estimates that are very imprecise and susceptible to severe biases in comparison to the Mission hydroacoustic estimates.

When considering **program costs under a Qualark-only scenario**, the total costs depend on what additional assessment programs are operated in order to address information gaps. Assuming that the PSC retains the same level of indeterminate staffing in order to administer the Qualark hydroacoustics program, then the indeterminate staffing component of the hydroacoustics budgets can be ignored. If the Qualark program is used for in-season assessment by the PSC, then the cost associated with the transport and genetic analyses of samples collected by the Qualark test fishing program would need to be added. The Qualark program would therefore cost \$210,000, averaged over a 4 year assessment cycle while the Mission program costs \$260,000. This excludes the cost of the Qualark test fishing program (\$85,000) which would be paid for through the use of fish or from the test fishing revolving fund.

The potential **additional costs of new monitoring programs to address the assessment challenges** are difficult to anticipate without detailed studies and planning. The test fishing costs associated with an additional marine test fishery (\$127,000) could be covered through the use of fish in high abundance years, but in most years the additional cost would be need to covered by the test fishing revolving fund. The conservative cost of the system wide mark-recapture program for pink salmon (\$500,000) would bring the total costs of a Qualark-only program to \$710,000 (odd years only). It should be noted that even with this budget the assessment challenges will not be fully addressed, and the overall quality of information available for in-season assessments would be reduced. Furthermore, additional costs would be required for research to assess the feasibility and accuracy of the new assessment programs, and the Mission hydroacoustics program would need to be operated concurrently for several years. These costs are not included within this document, but they merit further consideration especially since this would be a substantial amount of work that can not all be borne in the expected time frame by current PSC staff and therefore would require additional funding.

A detailed draft of the assessment challenges and options for addressing them have been provided to the Fraser Strategic Review Committee (FSRC).

Big Bar Landslide Response Update to PSC

January, 2020



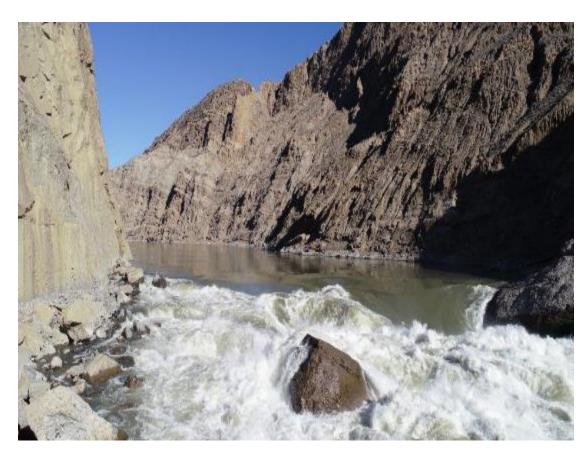






Outline

- Brief overview of the incident response phase (Summer 2019)
- Plans going forward (Winter 2019/20 and beyond)
 - Phased work
 - Key challenges ahead
 - Science questions and work
 - Immediate next steps

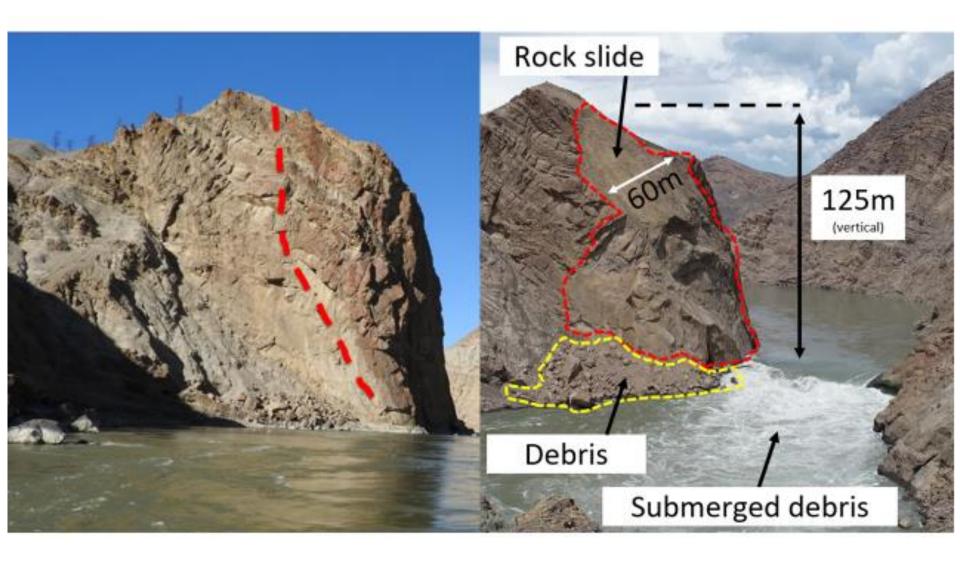








Before and After...









Incident Response (Phase 1) - Chronology of Events

- June 23, 2019 Rock slide was discovered
- June 29, 2019 ICS Trilateral Unified Command was established, including First Nation Leadership Panel
- Mid July 2019 Work onsite commenced, with initial focus safe site access
- July 20, 2019 Fish trapping and transport operations begin
- Sept 1, 2019 30,000 fish/day monitored passing unassisted through slide
- Sept 4, 2019 Fish transport operations paused (monitoring ongoing)
- Sept 27, 2019 Transition to Project Management





Rock Scaling and Manipulation

- From July to mid-October, almost daily activity by scalers ensured the stability of the cliff, safety of work at river and established a staging platform at the edge of the river for engineers, hydrologists, etc. to access rocks in river
- Crews aided in restoring natural passage by manipulating rocks to create pools and small jumps along the base of the slide.
- This was challenging work that occurred in a very small area with extreme safety and access risks for people and equipment, and very dependent on weather and water flow levels.
- Work at water level was evaluated daily by onsite experts. Observations
 of fish movement was used to help guide rock removal and
 manipulation and remove pinch points to increase migration corridors.













Fish Capture: Beach Seining/Fish Wheel

- First Nations, DFO crews and BC Wildfire Service crews worked together long days in extreme weather to capture fish to load into the fish transport tanks.
- The main fish capture technique during the incident response phase was beach seining.
- A secondary fish capture technique for transport was use of two fish wheels, both owned and operated exclusively by First Nations crews
- Fish biologists/technicians were on hand to monitor fish health prior to transport and ensure adequate oxygen levels.
- Once captured, crews worked quickly to move the captured fish from the seine nets to specialized tanks for helicopter transport over the slide.













Helicopter Transport

- Helicopter transfer was used to transport fish over the landslide to a location approximately 1km upstream, using specially designed fish transfer tanks.
- 51,449 Sockeye, 8,522 Chinook, 3 Coho and 372 Pink salmon (for a total of 60,346) were transported over the slide during the initial response phase.
- Helicopter transport of salmon ceased early September as natural migration improved with declining water levels. The focus of operations then shifted from transport to monitoring, and now winter remediation work and contingency planning.







Emergency Conservation Enhancement Results

 Many fish immediately below the slide had signs of stress and injury likely from attempting to pass the slide. High mortality occurred while fish matured in holding.

Conservation Fish Culture

- 88 spawning pairs of Early Stuart Sockeye were collected below the slide and taken to Cultus hatchery
- 17 females and 30 males matured and were spawned
- ~19,500 eggs hatched to the alevin stage and appear robust and active









Transition to Project Management (Phase 2)

- Our ultimate goal remains to fully restore the sustainable, natural fish passage at the Big Bar landslide site
- On September 27th, the emergency incident response transitioned from ICS to Project Management:
 - Planning process initiated for rock removal before Spring freshet and contingency planning in advance of the 2020 salmon returns
 - A longer-term multi-year response, including feasibility studies for different options, may also be needed.
- A multi-faceted program, involving dedicated federal, provincial and Indigenous capacity, is underway to restore upstream fish access at the Big Bar slide.







2019-2020 Big Bar Landslide Remediation Plan

- Canada, BC and Indigenous representatives are working collaboratively to develop:
 - Fish passage remediation project in advance of 2020 spring freshet to reduce water velocity at the slide site;
 - Intensive hydrological and fisheries monitoring programs; and
 - Contingency plans for spring/summer 2020 migration period.
- This also requires:
 - Dedicated project oversight and trilateral governance;
 - On-going communication to update and engage Indigenous groups;
 stakeholders, interested parties, the public; and
 - Feasibility studies for a potential longer-term response.

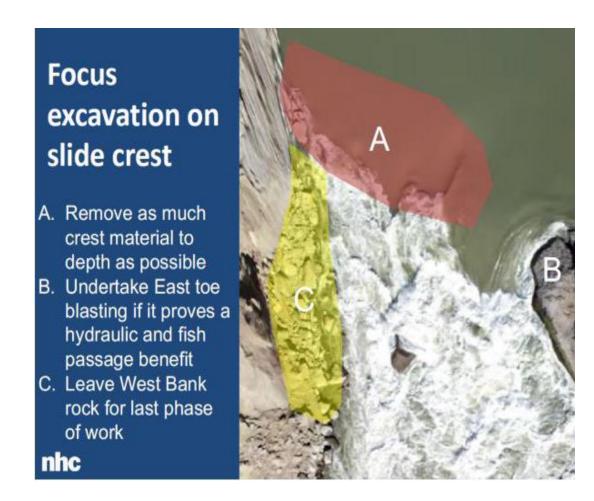






2019-2020 Fall activities

- Input and advice from:
 - US Army Corps of Engineers
 - Rio Tinto and BC Hydro
 - Canadian Forces
 - Group of wise people
 - North West Hydraulics

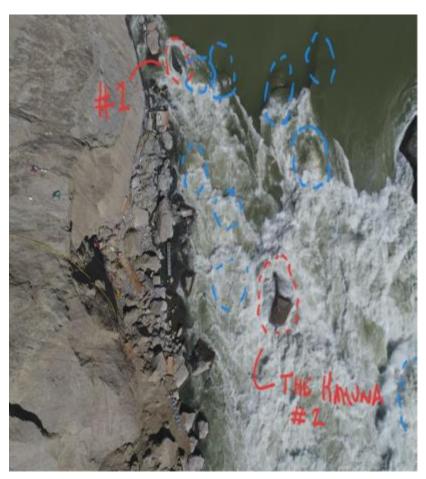








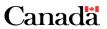
2019-2020 Fall activities





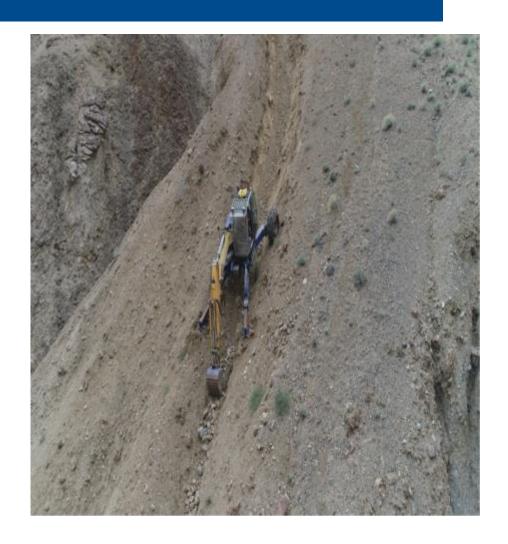






Actions undertaken

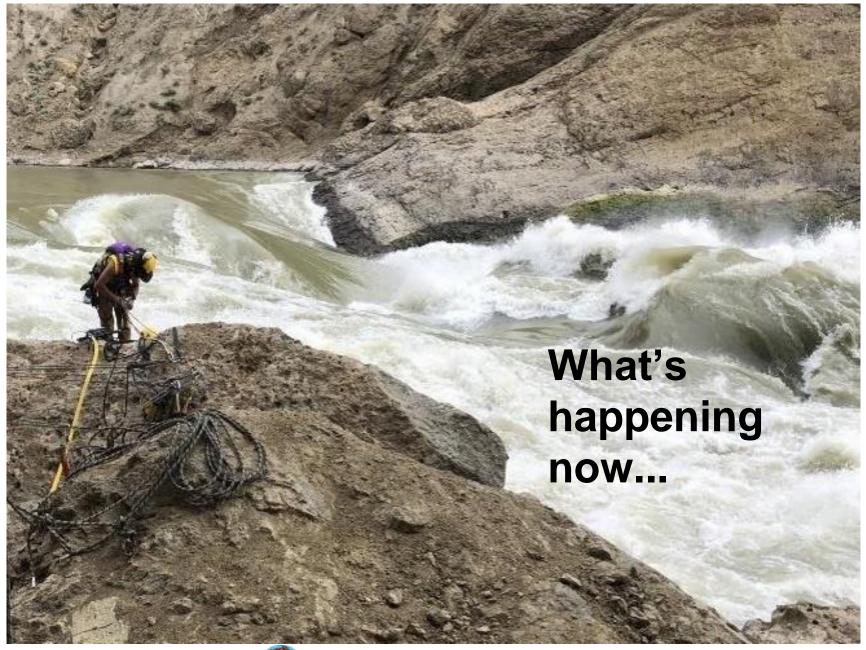
- West Pavilion road maintenance started.
- West Bank access road engineered design completed last summer/fall.
- Project manager hired and B.C. Engineering staff assigned.
- Archaeology work underway with access road construction planned this week.
- Initial construction to west bank summer/fall.
- Major construction planned to start early January 2020.













Search for the right expertise: December 2019

- Recognizing the complexity of the problem, Federal government contracted engineering firm SNC-Lavalin to help oversee and create project specification for the major rock removal project
- Request for Information, released on November 27, 2019 to seek:
 - ideas and suggestions on constructability and potential new technologies or approaches;
 - recommendations to enhance the project's success;
 - identification of potential contractors who possess specialized equipment, expertise and experience; and
 - identification of local Indigenous businesses with the capacity to conduct operations.
- Briefings, tours, information sharing early December
- Short list of potential contractors submitted bids last December.







Contract awarded January 3, 2020



Peter Kiewit and Sons

In the past 15 years, Kiewit has completed nearly 6,000 PROJECTS. 130 year old, Fortune 500 construction, engineering and mining company one of the largest construction companies in North America













Contract deliverables

- Title: Big Bar Landslide Fish Passage Remediation
- Project duration: March, 2020
- Key Activities:
 - Rock drilling (East toe)
 - Blasting (East toe)
 - In water blasting/reshaping (mid channel)
 - Excavation (west Bank)
 - Scaling (safety)
 - Scaling (monitoring)
- Amount awarded \$17.6M







Anticipated Project Challenges include...



- Short winter window for fish passage remediation work
- Few precedents of this scale
- Operating conditions (i.e. highly inclement weather, remoteness, unstable terrain)
- Current population status of many Fraser salmon and steelhead





Projected Component Timelines

	Fish passage remediation	December 2019 – April 2020
1	Hydrological and fisheries monitoring	December 2019 – March 2021
	Contingency planning for summer 2020	December 2019 – May 2020
	Contingency in-season operations, <u>if</u> <u>required</u>	June 2020 – September 2020
	Feasibility studies for a potential longer-term response, <u>if required</u>	April 2020 – September 2020
100	Fish passage remediation – 2 nd round <u>if required</u>	November 2020 – March 2021
	Project oversight and engagement processes	December 2019 – March 2021







2019-2020 Big Bar Slide Restoration Plan – Other key project components

- Contingency plans for summer 2020 including in-season work to avoid extirpation of upper Fraser spring and early-summer salmon stocks, if required;
- Dedicated project oversight and engagement processes; and
- Feasibility studies for a potential longer-term response, if required, including engineering work, technical drawings, environmental/hydrological studies, archaeology, and consultations.
- Intensive hydrological and fisheries monitoring to inform project design and assess program results;







Big Bar Rockslide Science Information Update

PSC 2020 Post-Season Meeting Portland, Oregon 13-17 January 2020

Fraser Salmon Expected Upstream of Slide Coho Sockeye (2019) Chinook Interior Fraser: 12% Early Stuart: 100% **Spring 5₂: 87%** Early Summer: • Spring 4₂: 0% • Pink: 5-30% 58% • Summer 5₂: 83% • Chum: 0% • Summer: 62% • Summer 4₁: 0% Late: 0% Steelhead: 35% • Fall 4₁: 0%

Includes populations of Chinook, Sockeye, Coho and Steelhead assessed as Threatened or Endangered



Biological Risks

- Depending on 2020 discharge and 2019-2020 demolition work, there is a high risk of extirpation to:
 - Early Stuart Sockeye
 - Early timed Early Summer Sockeye
 - Mid Fraser Spring 5₂ Chinook
- Depending on 2020 discharge, could be considerable risk to:
 - Early Summer Sockeye
 - Summer Sockeye
 - Mid Fraser Summer 5₂ Chinook
- Multi-year impacts will limit ability for a rescue effect
 - Chinook, Sockeye, Coho all have multiple age classes

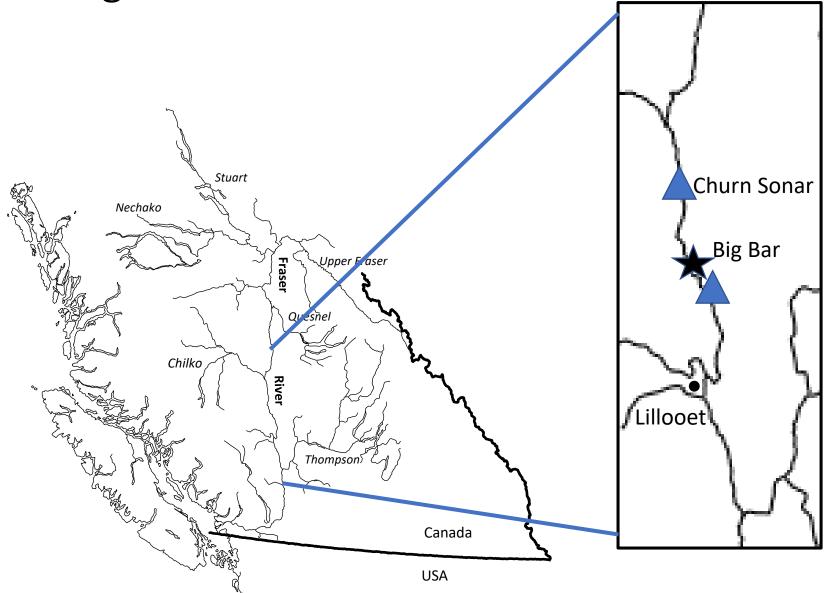
Presentation Outline

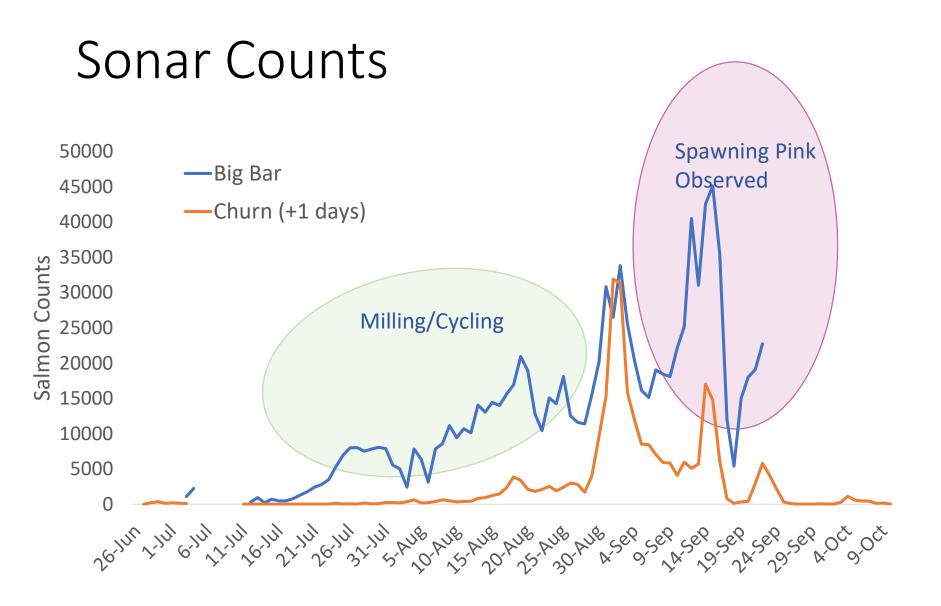
- 2019 science efforts and preliminary results
 - 1. Natural passage success of all salmon
 - 2. Helicopter transport assess upstream migration
 - 3. Behavior associated with barriers and fish condition
 - 4. Survival to spawn for both natural and transported salmon
- 2020 current status and science plans

2019 Salmon Monitoring Results

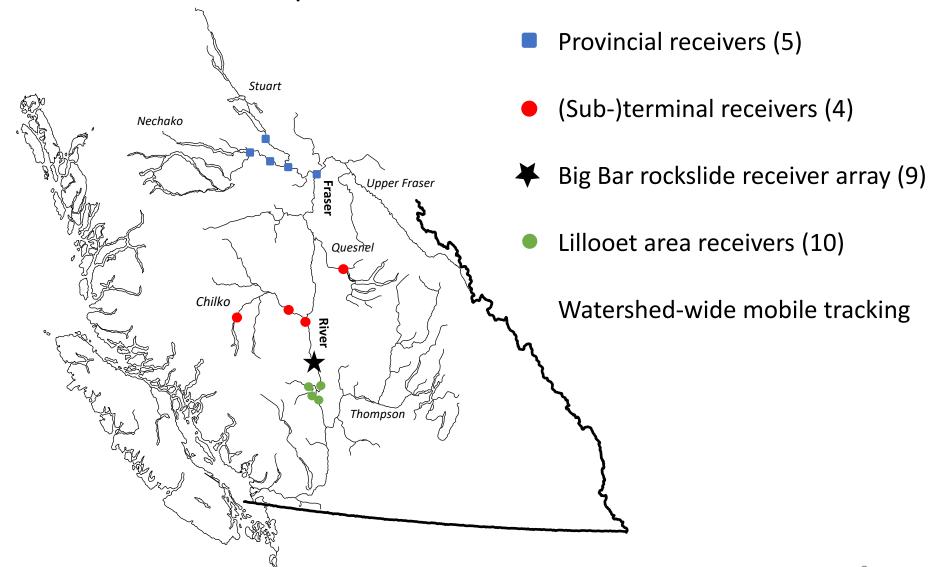
Hydroacoustics (sonar) and radio telemetry

Big Bar Slide and Sonar Locations





Radio Telemetry Receiver Array – Survival to Spawn



Big Bar Rockslide Receiver Array – Passage Success

Churn Creek Area Big Bar Slide Area , Google Earth

Radio Transmitter Application

- 1170 salmon were radio-tagged
 - 570 sockeye
 - 224 pink
 - 202 Chinook
 - 174 coho



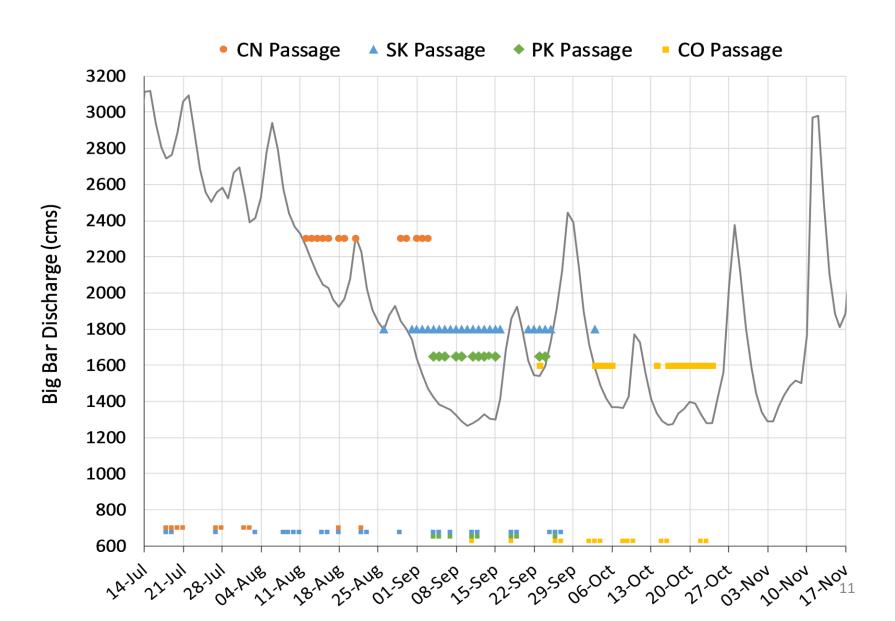
 353 radio-tagged salmon passed through the slide on their own and migrated by Churn Creek (40 km upstream)

Tag Site	CN	SK	PK	СО
Lillooet	12	89	21	0
Big Bar	16	119	47	49
Total	28	208	68	49

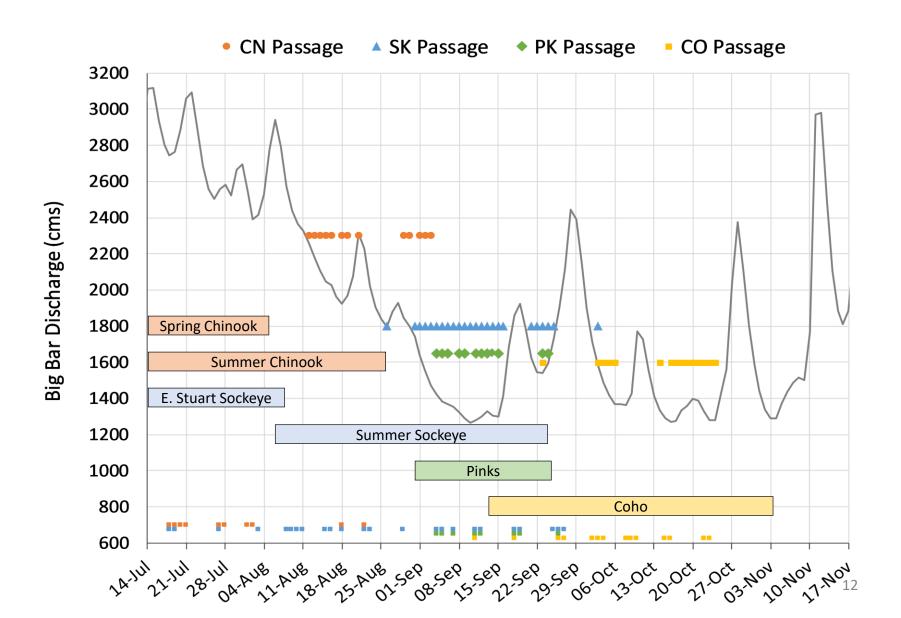
^{*} these preliminary numbers do not represent population-level passage estimates

^{*} these preliminary numbers do not represent individual survival to spawn estimates

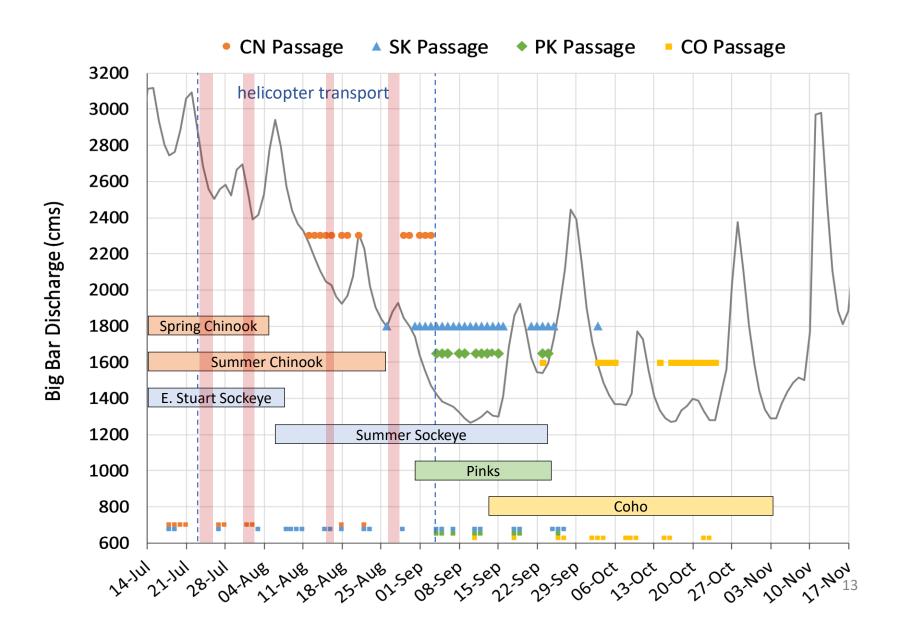
Natural Passage of Radio-Tagged Salmon



Natural Passage of Radio-Tagged Salmon



Natural Passage of Radio-Tagged Salmon



Helicopter Transport Above the Slide



- Release site 2.5 km upstream of the rockslide
- Approx. 5 min round trip by helicopter
- Operational July 23 → September 4
- Approx. 60K total heli-swims
 - 51K sockeye
 - 8.5K Chinook
 - 0.5K pink

Helicopter Transport Above the Slide

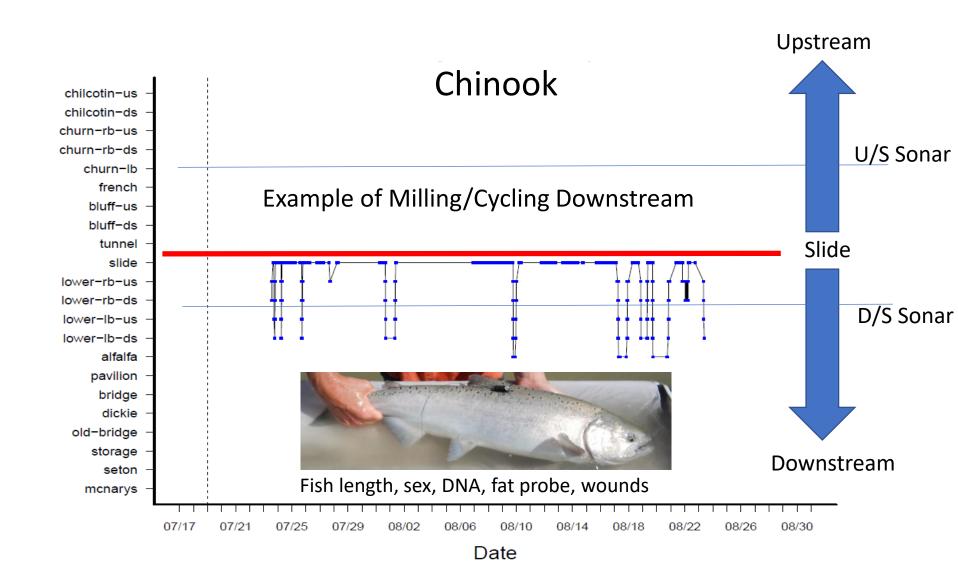
- 72 Chinook and 92 sockeye were tagged and transported over the slide throughout the transport window
- Tags applied between 15°C and 18°C
- Approx. 50-65% of tagged individuals resumed upstream migration after release and made it to Chilcotin confluence
- Both Chinook (~40%) and sockeye (~30%) fell back over the slide

Reasons for fall back behaviour:

- Capture and handling stress
- Water temperature
- Fish condition



Fish Behaviour: Cycling/Milling



Behaviour: Observed Downstream Dispersal

- Sockeye Seton R. reproductive success unknown
- Chinook Bridge R. reproductive success unknown
- Coho Bridge R. reproductive success unknown
- Pink difficult to determine

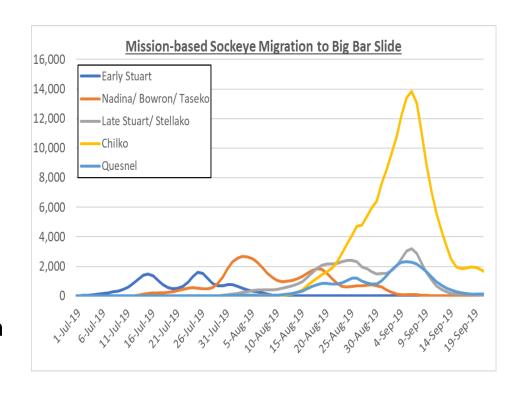


Bridge River and Fraser River Confluence ~80km downstream of Big Bar Slide

Survival to Spawning Grounds

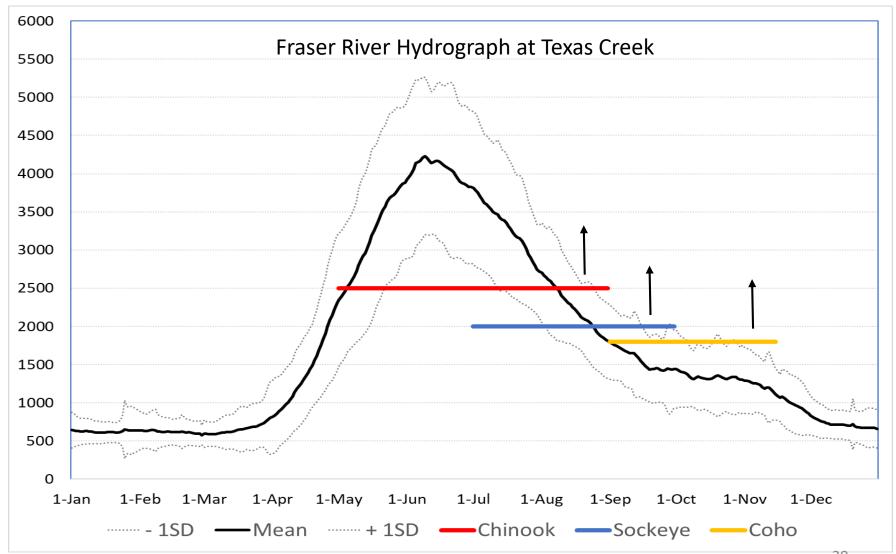
Example Early Stuart (EStu) Data

- 26,000 EStu Return (PSC)
- 89 Spawning Escapement (StAD)
- 0.34% survived to spawn
- ~25 EStu radio-tagged below slide
- 0 made it to spawning grounds
- ~2500 EStu heli-transported
- 24 EStu radio-tag heli-transported
- 16 survived to Chilcotin (80km)
- 2 survived to Ft. St. James (~100 km below spawning grounds)

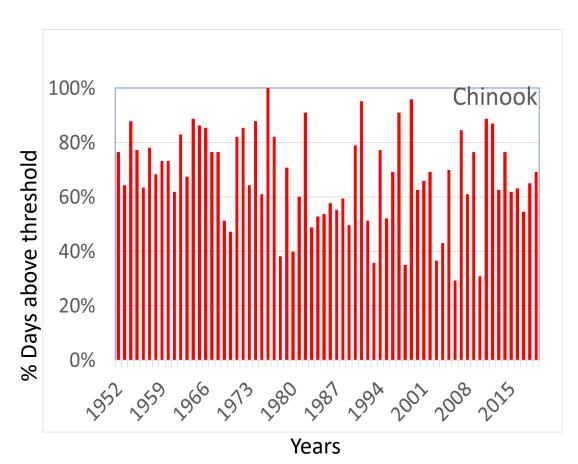


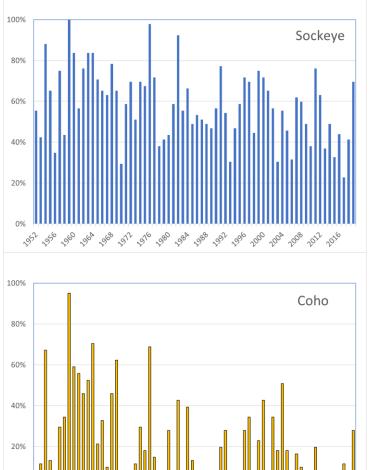
2020 Big Bar Slide Science Plans

2020 Discharge Considerations



Annual variability in % of days above discharge thresholds by species (2019 data)

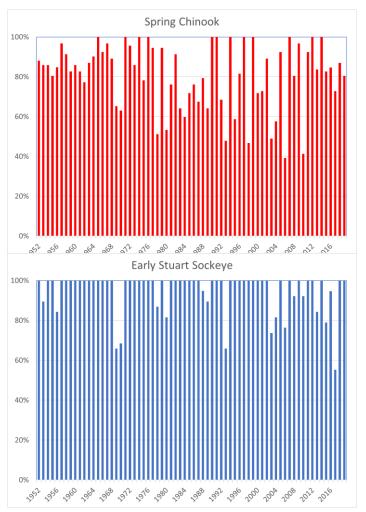




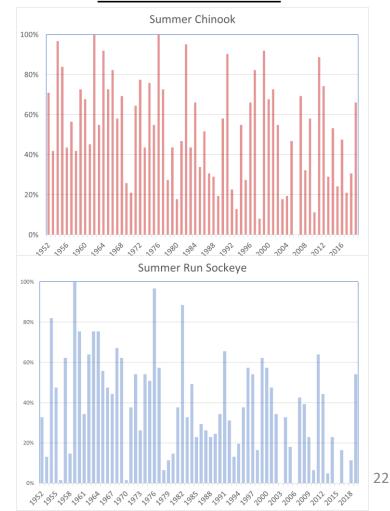
198h

Annual variability in % of days above discharge thresholds by population (2019 data)

Early Timed Stocks



Later Timed Stocks



Key Uncertainties

- Rock work changing discharge threshold values
- Discharge levels (snow pack conditions/weather)
- Impacts on downstream juveniles
- Burst swim ability at high/low temperatures
- Species-specific behaviour
- Downstream dispersal & reproductive success
- Population level impacts (short term/long term)

2020 Planned Work

- Rock work around slide
- Enhancement contingency
- Transport contingency







2020 Monitoring

Juvenile monitoring

 evidence of dispersal and successful reproduction (Chinook, Sockeye, Coho)

Hydroacoustics

- Above slide Churn Creek
- Below slide new Big Bar site or a correction for cycling behavior

Radio telemetry

- expand receiver network
- representative sampling of all salmon species



Science Analysis & Information

Analyze data to quantify impact on 2019 populations to inform management and guide upcoming field-based projects

- 2019 individual transport/passage success
- 2019 individual survival to spawning areas
- Population level impacts in 2019
- Environmental forecasting



Science Analysis & Information

Conduct targeted <u>literature reviews</u> along with data analysis to provide succinct knowledge summaries to guide upcoming field-based projects

- Population vulnerability
- Juvenile migration impacts
- Downstream dispersal and successful colonization
- Species and size-specific swimming ability for passage

Field-Based Projects

Collect science information relevant to the Big Bar rockslide, built of monitoring activities

- Hydraulic conditions at the rockslide could cause physiological stress during juvenile outmigration
- Fine-scale behaviour during passage efforts
- Species-specific burst swim performance
- Fish-condition and passage success/survival to spawn



Planning: Science-Management

Purpose: gather core science information to best support management decisions

Process:

- Management/science meetings
- Science workshops
- Project planning

Key outputs:

- Summary of management questions
- Summary of scientific knowledge and gaps
- Inventory of projects, expertise, responsibility and interest
- Plan and budget based on a strategic framework



Pre-season Science Information

- Information on what is going on: rock work, enhancement plans, transport plans
- 2019 analysis passage success and survival to spawn by species/population
- Match rock work efficacy with passage scenarios
- Expected timelines of rock work success
- Timeline for environmental forecasts of discharge levels
- Differential survival by sex (effective females) and population
- Reproductive success (fecundities, gamete viability)

In-season Science Information

- Timeline for an estimate of passage success?
- Timeline for an estimate of survival to spawn?
- Timeline for an update environmental forecasts
- Comparison of stock composition from lower river to Big Bar samples
- Fish condition information (size, age structure, energy condition, Stock ID) – lower river and Big Bar
- In-season modelling of en route loss estimates

^{*} Recognizing we do not know what passage conditions will look like this year, it is prudent to consider information needs under different passage scenarios

Long-Term Science Information

- Impacts on future population dynamics and implications to different fisheries
- Life cycle impacts gamete quality, smolt condition, and adult
- Selection pressure of early migration
- COSEWIC evaluations (Steelhead; other sockeye)
- Permanent fish passage structures
- Likelihood of future events in Fraser and beyond
- Better understand of swimming ability and connection hydrologic modelling
- Consequences of successful dispersal on future stock ID and population dynamics

^{*} Consider information needs for single and multi-year impacts to both adult and juvenile life stages

Next Steps

- Follow up management meetings
- Engage the broader science community
- Prioritization framework for science work linked to the needs of different Panels
- Gauge the capacity to deliver
- Evaluate funding requirements
- Seek additional resources where necessary