

PACIFIC REGION

INTEGRATED FISHERIES MANAGEMENT PLAN

JULY 1, 2023 – JUNE 30, 2024

YUKON RIVER, YUKON TERRITORY
CHINOOK, CHUM, AND COHO



Oncorhynchus keta



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada

This Integrated Fisheries Management Plan is intended for general purposes only. Where there is a discrepancy between the Plan and the Fisheries Act and Regulations, the Act and Regulations are the final authority. A description of Areas and Subareas referenced in this Plan can be found in the Pacific Fishery Management Area Regulations, 2007.

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DEPARTMENT CONTACTS

A more comprehensive list of contacts can be found online at:

<https://www.pac.dfo-mpo.gc.ca/contact-eng.html>

24 Hour Recorded Information (Commercial)

Vancouver (604) 666-2828

Toll Free 1-888-431-3474

24 Hour Recorded Information (Salmon Hot Line-Yukon) .. Whitehorse (867) 393-3133

..... Toll Free (877) 725-6662

Turn In Poachers (TIPP) Toll Free (800) 661-0525

Pacific Salmon Commission (PSC) Office..... (604) 684-8081

PSC Test Fisheries (Recorded, In-Season Information) (604) 666-8200

Recreational Fishing: <https://www.dfo-mpo.gc.ca/fisheries-peches/recreational-recreative/index-eng.html>

Commercial Fishing: <https://www.dfo-mpo.gc.ca/fisheries-peches/commercial-commerciale/index-eng.html>

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INDEX OF WEB-BASED INFORMATION

FISHERIES AND OCEANS CANADA GENERAL INFORMATION

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<http://www.dfo-mpo.gc.ca>

Our Vision, Latest News, Current Topics

Twitter:

DFO Pacific: [@DFO_Pacific](#)

En Français: [@MPO_Pacifique](#)

ACTS, ORDERS, AND REGULATIONS

<https://www.dfo-mpo.gc.ca/acts-lois/index-eng.htm>

Atlantic Fisheries Restructuring Act, Canada Shipping Act, Coastal Fisheries Protection Act, Department of Fisheries and Oceans Act, Financial Administration Act, , Fisheries Act, Fisheries Development Act, Fisheries Improvements Loan Act, Fishing and Recreational Harbours Act, Freshwater Fish Marketing Act, Great Lakes Fisheries Convention Act, Oceans Act, Species at Risk Act

REPORTS AND PUBLICATIONS

<http://www.dfo-mpo.gc.ca/reports-rapports-eng.html>

Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*, Audit and Evaluation Reports - Audit and Evaluation Directorate, Canadian Code of Conduct for Responsible Fishing Operations, Departmental Performance Reports, Fisheries Research Documents, Standing Committee's Reports and Government responses, Sustainable Development Strategy

FEDERAL SCIENCE LIBRARIES NETWORK

<https://science-libraries.canada.ca/eng/fisheries-oceans/>

Fisheries and Oceans Canada online library catalogue

PACIFIC SALMON TREATY

<http://www.psc.org>

Background information; full text of the treaty

PACIFIC REGION GENERAL INFORMATION

MAIN PAGE

<http://www.pac.dfo-mpo.gc.ca/index-eng.html>

General information, Area information, Latest news, Current topics

POLICIES, REPORTS AND AGREEMENTS

<https://www.dfo-mpo.gc.ca/about-notre-sujet/publications/fisheries-peche-eng.html>

Reports and Discussion Papers, New Directions Policy Series, Agreements

OCEANS PROGRAM

<http://www.pac.dfo-mpo.gc.ca/oceans/index-eng.html>

Integrated Coastal Management; Marine Protected Areas; Areas of Interest; Canada's Ocean Strategy; *Oceans Act*

PACIFIC REGION FISHERIES MANAGEMENT

MAIN PAGE

<http://www.dfo-mpo.gc.ca/fm-gp/index-eng.html>

Commercial Fisheries, Aboriginal Fisheries, Recreational Fisheries, Maps, Notices and Plans, International Management, Enforcement

ABORIGINAL FISHERIES STRATEGY

<http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/index-eng.html>

Aboriginal Fisheries Strategy (AFS) principles and objectives; AFS agreements; Programs; Treaty Negotiations

AQUACULTURE MANAGEMENT

<http://www.pac.dfo-mpo.gc.ca/aquaculture/index-eng.html>

The new federal regulatory program for aquaculture in British Columbia; Program overview and administration, public reporting, and aquaculture science

RECREATIONAL FISHERIES

<http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/index-eng.html>

Fishery Regulations and Notices, Fishing Information, Recreational Fishery, Policy and Management, Contacts, Current BC Tidal Waters Sport Fishing Guide and Freshwater Supplement; Rockfish Conservation Areas, Shellfish Contamination Closures; On-line Licencing

COMMERCIAL FISHERIES

<http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/index-eng.htm>

Links to Groundfish, Herring, Salmon, Shellfish and New and Emerging Fisheries homepages; Selective Fishing, Test Fishing Information, Fishing Areas, Canadian Tide Tables, Fishery Management Plans, Commercial Fishery Notices (openings and closures)

INITIATIVE TO UPDATE THE COMMERCIAL SALMON ALLOCATION FRAMEWORK (IN B.C.)

<http://www.pac.dfo-mpo.gc.ca/consultation/smon/saf-crrs/index-eng.html>

Links to the Departments' consultation website which provides an overview of the process to update the Commercial Salmon Allocation Framework (CSAF), including links to summary reports and submissions with recommendations.

FISHERIES NOTICES

<http://www-ops2.pac.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?>

Want to receive fishery notices by e-mail? If you are a recreational sport fisher, processor, multiple boat owner or re-distribute fishery notices, register your name and/or company at the web-site address above. Openings and closures, updates, and other relevant information regarding your chosen fishery are sent directly to your registered email. It's quick, it's easy and it's free.

INTEGRATED FISHERY MANAGEMENT PLANS

<http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/index-eng.html>

Current Management Plans for Groundfish, Pelagics, Shellfish (Invertebrates), Minor Finfish, Salmon; sample Licence Conditions; Archived Management Plans

SALMON TEST FISHERY - PACIFIC REGION

<https://www.pac.dfo-mpo.gc.ca/pacific-smon-pacifique/science/research-recherche/testfishery-pechedessai-eng.html>

Definition, description, location and target stocks

LICENCING

<http://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/index-eng.html>

Contact information; Recreational Licencing Information, Commercial Licence Types, Commercial Licence Areas, Licence Listings, Vessel Information, Vessel Directory, Licence Statistics and Application Forms

NATIONAL ON-LINE LICENSING SYSTEM (NOLS)

<https://fishing-peche.dfo-mpo.gc.ca>

E-mail: fishing-peche@dfo-mpo.gc.ca

(Please include your name and the DFO Region in which you are located.)

Telephone: 1-877-535-7307

Fax: 613-990-1866

TTY: 1-800-465-7735

SALMON

<https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/index-eng.html>

Salmon Facts; Salmon Fisheries; Enhancement and Conservation; Research and Assessment; Consultations; Policies, Reports and Agreements; Glossary of Salmon Terms

FRASER RIVER/BC INTERIOR AREA RESOURCE MANAGEMENT AND STOCK ASSESSMENT

<http://www.pac.dfo-mpo.gc.ca/fm-gp/fraser/index-eng.html>

Contact information; Test fishing and survey results (Albion, creel surveys, First Nations); Fraser River Sockeye and Pink escapement updates; Important notices; Recreational fishing information

NORTH COAST RESOURCE MANAGEMENT

<http://www.pac.dfo-mpo.gc.ca/fm-gp/northcoast-cotenord/index-eng.html>

First Nations fisheries, Recreational fisheries; Commercial salmon and herring fisheries; Skeena Tye test fishery; Counting facilities; Post-season Review; Contacts

YUKON TRANSBOUNDARY RIVERS AREA MAIN PAGE

<http://www.pac.dfo-mpo.gc.ca/yukon/index-eng.html>

Fisheries Management; Recreational fisheries; Habitat; Licencing; Contacts

PACIFIC REGION SALMONID ENHANCEMENT PROGRAM

MAIN PAGE

<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/index-eng.html>

Publications (legislation, policy, guidelines, educational resources, brochures, newsletters and bulletins, papers and abstracts, reports); GIS maps and Data (habitat inventories, spatial data holdings, land use planning maps); Community involvement (advisors and coordinators, educational materials, habitat conservation and Stewardship Program, projects, Stream Talk).

PACIFIC REGION POLICY AND COMMUNICATIONS

MAIN PAGE

<http://www.pac.dfo-mpo.gc.ca/index-eng.html>

Media Releases; Salmon Updates, Backgrounders, Ministers Statements, Publications; Contacts

CONSULTATION SECRETARIAT

<http://www.pac.dfo-mpo.gc.ca/consultation/index-eng.html>

Consultation Calendar; Policies; National; Partnerships; Fisheries Management, Oceans, Science and Habitat and Enhancement Consultations; Current and Concluded Consultations

PUBLICATIONS CATALOGUE

<http://www.pac.dfo-mpo.gc.ca/publications/index-eng.html>

Information booklets and fact sheets available through Communications branch

SPECIES AT RISK ACT (SARA)

<https://www.dfo-mpo.gc.ca/species-especies/sara-lep/index-eng.html>

SARA species; SARA permits; public registry; enforcement; Stewardship projects; Consultation; Past Consultation; First Nations; Related Sites; News Releases

PACIFIC REGION SCIENCE

MAIN PAGE

<http://www.pac.dfo-mpo.gc.ca/science/index-eng.html>

Science divisions; Research facilities; PSARC; International Research Initiatives

YUKON TRANSBOUNDARY RIVERS AREA

YUKON RIVER PANEL

<http://yukonriverpanel.com/salmon/>

Yukon River Salmon Agreement, Restoration and Enhancement Fund Reports, Panel reports.

YUKON SALMON SUB-COMMITTEE

<http://www.yssc.ca/>

A public advisory body to the Minister of Fisheries & Oceans Canada and Yukon First Nation Governments.

GLOSSARY AND LIST OF ACRONYMS

A comprehensive glossary is available online at:

<http://dev-public.rhq.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/gloss-eng.html>

LIST OF ACRONYMS USED IN THIS PLAN:

| ACRONYM | PHRASE |
|---------|---|
| AAROM | Aboriginal Aquatic Resources and Oceans Management |
| ABM | Abundance-Based Management |
| ADF&G | Alaska Department of Fish and Game |
| AFS | Aboriginal Fisheries Strategy |
| ATK | Aboriginal Traditional Knowledge |
| ATP | Allocation Transfer Program |
| BASIS | Bering-Aleutian Salmon International Survey |
| BNA | Basic Needs Allocation |
| C&P | Conservation and Protection unit |
| COSEWIC | Committee for the Status of Endangered Wildlife in Canada |
| CWT | Coded Wire Tag |
| CU | Conservation Unit as identified in the Wild Salmon Policy |
| CYFN | Council for Yukon First Nations |
| DFO | Fisheries and Oceans Canada |
| FN | First Nation |

| | |
|--------------|--|
| FSC | Food, Social and Ceremonial |
| GSI | Genetic Stock Identification |
| IFMP | Integrated Fisheries Management Plan |
| IMEG | Interim Management Escapement Goal |
| IK | Indigenous Knowledge |
| IYRSA | Interim Yukon River Salmon Agreement |
| JTC | Joint Technical Committee of the Yukon River U.S./Canada Panel |
| MRP | Mark-Recapture Program |
| NMFS | National Marine Fisheries Service (U.S.) |
| NOLS | National Online Licencing System |
| PSARC | Pacific Scientific Advice Review Committee |
| PSC | Pacific Salmon Commission |
| PSSI | Pacific Salmon Strategy Initiative |
| PST | Pacific Salmon Treaty |
| R/S | Return per spawner |
| RCMP | Royal Canadian Mounted Police |
| RRC | Renewable Resources Council |
| SARA | Species at Risk Act |
| SEP | Salmon Enhancement Program |
| SFF | Sustainable Fisheries Framework |

| | |
|-------------------|---|
| SPA | Scale Pattern Analysis |
| S/R | Stock/Recruitment |
| TAC | Total Allowable Catch |
| TEK | Traditional Ecological Knowledge |
| UFA | Umbrella Final Agreement of the Yukon First Nations Land Claims |
| USF&WS | United States Fish and Wildlife Service |
| WSP | Wild Salmon Policy |
| YRP | Yukon River Panel |
| YRSA | Yukon River Salmon Agreement |
| YSCCC | Yukon Salmon Conservation Catch Card |
| YSSC | Yukon Salmon Sub-Committee |

FORWARD

The purpose of this Integrated Fisheries Management Plan (IFMP) is to identify the specific objectives and requirements for the management of Canadian salmon fisheries in the Yukon River, as well as the management measures that will be used to achieve these objectives. This document also serves to communicate the basic information on the fishery and its management to Fisheries and Oceans Canada (DFO, the Department) staff, legislated co-management boards and committees (including the Yukon Salmon Sub-Committee (YSSC)), First Nations, First Nation Governments, harvesters, and other interested parties. This IFMP provides a common understanding of the basic “rules” for the sustainable management of the salmon fisheries resource.

This IFMP is not a legally binding instrument that can form the basis of a legal challenge. The IFMP can be modified at any time and does not fetter the Minister's discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the IFMP in accordance with the powers granted pursuant to the *Fisheries Act*.

Where DFO is responsible for implementing obligations under *Yukon First Nation Final Agreements*, the IFMP will be implemented in a manner consistent with those obligations – consistent with the intergovernmental co-management approach established between Yukon First Nation Governments and Fisheries and Oceans Canada. That is, the provisions of the land claims agreements will prevail to the extent of the inconsistency.

HIGHLIGHTS AND KEY CHANGES FOR 2023/2024

KEY CHANGES FOR THE 2023/24 YUKON RIVER SALMON IFMP

PACIFIC SALMON STRATEGY INITIATIVE

The Pacific Salmon Strategy Initiative (PSSI) will continue its long-term strategy to address serious declines in key Pacific salmon populations through a series of initiatives under four pillars.

In December 2022, The Department launched The Pacific Salmon Commercial Licence Retirement Program, Pacific Salmon Indigenous Communal Commercial License Alternation Program, and the Derelict Vessel Mitigation and Gear Disposal Program to transform the harvest sector for greater adaptability and economic viability by reducing the commercial salmon fleet to better align with longer-term prospects for commercial harvest. More information can be found at:

<https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/comm-licence-retirement-retrait-permis/index-eng.html>

In 2023, the Department will continue to implement longer term commercial pacific salmon fishery closures that were identified in 2022 where stocks of conservation concern may be intercepted in targeted fisheries or as by-catch. These closures are expected to remain in place until there is clear evidence of stock growth and abundance is above levels associated with the critical zone or Wild Salmon Policy red zone. Further details on longer term commercial salmon pacific salmon fishery closures or additional mitigations can be found in Appendix 12.

For 2023 and beyond, the Department is continuing to take a more precautionary approach to managing fisheries that interact with stocks of conservation concern as part of a coordinated approach under the PSSI to help stabilize and support rebuilding of populations. Under the Harvest Transformation pillar, the Department will be seeking feedback from First Nations and stakeholders on other areas where additional changes may be implemented to modernize fisheries management and stabilize and restore Pacific salmon. Harvest transformation initiatives will continue to be discussed in further detail at engagement sessions planned for 2023.

Further details can be found here: [Pacific Salmon Strategy Initiative \(dfo-mpo.gc.ca\)](https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/comm-licence-retirement-retrait-permis/index-eng.html)

FISH STOCKS PROVISIONS / REBUILDING PLANS

In April of 2022, three stocks of Pacific Salmon were included in a regulatory amendment to the *Fishery (General) Regulations* (FGR) under the Fish Stocks Provisions (FSP). FSP includes obligations to maintain prescribed fish stocks at levels necessary to promote their sustainability (s. 6.1) and to develop and implement rebuilding plans for stocks that have declined to or below their limit reference point, LRP, (s. 6.2). The first three prescribed salmon stocks are Okanagan Chinook, West Coast Vancouver Island (WCVI) Chinook, and Interior Fraser River (IFR) Coho.

In addition to the first batch of stocks, the Department sought feedback from October 19 to December 19, 2022 on a proposal for a regulatory amendment to the FGR to prescribe the second batch of fish stocks that would be subject to FSP (sections 6.1–6.3 of the Fisheries Act) which includes Yukon Chinook. This regulatory amendment would see the addition of 62 fish stocks to Schedule IX of the FGR nationally, including four Pacific salmon stocks. Schedule IX currently contains 30 fish stocks.

Information on the proposed batch two stocks can be found here: [Consultation on a Regulatory Proposal to Prescribe Stocks to the Fish Stocks Provisions in the Fisheries Act](https://www.dfo-mpo.gc.ca/consultation/consultation-on-a-regulatory-proposal-to-prescribe-stocks-to-the-fish-stocks-provisions-in-the-fisheries-act) (dfo-mpo.gc.ca).

SALMON OUTLOOKS AND HARVEST OPPORTUNITIES

Chinook Salmon in the Yukon River Mainstem and Porcupine Rivers:

- Very low abundance anticipated, not expected to provide for fishery harvest opportunities.
- Limited to no allocation anticipated for First Nation subsistence fisheries.
- Public angling, commercial and domestic fisheries to be closed for duration of season.

Chum Salmon in the Yukon River Mainstem:

- Low abundance anticipated, low likelihood of fishery harvest opportunities.
- Limited to no allocation anticipated for First Nation subsistence fisheries.
- Public angling, commercial and domestic fisheries to be closed for duration of season.

Chum Salmon in the Porcupine River:

- Very low abundance anticipated.
- Availability of Vuntut Gwitchin First Nation basic needs allocation uncertain.
- Public angling fisheries to be closed for duration of season.

Coho Salmon in the Porcupine River:

- Average to below average abundance anticipated.
- Full Vuntut Gwitchin First Nation basic needs allocation likely to be available.

I.1 INTRODUCTION

The Yukon River Salmon Integrated Fisheries Management Plan (IFMP) covers the period July 1, 2023 to June 30, 2024.

Fisheries and Oceans Canada is responsible for the conservation and sustainable use of Canada's fisheries resources and is the principal management authority for Yukon River salmon. A number of governments and mandated bodies are also involved in the management of salmon harvest in Canadian portion of the Yukon River. The Yukon Salmon Sub-Committee (YSSC) of the Fish and Wildlife Management Board is established pursuant to Chapter 16 of each *Yukon First Nation Final Agreement*, as described in the framework *Umbrella Final Agreement* (UFA). The YSSC is established as the main instrument of salmon management in the Yukon and has the mandate to make recommendations, in the public interest, to the Minister of Fisheries and Oceans Canada and to Yukon First Nations on matters related to salmon. The YSSC is required to annually consult with Yukon First Nations and subsequently provide recommendations to the Minister of DFO on allocation of salmon by both user groups and areas. DFO supports the YSSC through the provision of technical expertise and participation in the First Nation consultation and public meeting processes.

When adult Canadian-origin Yukon River salmon return to their natal streams to spawn, they migrate through Alaska before reaching Canada and their spawning grounds. Fisheries occur on both sides of the international border. Given the transboundary (international) nature of the Yukon River, management of Canadian-origin salmon stocks are governed under Chapter 8 of the *Pacific Salmon Treaty* (PST) (*Yukon River Salmon Agreement*, YRSA). The YRSA is implemented through the bilateral U.S.-Canada Yukon River Panel which has the authority to provide recommendations on escapement goals, harvest sharing provisions and management measures to signatories to the Agreement. Consistent with *Yukon First Nation Final Agreements* YSSC members comprise the majority of the Canadian members of the Yukon River Panel.

This IFMP and management strategies described within are based on recommendations from the Yukon River Panel, the YSSC and Yukon First Nations and cover a one-year span. It concerns the management strategies for Chinook, chum, and coho salmon fisheries on the Yukon River. The IFMP contains comprehensive decision guidelines, which set out the rationale for management decisions and describes the range of departmental responses to changing in-season information. Decision guidelines may be reviewed and modified, if necessary, to reflect new considerations. This document also contains a brief overview of Yukon River salmon fisheries and is meant to

inform harvesters, processors and other interested parties about the expected run sizes, management considerations, and plans.

Management actions outlined in this plan are subject to change in response to in-season variables such as salmon migration timing, abundance, and environmental conditions. While fishing opportunities outlined in this plan are anticipated based on pre-season information, they are not guaranteed. DFO and the YSSC will continue to consult with First Nations, commercial, domestic (non-Indigenous subsistence fishery) and recreational fishers throughout the season regarding fishing activities and allocations, particularly when in-season revisions are required to address specific conservation concerns.

The development and implementation of this IFMP supports the Departmental commitment to achieving long-term goals of salmon conservation, sustainable use of the resource and improved decision-making processes through consultation. Feedback on this IFMP is encouraged so that future plans can be made as useful as possible to stakeholders.

1.2 HISTORY

For thousands of years salmon have played a pivotal role in the fabric of the Yukon. They are an integral part of the ecosystem providing a source of food and nutrients for a wide variety of flora and fauna. They have been a key food source for First Nations for millennia and more recently have played an important part in the socio-economic life and in the developmental history of north-western Canada.

Because of their significance and the very high level of interest in ensuring the persistence of these populations, prudent and careful management supported by the broad spectrum of interests is required. Salmon are currently faced with a variety of threats including unstable conditions resulting from environmental changes, marine conditions, and in some cases, overexploitation.

1.3 LOCATION OF FISHERY

This IFMP describes the Chinook, chum and coho salmon fisheries in the Canadian portion of the Yukon River watershed (see Map in Appendix 4) .

1.4 TYPES OF FISHERY, PARTICIPANTS AND CHARACTERISTICS

This plan describes the management of First Nations, public angling, commercial and domestic salmon fisheries for Pacific salmon in the Yukon River and the factors that influence decision-

making. Key to salmon management is the development and implementation of integrated fisheries management plans that meet specified objectives focusing on conservation, allocation and obligations to First Nations and international treaties.

I.4.1 FIRST NATION FISHERY

The longest standing fishery in the Yukon is the First Nation fishery, which is widespread throughout the Yukon River drainage in Canada. Yukon First Nation fishery participants have traditionally relied heavily on the salmon resources of the Yukon.

In the 1990 Sparrow decision, the Supreme Court of Canada found that where an Aboriginal group has an Aboriginal right to fish for food, social and ceremonial purposes, it takes priority, after conservation, over other uses of the resource.

Following DFO's engagement in a variety of consultation and collaborative salmon management processes First Nations Fisheries are authorized via a Communal Licence issued by the Department under the *Aboriginal Communal Fishing Licences Regulations*. In accordance with individual *First Nation Final Agreements*, First Nation individuals who wish to fish for subsistence purposes outside their traditional territory must first obtain consent from the First Nation whose territory in which they wish to fish.

Currently 12 communal licences are issued annually to First Nations within the Yukon (including the Porcupine River) watershed. Subsistence fisheries primarily employ set gillnets, fish wheels (in larger tributary sites and in the mainstem Yukon River) drift gillnets (in the Teslin River), and gaffs in the smaller headwater streams. Depending on annual run timing, First Nation fishers usually commence fishing for Chinook salmon in early to mid-July and continue until subsistence needs are met. Fishing for chum salmon in the upper Yukon is usually completed by mid-October. However, on the Porcupine River, the fishery continues to operate through November with netting frequently occurring under the ice. Coho salmon are also caught in these late fisheries on the Porcupine River.

I.4.2 COMMERCIAL FISHERY

The Canadian Yukon River commercial salmon fishery began in 1898. The commercial fishery is comprised of 22 licenses, plus eight additional licences reserved for Self-Governing Yukon First Nations (total of 30).

The mainstem Yukon River commercial salmon fishery is restricted to the following areas (see map in Appendix 5):

- In the Yukon River, downstream from Tatchun River to Dozen Islands (excluding a closed section around the mouth of the Klondike River);
- In the Stewart River downstream from the mouth of the McQuesten River until September 30, otherwise closed; and
- In the Pelly River downstream from the mouth of the MacMillan River.

Historically, commercial fishing gear consisted of fish wheels and gillnets.

During years of sufficient salmon abundance (when there are no conservation concerns), the commercial fishery typically opens in early July for Chinook salmon with specific schedules dependent upon run timing and the strength of the run. The commercial fishery for chum salmon occurs after Chinook (based on run timing), peaking in mid-September and concluding in mid to late October.

Commercial licences are administered via the web-based National Online Licensing System (NOLS). Through this system, commercial harvesters/licence holders/vessel owners may view, pay for, and print their commercial fishing licences, licence conditions and receipts. Licence renewal and payment of fees is mandatory on an annual basis prior to the expiry date of each fishery, in order to maintain the eligibility to be issued the licence in the future. Please note the licence eligibility will cease if it is not renewed annually.

For queries, NOLS access problems, or transactions that are not yet available in NOLS (e.g. vessel replacements and nominations), licensing services will continue to be available via:

Telephone: 1-877-535-7307 (request / identify 'Pacific Region')

Fax: 1-604-666-5855

E-mail: fishing-peche@dfo-mpo.gc.ca (specify 'Pacific Region' in the subject line)

Please visit the Pacific Region Licencing website and subscribe to fishery notices for updates on NOLS and licencing services: <http://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/index-eng.html>. Information on NOLS may be found on the DFO internet site at: <http://www.dfo-mpo.gc.ca/fm-gp/sdc-cps/licence-permis-eng.htm>.

I.4.3 PUBLIC ANGLING FISHERY

The first official public angling (alternatively called sport or recreational fishing) salmon licences in the Yukon were issued in 1949 shortly after the construction of the Alaska Highway (1942-1947). The majority of public angling effort for salmon occurs in the mainstem Yukon River near Tatchun River, as well as Klondike, Teslin, Takhini and Pelly rivers. The timing of the Chinook salmon

angling effort on the Yukon River is typically from mid-July through mid-August. It is unlawful to use any hook other than a single-pointed barbless hook with a distance less than 2 cm (3/4 in.) between the point and the shank while angling for salmon in the Yukon River and major tributaries from July 1st to October 15th.

In addition to holding a valid Yukon Angling Licence, anglers targeting Yukon River salmon are also required to obtain a Yukon Salmon Conservation Catch Card (Catch Card) prior to fishing for salmon. If a salmon is caught and landed, the angler must immediately record the date, location, species, sex, presence of tags, presence of adipose fins and type of gear used. This information must be recorded even if the salmon is intended to be (or is) released. All anglers who are issued a Catch Card must submit a catch and harvest report (even if salmon fishing did not occur, or no salmon were caught) to DFO by no later than November 30. Failure to submit the catch and harvest report will result in issuance of a non-compliance notice and a fine. In addition, anglers who do not submit a catch and harvest report will not be able to purchase a Catch Card in subsequent years until such time as the catch and harvest report is submitted. Catch Cards are only available for purchase online through the National Recreational Licencing System (NRLS: <https://recfish-pechesportive.dfo-mpo.gc.ca/nrls-sndpp/index-eng.cfm>). Retention of Chinook salmon from the Alsek, Yukon and Porcupine Rivers is not permitted unless specified through an in-season Fishery Notice (<http://www-ops2.pac.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?>).

I.4.4 DOMESTIC FISHERY

The domestic fishery was first initiated in 1899 to allow British subjects and Yukon residents to fish for personal use with up to 300 yards of gillnet. This fishery was eliminated in 1961 but then reinstated in 1974 to allow Yukon residents living in remote areas to harvest salmon for food. The domestic fishery is comprised of seven (7) licenses. Domestic fisheries are restricted to the same geographic areas as commercial fisheries (see map in Appendix 5). When there are no conservation concerns, the domestic fishery follows the same schedule of openings and closures as the commercial fishery.

2 GOVERNANCE

Departmental policy development related to the management of fisheries is guided by a range of considerations including legislated mandates, judicial guidance, international and domestic commitments, and a precautionary, ecosystem-based approach to the management of resources. This section provides a brief overview of key policies and the legal context for Pacific salmon management. Policies are developed with considerable consultation from all those with an interest in salmon management. While the policies themselves are not subject to annual changes, implementation details are continually refined where there is general support.

Additional information is accessible on-line and can be found through the Index of Web-based Information in this report.

2.1 PACIFIC SALMON TREATY

In March 1985, the United States and Canada agreed to co-operate in the management, research and enhancement of Pacific salmon stocks of mutual concern by ratifying the Pacific Salmon Treaty (PST). Various chapters in Annex IV of the Treaty have been renegotiated and ratified since 1985. A component of the 1985 PST was a commitment of the Parties to continue negotiations with the objective of establishing a chapter specific to Canadian-origin Yukon River salmon stocks. In March 2001, Canada and the U.S. concluded the Yukon River salmon negotiations, which had been ongoing since 1971. The comprehensive *Yukon River Salmon Agreement* (YRSA) was ratified by the Parties and incorporated into the PST in 2002. The YRSA contains specific obligations for the Parties to manage fisheries to achieve conservation and harvest sharing objectives for Canadian-origin Yukon River Salmon stocks.

The Pacific Salmon Commission (PSC), established under the Pacific Salmon Treaty, provides regulatory and policy advice as well as recommendations to Canada and the United States (U.S.) with respect to interception salmon fisheries. Under the terms of the Treaty, the responsibility for in-season management of all species rests with the Parties to the agreement. One exception is the in-season management of Fraser River Sockeye and Pink salmon which is specifically delegated to the Fraser River Panel with support from the Pacific Salmon Commission Secretariat staff.

Coded-wire tag (CWT) data are essential to the management of Chinook and coho salmon stocks under the Pacific Salmon Treaty. On August 13, 1985, the United States and Canada entered into a Memorandum of Understanding in which “the Parties agree to maintain a coded-wire tagging and recapture program designed to provide statistically reliable data for stock assessments and fishery

evaluations”. Both countries recognize the importance of the coded-wire tag program to provide the data required to evaluate the effectiveness of bilateral conservation and fishing agreements. In addition, alternatives to CWT data have been explored by the PSC, including through the feasibility of parentage-based genetic tagging.

The chapters in Annex IV outline the joint conservation and harvest sharing arrangements between Canada and the U.S. for key stocks and fisheries subject to the Treaty. Those are:

- Chapter 1: Transboundary Rivers
- Chapter 2: Northern British Columbia and South Eastern Alaska
- Chapter 3: Chinook Salmon
- Chapter 4: Fraser River Sockeye and Pink Salmon
- Chapter 5: Coho Salmon
- Chapter 6: Southern British Columbia and Washington State Chum Salmon
- Chapter 7: General Obligations
- Chapter 8: Yukon River

2.3 FIRST NATIONS’ FISHERIES

Section 35(1) of the *Constitution Act*, recognizes and affirms the existing Aboriginal and treaty rights of the Aboriginal peoples in Canada. The Government of Canada’s legal and policy frameworks identify a special obligation to provide First Nations the opportunity to harvest fish for food, social and ceremonial purposes. Treaty Agreements signed between Nations and the Government of Canada also obligate Canada to provide these opportunities.

DFO is committed to the recognition and implementation of Indigenous and treaty rights related to fisheries, oceans, aquatic habitat, and marine waterways in a manner consistent with section 35 of the *Constitution Act, 1982*, the United Nations Declaration on the Rights of Indigenous peoples, the United Nations Declaration on the Rights of Indigenous Peoples Act, and the federal Principles Respecting the Government of Canada’s Relationship with Indigenous peoples. DFO-CCG Reconciliation Strategy provides a guidance document to better understand why and how reconciliation informs the work of the Department.

For further details on the United Nations Declaration on the Rights of Indigenous peoples see <https://www.justice.gc.ca/eng/declaration/index.html>

For further details on the United Nations Declaration on the Rights of Indigenous Peoples Act see <https://laws-lois.justice.gc.ca/eng/acts/u-2.2/>

For further details on the Principles Respecting the Government of Canada's Relationship with Indigenous peoples see <https://www.justice.gc.ca/eng/csj-sjc/principles-principes.html>

DFO's Reconciliation Strategy can be found at <https://www.dfo-mpo.gc.ca/fisheries-peches/aboriginal-autochtones/reconciliation-eng.html>

For further details on reconciliation in British Columbia and Yukon, refer to <https://www.pac.dfo-mpo.gc.ca/abor-autoc/reconciliation-pacific-pacifique-eng.html>

Information on Indigenous fisheries and reconciliation is available at: <http://www.pac.dfo-mpo.gc.ca/abor-autoc/index-eng.html>

Information on the Government of Canada work to advance reconciliation can be found here: <https://www.rcaanc-cirnac.gc.ca/eng/1400782178444/1529183710887>

2.4 UMBRELLA FINAL AGREEMENT AND YUKON FIRST NATION FINAL AGREEMENTS

The *Umbrella Final Agreement* (UFA) was approved in 1993 by the Government of Canada, Government of Yukon and Yukon First Nations as represented by the Council of Yukon First Nations (CYFN). The UFA has served as a framework for the establishment of 11 individual *Yukon First Nation Final Agreements* ratified in the Yukon to date. *Yukon First Nation Final Agreements* represent an exchange of undefined aboriginal rights for defined treaty rights. Individual *Yukon First Nation Final Agreements* set out specific rights for the particular First Nation and its Citizens which are protected under s. 35 the *Constitution Act*.

Chapter 16 of the Final Agreements establishes the framework for many aspects of salmon management and allocation processes in the Yukon, including the creation of the Yukon Salmon Sub-Committee (YSSC) and guaranteeing that the majority of Canadian representation on the Yukon River Panel is comprised of YSSC members. First Nation access to Yukon River salmon for subsistence harvest purposes is afforded the highest priority after conservation requirements are met.

2.5 FIRST NATIONS AND CANADA'S FISHERIES

The Government of Canada's legal and policy frameworks identify a special obligation to provide First Nations the opportunity to harvest fish for food, social, and ceremonial (FSC) purposes. The *Aboriginal Fisheries Strategy (AFS)* was implemented in 1992 to address several objectives related to First Nations and their access to the resource, including:

- Improving relations with First Nations
- Providing a framework for the management of the First Nations fishery in a manner that was consistent with the 1990 Supreme Court of Canada Sparrow decision
- Greater involvement of First Nations in the management of fisheries
- Increased participation in commercial fisheries (Allocation Transfer Program)

Where First Nation treaties have not been finalized, the AFS continues to be the principal mechanism that supports the development of relationships with First Nations including consultation, planning and implementation of fisheries, and the development of capacity to undertake fisheries management, stock assessment, as well as stock and enhancement programs.

The Aboriginal Aquatic Resources and Oceans Management (AAROM) program has been implemented in some areas to fund aggregations of First Nation groups to build the capacity required to coordinate fishery planning and program initiatives. AAROM is focused on developing affiliations between First Nations to work together at a broad watershed or ecosystem level – a level at which there is a certain number of common interests and where decisions and solutions can be based on integrated knowledge of several Aboriginal communities. In the conduct of their activities, AAROM bodies are working to be accountable to the communities they serve, while working to advance collaborative relationships between member communities, DFO and other interests in aquatic resource and oceans management.

2.6 POLICY FRAMEWORK FOR THE MANAGEMENT OF PACIFIC SALMON FISHERIES

Salmon management programs continue to be guided by the following policies: *Canada's Policy for Conservation of Wild Pacific Salmon (WSP)*, *An Allocation Policy for Pacific Salmon*, *Pacific Fisheries Reform*, *A Policy for Selective Fishing*, *A Framework for Improved Decision Making in the Pacific Salmon Fishery*, and the *Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries*. These policies are available at:

<https://www.dfo-mpo.gc.ca/reports-rapports/regs/policies-politiques-eng.htm>

Canada's Policy for Conservation of Wild Pacific Salmon (the Wild Salmon Policy) sets out the vision regarding the importance and role of Pacific wild salmon as well as a strategy for their protection. More information on this can be found at:

<https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/wsp-pss/policy-politique/index-eng.html>

To communicate the work the Department is doing in support of the policy, Canada's Minister of Fisheries and Oceans and the Canadian Coast Guard released the *Wild Salmon Policy 2018-2022 Implementation Plan* in October 2018. This collaboratively developed plan was consulted on broadly throughout fall 2017, and lays out nine overarching approaches to implementation and 48 specific activities. The plan is organized under three key themes: Assessment; Maintaining and Rebuilding Stocks; and Accountability. In early 2022, the third annual report on progress was released.

For a copy of the *Wild Salmon Policy*, the *Wild Salmon Policy 2018-2022 Implementation Plan*, information on what we heard during consultations and response, annual reports, and other Wild Salmon Policy related materials, please see: <https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/wsp-pss/index-eng.html>

For Canadian-origin Yukon River Chinook salmon, 12 Conservation Units have been preliminarily identified:

1. North Yukon River (including the Yukon River and tributaries downstream of the Stewart-Yukon confluence)
2. Mid Yukon River (extending from the White-Yukon confluence upstream (and including) the Little Salmon drainage)
3. Upper Yukon and tributaries upstream of the Yukon-Teslin confluence
4. Stewart River and tributaries
5. White River and tributaries
6. Pelly River and tributaries
7. Nordenskiold River and tributaries
8. Big Salmon River and tributaries
9. Teslin River including tributaries and headwaters
10. Old Crow River (tributary to Porcupine River)
11. Salmon Fork River (tributary to Porcupine River)
12. Porcupine River and all other tributaries (excluding Old Crow and Salmon Fork Rivers)

For Canadian-origin Yukon River chum salmon, 7 Conservation Units have been preliminarily identified:

1. North Yukon River downstream from the Yukon-White confluence
2. Middle Yukon River

3. South Yukon River upstream of the Yukon-Teslin confluence
4. White River and tributaries
5. Teslin River and tributaries
6. Porcupine River and tributaries including the Fishing Branch
7. Old Crow River (tributary to the Porcupine River)

The Department's *Allocation Policy for Pacific Salmon* (1999), contains principles to guide the management and allocation of the Pacific salmon resource between First Nations, commercial and recreational harvesters, and forms the basis for general decision guidelines outlined in this plan. In 2019 the Department announced that the *Allocation Policy for Pacific Salmon* undergo a review, modernization and renewal process.

In May 1999, the Department released *A Policy for Selective Fishing in Canada's Pacific Fisheries*. Under the Department's selective fishing initiative, harvester groups have experimented with a variety of methods to reduce the impact of fisheries on non-target species, with a number of measures reaching implementation in fisheries.

The Department has embarked on a collaborative, phased process with **First Nations and stakeholders** to review and update the policy. This process of updating the Salmon Allocation Policy (SAP) is being conducted in a manner that is intended to respect Canada's nation-to-nation relationship with Indigenous peoples and engage stakeholders. For more information on the SAP Review process, please visit our website (<http://www.pac.dfo-mpo.gc.ca/consultation/smon/sap-prs/index-eng.html>).

SUSTAINABLE FISHERIES FRAMEWORK

The Sustainable Fisheries Framework (SFF) is a toolbox of policies to ensure that Canadian fisheries support conservation and sustainable use of resources.

These policies include:

- A Fishery Decision-Making Framework Incorporating the Precautionary Approach
 - Guidelines for Implementing the Fish Stocks Provisions in the *Fisheries Act*
 - Guidelines for writing rebuilding plans per the Fish Stocks Provisions and A Fishery-Decision-making Framework Incorporating the Precautionary Approach
- Ecological Risk Assessment Framework (ERAF) for Coldwater Corals and Sponge Dominated Communities

Fishery Monitoring Policy

- Introduction to the procedural steps for implementing the Fishery Monitoring Policy
- Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas
- Policy on Managing Bycatch
- Policy on New Fisheries for Forage Species
- Wild Salmon Policy

For more information on the Sustainable Fisheries Framework and its policies, visit:

<https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm>

Sustainability Surveys for Fisheries: DFO annually tracks the performance of major fish stocks that it manages through the Sustainability Survey for Fisheries. Results of previous Sustainability Surveys are available at: <http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/survey-sondage/index-en.html>

Sustainable Fisheries Framework work plans: Each year, DFO develops a work plan and reports on priorities and targets regarding the sustainable management of Canada’s marine resources. These work plans are available at: <https://www.dfo-mpo.gc.ca/about-notre-sujet/publications/work-plan-travail/index-eng.html>

PRECAUTIONARY APPROACH FRAMEWORK

The Sustainable Fisheries Framework policy suite includes a decision-making framework incorporating a precautionary approach to commercial, recreational, and food, social, and ceremonial fishing: <http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm>

The precautionary approach in fisheries management requires caution when scientific knowledge is uncertain. The absence of adequate scientific information should not result in postponed action or failure to take action to avoid the risk of serious harm to fish stocks or their ecosystem.

Applying the precautionary approach to fisheries management decisions entails establishing harvest strategies that:

- a. identify three stock status zones – Healthy, Cautious, and Critical – delineated by an upper stock reference point and a limit reference point;
 - b. set the removal rate at which fish may be harvested within each stock status zone;
- and

- c. adjust the removal rate according to fish stock status (i.e. spawning stock biomass or another index/metric relevant to population productivity), based on pre-agreed decision rules.

The framework requires that a harvest strategy be incorporated into respective fisheries management plans to keep the removal rate moderate when the stock status is in the Healthy Zone, to promote rebuilding when stock status is low, and to ensure a low risk of serious or irreversible harm to the stock.

A key component of the *Precautionary Approach Framework* requires that when a stock has declined to the Critical Zone, a rebuilding plan must be in place with the aim of having a high probability of the stock growing out of the Critical Zone within a reasonable timeframe: <http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precautionary-precaution-eng.htm>

FISHERIES ACT: FISH STOCK PROVISIONS

Amendments to the *Fisheries Act* (Bill C-68) were passed into legislation in 2019 and include new authorities to amend the Fishery (General) Regulations and requirements to maintain major fish stocks at sustainable levels, and to develop and implement rebuilding plans for stocks that have declined to their critical zone. Amendments are available at: <https://www.parl.ca/LegisInfo/en/bill/42-1/C-68>

The associated regulatory amendment to prescribe major fish stocks and describe requirements for rebuilding plans was registered and came into force on April 3, 2022, and published in Canada Gazette, Part II. Available at: <https://www.gazette.gc.ca/rp-pr/p2/2022/2022-04-13/html/sor-dors73-eng.html>

ECOLOGICAL RISK ASSESSMENT FRAMEWORK & COLD-WATER CORAL AND SPONGE CONSERVATION STRATEGY

The *Ecological Risk Assessment Framework for Coldwater Corals and Sponge Dominated Communities* (or ERAF) outlines a process for identifying the level of ecological risk of fishing activity and its impacts on sensitive benthic areas in the marine environment. Available at: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/risk-ecolo-risque-eng.htm>.

DFO's *Pacific Region Cold-water Coral and Sponge Conservation Strategy* aims to promote the conservation, health and integrity of Canada's Pacific Ocean cold-water coral and sponge species.

For more information, visit: <https://www.dfo-mpo.gc.ca/oceans/ceccsr-cerceef/conservation-eng.html>

POLICY FOR MANAGING THE IMPACTS OF FISHING ON SENSITIVE BENTHIC AREAS

To avoid serious or irreversible harm to sensitive benthic habitat, species and communities and to otherwise address impacts to benthic habitat, communities and species, this policy outlines a five (5) step process. Available at: <http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/benthi-eng.htm>

POLICY ON MANAGING BYCATCH

The *Policy on Managing Bycatch* supports sustainable fisheries management by minimizing the risk of fisheries causing serious or irreversible harm to bycatch species, and by accounting for total catch, including retained and non-retained bycatch. Available at: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/bycatch-policy-prise-access-eng.htm>

The *Guidance on Implementation of the Policy on Managing Bycatch* supports policy implementation: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/bycatch-guide-prise-access-eng.htm>

POLICY ON NEW FISHERIES FOR FORAGE SPECIES

While other new fisheries may be started under the *New and Emerging Fisheries Policy*, this policy outlines the special considerations for new fisheries on forage species, which must not threaten the conservation of other species that depend on the forage species for food. Available at: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/forage-eng.htm>

WILD SALMON POLICY

Canada's Policy for Conservation of Wild Pacific Salmon (WSP) guides Canada and its partners in protection and conservation actions for the five iconic wild Pacific salmon species and their habitats. For more information visit: <https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/wsp-pss/index-eng.html>

2.7 FISHERY MONITORING AND CATCH REPORTING

Robust fishery monitoring information is essential for stock assessment and to effectively implement management measures such as target and bycatch limits, quotas and closed areas. Catch monitoring programs have been developed for Yukon fisheries including First Nation, recreational, commercial and domestic fisheries. Monitoring programs will ensure that the fishery information required to make critical management decisions is available to all those who need it, when it is required. Furthermore, catch data are required to effectively manage and report on domestic and international harvest sharing arrangements. Fishery monitoring information is also needed to support the long-term sustainable use of fish resources for Food, Social, and Ceremonial and other Indigenous fisheries, commercial fisheries, recreational fisheries, and to support market access for Canadian fish products.

DFO released the national Fishery Monitoring Policy in 2019, which will replace the regional Strategic Framework for Fisheries Monitoring and Catch Reporting in the Pacific Fisheries (2012). The national policy seeks to provide dependable, timely and accessible fishery information through application of a common set of steps used to establish fishery monitoring requirements across fisheries. Available at: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fishery-monitoring-surveillance-des-peches-eng.htm>

The 2012 Pacific Strategic Framework for Fisheries Monitoring and Catch Reporting is available at: <https://www.pac.dfo-mpo.gc.ca/fm-gp/docs/framework-monitoring-cadre-surveillance-eng.html>

To ensure consistent national application, further guidance is provided through in the Introduction to the Procedural Steps of Implementing the Fishery Monitoring Policy, available at: <https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/fmp-implementation-ppm-mise-en-oeuvre-eng.htm>

2.8 SPECIES AT RISK ACT

The *Species at Risk Act* (SARA) came into force in 2003. The purposes of the *Act* are “to prevent wildlife species from being extirpated or becoming extinct, and to provide for the recovery of a wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened”.

To view the list of endangered, threatened, and special concern species currently listed under Schedule 1 of SARA, please visit: <http://dfo-mpo.gc.ca/species-especies/sara-lep/identify-eng.html>.

In addition to the existing prohibitions under the *Fisheries Act*, it is illegal to kill, harm, harass, capture, take, possess, collect, buy, sell or trade any SARA-listed extirpated, endangered or threatened animal or any part or derivative of an individual. These prohibitions apply unless a person is authorized, by a permit, licence or other similar document issued in accordance with SARA, to engage in an activity affecting the listed species, any part of its critical habitat, or the residences of its individuals. These prohibitions do not apply to species listed as special concern.

No SARA-listed species or species currently under consideration for listing under SARA, are encountered by salmon fisheries in the Yukon River. For Bearing Cisco, an action plan is being developed to better understand the status of Bearing Cisco in the Yukon.

2.9 SALMONID ENHANCEMENT PROGRAM

The Salmonid Enhancement Program (SEP) produces Pacific salmon at enhancement facilities, restores habitat, and undertakes projects that include public participation by local communities and First Nations in fisheries and watershed stewardship activities. Enhanced salmon enable economic, social and cultural harvest opportunities for commercial, recreational and First Nations harvesters, support vulnerable stock rebuilding, and contribute to Canada's stock assessment commitments under the Pacific Salmon Treaty with the United States. Projects with community partners include stewardship activities and the development of integrated local and area watershed plans. SEP also support school education and public awareness projects.

With respect to projects that undertake fish culture, about 150 projects release fish annually from sites throughout British Columbia and the Yukon. Projects range in size from spawning channels releasing nearly 100 million juveniles annually to school classroom incubators releasing fewer than one hundred juveniles. SEP enhances Chinook, Coho, Chum, pink, and sockeye salmon, as well as small numbers of steelhead and cutthroat trout. Project types include hatcheries, fishways, spawning and rearing channels, habitat improvements, flow control works, lake fertilization, and small classroom incubators. Projects are operated by SEP staff or contracted with some SEP support to First Nations and community and volunteer groups.

The program is delivered through three components:

- Major Operations (OPS) SEP facilities that rebuild stocks and provide harvest opportunities through hatcheries and spawning channels;
- The Community Involvement Program (CIP), which includes:

- The Community Economic Development Program (CEDP) that operates contracted SEP facility operations with local community groups;
 - First Nations, and Public Involvement Program projects that are divided into designated (DPI – Designated Public Involvement) and non-designated (PIP – Public Involvement Program) categories. The latter are smaller projects that focus on outreach, stewardship and educational activities, and do not produce large numbers of fish;
 - The Resource Restoration Unit, which supports habitat improvements, stock assessment, effectiveness monitoring, watershed planning, and partnerships related to habitat initiatives.
- SEP Planning and Assessment (SPA) that reviews data, analyses returns and incorporates these details into a draft production plan along with major operation facility information.

2.10 SCIENTIFIC SUPPORT

Research on Yukon River salmon stocks is being conducted through coordinated efforts of the Department, U.S. agencies (Alaska Department of Fish and Game, United States Fish and Wildlife Service), and the National Marine Fisheries Service, Yukon First Nations and a number of private firms and academic institutions. Many of the public programs and some government projects are funded through the Yukon River Restoration and Enhancement Fund.

The annual report of the Yukon River Panel’s Joint Technical Committee (JTC) provides a comprehensive summary and data report on research and management-related activities undertaken on the Yukon River. The most recent JTC report can be accessed through the YRP website at: <http://yukonriverpanel.com/salmon/publications/joint-technical-committee-reports/>

Some of the research activities of the Department’s Science Sector are summarized in annual reports and/or scientific papers that are peer reviewed through Centre for Scientific Advice – Pacific (CSAP). The advice is then forwarded to the client for review and adoption as required. Additional information and reports are available at: (<http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especies/salmon-saumon/research-recherche/assessment-eng.html>)

2.11 INTEGRATED FISHERIES MANAGEMENT PLAN APPROVAL PROCESS

Following the development of this IFMP by the Department's Yukon Transboundary Rivers Area operational office, the plan is reviewed by senior Departmental officials with responsibility for salmon management in Pacific Region. The IFMP is considered final once approved by the Pacific Regional Director General of Fisheries and Oceans Canada and following the Minister's Response to allocation and management recommendations provided by the Yukon Salmon Sub-Committee.

3 STOCK ASSESSMENT, SCIENCE, BIOLOGICAL SYNOPSIS AND INDIGENOUS KNOWLEDGE SYSTEMS

3.1 CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*)



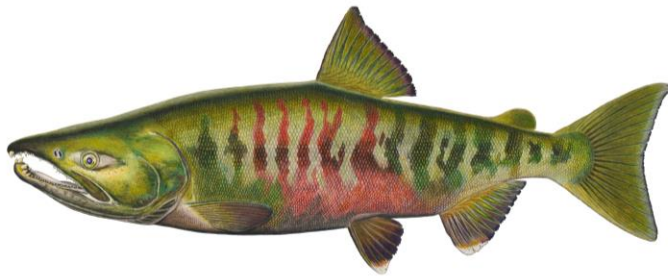
Chinook salmon spawn in streams and rivers along the west coast of North America. The Yukon River is one of the most northerly of the major Chinook spawning rivers, and hosts some of the longest upstream migrating salmon stocks in the world. Some headwater stocks migrate in excess of 2,960 kilometres in freshwater to reach their spawning grounds in the Yukon and northern British Columbia. The majority of Chinook salmon spawning in the upper Yukon River occurs in August.

Over the winter, the eggs incubate in the gravel and Chinook fry emerge in the spring and early summer. Some fry leave the rivers of their birth, or “natal” streams, soon after emergence. They may be carried downstream into larger rivers by the spring freshet. Through the summer, many fry will migrate into “non-natal” streams to feed and may migrate significant distances upstream (in a number of documented cases upwards of 75 kilometres) and hundreds of kilometres downstream. In large rivers, juvenile Chinook are often found along the river margins and in the mixing zones where streams and rivers join larger ones. In lakes, Chinook fry have been found in nearshore habitats and near the mouths of tributaries. Juveniles may be abundant in tributaries not used for spawning.

Yukon River Chinook salmon fry must grow rapidly and build up reserves of fat for their first winter in freshwater. This is called the freshwater “rearing” phase. Successful over-wintering of juveniles has been documented only in streams and smaller rivers, although it is expected to also occur in larger rivers. After their winter in freshwater as free swimming juveniles, fry begin their downstream migration to the ocean. The first winter at sea is thought to be a very important time

for Chinook salmon and survival during this period can greatly influence the strength of this brood year. Chinook salmon then spend the next two to five years in the Bering Sea before returning to their natal spawning grounds. Most Chinook salmon return at age-five or age-six, but some return as age-four or age-seven olds (typically less than 10%). There used to be some Chinook salmon in the Yukon River that returned as age-eight olds, however none have been recorded for several decades.

3.2 CHUM SALMON (*ONCORHYNCHUS KETA*)



Chum salmon spawn in rivers and streams along most of the west coast of North America, and along the Bering and Arctic coasts eastwards to the Mackenzie River drainage. The upper Yukon River stocks of this species may have the longest upstream Chum spawning migration in the world with some migrating over 2,700 kilometres¹ in freshwater. In more southerly rivers, adult freshwater migrations tend to be much shorter with spawning occurring closer to the estuaries.

There are two runs of Chum salmon that enter the mouth of the Yukon River. The first to arrive are the summer (Alaskan stocks) Chum, which enter the river mouth in early June and reach peak abundance around the third week of June. Summer Chum generally spawn in the lower 800 kilometres of the Yukon drainage and only occasionally migrate into the Canadian section of the drainage.

Adult (fall) Chum salmon are characterized at the river mouth by later run timing, larger body size and a more silvery appearance than summer Chum salmon. Spawning occurs primarily in the upper portions of the drainage. Upper Yukon Chum salmon return as spawning adults to the river mouth from mid-July through early September after spending up to five years in the ocean. Peak migration timing of Chum salmon entering the Canadian portion of the drainage usually occurs in

¹ Spawning fall Chum salmon have been observed spawning on the Teslin River near Boswell Creek and are known to migrate into Teslin Lake.

mid-September. Predominant age classes of mature upper Yukon Chum salmon are age-four (62%) and age-five (35%). Spawning has been documented in ground water discharge areas that have water with a constant flow rate and temperature (between three and seven degrees Celsius), along cutbanks and in riffle areas of the mainstem Yukon, and in side channels and sloughs. Peak spawning occurs from October through early November.

Juvenile upper Yukon Chum salmon emerge from the gravel in April and May. After emergence, they spend little time in the natal area. By mid-June, most have moved away from the spawning areas. Little is known about the downstream migration of juveniles, although it is thought to occur close to the time of spring break-up.

3.3 COHO SALMON (*ONCORHYNCHUS KISUTCH*)



Coho are swift, active fish that spawn in streams from California to Alaska with the majority of their territory located between the Columbia River and the Cook Inlet in Alaska.

In northern populations, juvenile Coho spend two or three years in freshwater before entering the ocean. Juvenile Coho favour small streams, sloughs and ponds, but can also be found in lakes and large rivers. Migrating as smolts to the oceans, Coho spend up to 18 months in the sea before returning to their natal streams to spawn. While most Coho salmon return to fresh water as mature adults at three years of age, some mature earlier and migrate to their home streams as jacks at only two years. Little is currently known about Coho populations in the Canadian portion of the Yukon River despite observations in the mainstem and regular First Nation harvests in the Porcupine River.

3.4 ECOSYSTEM INTERACTIONS

As a consequence of their anadromous life history, salmon are sensitive to changes in both the marine and freshwater ecosystems. Salmon are an ecologically important species supporting

complex food webs in oceanic, estuarine, freshwater and terrestrial ecosystems by providing nutrients every year during their migration to the rivers and lakes to spawn.

DFO is moving away from management on a single species and moving towards an integrated ecosystem approach to science and management. Strategy 3 of the [Wild Salmon Policy](#) (WSP), Inclusion of Ecosystem Values and Monitoring, states the Department's intent to progressively incorporate ecosystem values in salmon management. The main focus of this effort will be on developing ecosystem-related indicators and science-based tools to better understand the pressures on Conservation Units (CUs) of Pacific Salmon and for integrating salmon conservation and other planning objectives. This strategy will include extraction of relevant information on environmental conditions in marine and freshwater ecosystems, in a risk-based framework.

The greatest challenge in implementation of the WSP is balancing the goals of maintaining and restoring healthy and diverse salmon populations and their habitats, with social and economic objectives that reflect people's values and preferences. Standardized monitoring and assessment of wild salmon populations, habitat and eventually ecosystem status will facilitate the development of comprehensive integrated strategic plans (WSP Strategy 4) that will address the goals of the WSP while addressing the needs of people. Outcomes of these plans will include biological objectives for salmon production from CUs and, where appropriate, anticipated timeframes for rebuilding, as well as management plans for fisheries and watersheds, which reflect open, transparent, and inclusive decision processes involving First Nations, communities, environmental organizations, fishers and governments.

For strategic planning and successful management of Pacific salmon, it will be essential to link variation in salmon production with changes in climate and their ecosystems. Salmon productivity in the Pacific is clearly sensitive to climate-related changes in stream, estuary and ocean conditions. Historically, warm periods in the coastal ocean have coincided with relatively low abundances of salmon, while cooler ocean periods have coincided with relatively high salmon numbers. In the past century, most Pacific salmon populations have fared best in periods having high precipitation, deep mountain snowpack, cool air and water temperatures, cool coastal ocean temperatures, and abundant north-to-south upwelling winds in spring and summer.

The Department conducts programs to monitor and study environmental conditions. Information on these programs is available at:

<http://www.pac.dfo-mpo.gc.ca/science/index-eng.html>.

These programs include:

- The Strait of Georgia Ecosystem Research Initiative

- Fraser River Environmental Watch
- Monitoring of physical, biological, and chemical freshwater and marine conditions
- Chlorophyll and phytoplankton timing and abundance

The annual State of the Pacific Ocean Report describes changes and trends in atmospheric and oceanic conditions which have the potential to affect Pacific salmon (and other species) populations and informs science-based decision-making and DFO's management of fisheries and marine resources in the Pacific Region. It is available at:

<http://www.dfo-mpo.gc.ca/oceans/publications/index-eng.html>.

3.4.1 PACIFIC SALMON RETURNING IN 2023: MIXED SIGNALS FROM ENVIRONMENTAL CONDITIONS

B.L. MacDonald, N.L. Wilson, S.C.H. Grant, J.L. Boldt, D.A. Patterson, A. Sastri C. Hannah

Summary

The 2023 Pacific salmon returns experienced varying environmental conditions across their freshwater and marine residences. Overall, we predict that 2023 Canadian Pacific salmon productivity (adult recruits produced per parental spawner) will generally fall near or below historical averages. This prediction is based on environmental and biological data from 2018-2023, which coincide with parental spawning and egg incubation through to ocean rearing conditions for the 2023 salmon returns across populations.

The effects of environmental conditions on 2023 returning salmon will depend on the specific conditions encountered by each population, and their life-histories. While we do not have relevant data for each salmon population, we provide a general description of what is known about overall environmental conditions experienced by Pacific salmon returning in 2023. Specifically:

- 1) Summer river temperatures are increasingly exceeding upper thermal tolerances for salmon in assessed systems. In the Fraser River, summer temperatures in 2018, 2019, and 2021 regularly exceeded such thresholds.
- 2) Early, rapid snowmelt depleted snowpacks in most of B.C. by mid-May/early-June in 2018 and 2019. Early loss of snowpack can contribute to warmer summer river and lake temperatures. Snowpacks were more variable across B.C. in 2020 and 2021, though some areas were well below average by late spring.

- 3) B.C. experienced multiple summer droughts in recent years. A notable summer drought in 2018 affected most of the province, including the northwest coast. In 2021, extreme to severe drought impacted multiple regions in southern B.C. Lower water levels can increase temperatures, block passage to key spawning habitat, strand salmon, and increase their exposure to predators.
- 4) Unprecedented flooding in southwestern B.C. during November 2021 may have scoured out salmon eggs in some systems (relevant for Pink salmon specifically).
- 5) Northeast Pacific marine heatwaves were present during late-2013-2016 and in 2019, 2020 and 2021. Marine heatwaves have negatively affected physical and biological ocean processes relating to salmon growth and productivity. However, by 2021 zooplankton community composition off the west coast of Vancouver Island and in Hecate Strait had generally returned to average conditions after being dominated by lower quality species since the 2013-2016 heatwave.

Looking further into the future, we do not anticipate that long-term salmon survival patterns will return to what we have seen historically. Pacific salmon are already responding to environmental changes driven by climate change and other human activities. As environmental conditions continue to change, as predicted for B.C. and the Yukon, climate change vulnerability assessments will be a valuable tool for providing a longer-range outlook for Canadian Pacific salmon.

General Distribution of the 2023 Pacific Salmon Returns

Five species of Pacific salmon are assessed and managed by the Department of Fisheries and Oceans: sockeye, Chinook, coho, pink and chum. Species and populations exhibit considerable variation in the habitats they occupy and the life history strategies they employ.

Most Canadian Pacific salmon returning in 2023 would have been deposited as eggs in their fresh water spawning grounds between 2018 and 2021, and will therefore return at an age falling between two and five years old (Figure). Many sockeye and Chinook populations, and all coho populations, rear in fresh water for one to two years as juveniles, before migrating to the ocean. Other sockeye and Chinook populations, and all chum and pink populations, migrate to the ocean shortly after hatching and emergence, with only a limited fresh water juvenile stage. Since the majority of 2023 returns would have inhabited fresh water environments between 2018 and 2021 (Figure), we present general fresh water conditions specific to these years.

The majority of 2023 Pacific salmon returns would have entered into the marine environment between 2020 and 2022, depending on their species and population, and will remain there until

they return to fresh water in 2022. We present general marine conditions for 2020 to 2022 where available.



Figure 1. Timing of common age classes of Pacific salmon returning in 2023 in each habitat they occupy. For each species, the most common life-history types are presented, using the Gilbert-Rich age designation system (in brackets); the number on the left indicates the total age at return, while the subscript shows the number of winters spent in fresh water prior to migrating to the ocean. Coloured boxes show the life stage and habitat occupied by each group of animals in every year of their life, leading up to their return to fresh water to spawn in 2023.

Global and Regional Environmental Context for Salmon Outlook

The planet is warming (Figure). Average land-ocean temperature has risen by 1.09°C over the last century (IPCC 2022), and the years 2014 to 2021 were the warmest on record (NOAA National Centers for Environmental Information 2022). Canada is warming at double the rate of the global average, due to its northern latitude (Bush and Lemmen 2019).

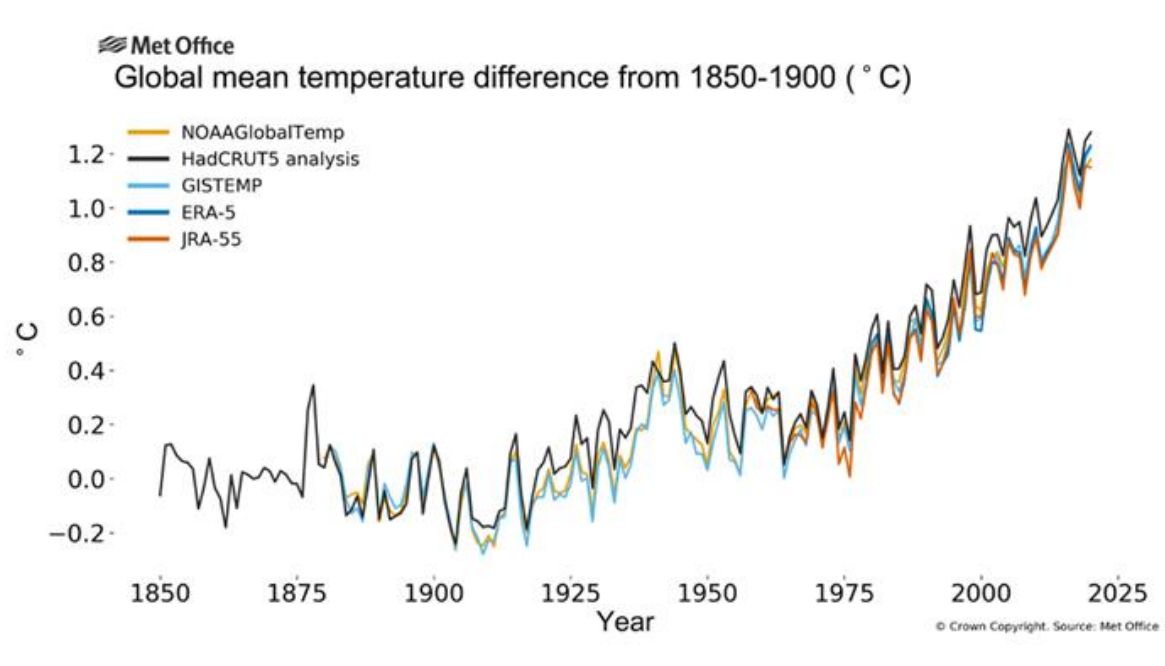


Figure 2. Global annual mean temperature difference from pre-industrial conditions (1850-1900). Canada’s temperature increases are double this global rate of warming, typical of countries occupying northern latitudes. The World Meteorological Organization (WMO) uses six international data sets to provide an authoritative assessment of global temperature change presented in this figure: Had CRUT5; NOAA GlobalTemp; GISTEMP; ERA5; JRA-55; Berkeley Earth. Source: Met Office Hadley Centre for Climate Science and Services, <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/2021-hadcrut5-wmo-temperature-statement> [Accessed Dec 15, 2022]

Profound environmental changes are already occurring in Western Canada as a result of the warming that has taken place to date. In B.C., average precipitation is increasing; snowpacks are melting earlier, altering the hydrographs of rivers in snow-dominated systems; lakes and rivers are becoming ice-free earlier in the spring; river temperatures are warming, and sea-surface temperatures are also warming along the coast (White et al. 2016). The Yukon has experienced accelerated warming during the winter months, increases in precipitation, melting glaciers, thawing permafrost, and earlier snowmelt over the past 50 years. Such changes are affecting the hydrologic regime in the Yukon, leading to increases in flooding and winter low flows (Streicker 2016).

Extreme events, such as the 2021 heat dome and fall atmospheric rivers, are likely to become more common and more severe in the Pacific Region as global temperatures continue to rise (White et al. 2016; Philip et al. 2021). A heatwave like that experienced in June 2021 historically would have

occurred once every 1,000 years. With 2°C of global warming above the pre-industrial (1850-1900) average, the frequency of such an event would increase to roughly every 5 to 10 years (Philip et al. 2021). Similarly, human-induced climate change has increased the likelihood of westerly atmospheric river events like that experienced in fall 2021 by at least 60% (Gillett et al. 2022).

Global temperatures are projected to rise 1.5°C to 3.7°C above the 1850-1900 average by the end of this century. We are already approaching the 1.5°C global limit of warming that the IPCC recommends as critical if we are to avoid significant issues related to food, water, and other life support systems on the planet (IPCC 2014, 2018, UNEP 2019). Temperatures in BC are expected to increase between 1.6°C to 5.2°C above the 1986-2005 average by the end of this century, according to low (RCP2.6) or “business as usual” high (RCP8.5) emission scenarios (Bush and Lemmen 2019). These projected changes will be accompanied by further increases in precipitation, loss of glaciers, and summer/early fall drought in southern BC (White et al. 2016). Average temperatures in Northern Canada are projected to increase by 2.1 to 7.8°C by the end of the century (Bush and Lemmen 2019). Precipitation will likely continue to increase in the Yukon, and will increasingly fall as rain rather than snow, while glaciers continue to melt, and permafrost continues to thaw (Bush and Lemmen 2019).

Environmental Conditions are Affecting the Salmon Outlook for 2023: Why does this matter?

Pacific salmon are already responding to environmental changes driven by climate change and other human activities (Grant et al. 2019). Though there are exceptions, we present general trends:

- a) Chinook salmon abundances have declined throughout their range across B.C. and the Yukon (Dorner et al. 2018; Grant et al. 2019).
- b) Sockeye salmon have declined and/or exhibited low abundances in southern latitudes in the past decade (Peterman and Dorner 2012; Grant et al. 2019; Hyatt et al. 2021). In recent years, sockeye abundances were generally poor throughout their Canadian range, including northern areas.
- c) Coho salmon declined in the mid-1980's. Northern BC coho recovered in the mid-2000s, but southern populations continue to exhibit low marine survival and exist at low abundances.
- d) Chum salmon have generally not exhibited declines in the past decade (Grant et al. 2019, 2020, 2021), though returns were generally poor from 2019 to 2021.
- e) Pink salmon have generally not exhibited declines in the past decade (Grant et al. 2019, 2020, 2021).

This qualitative outlook describes broad-scale patterns in fresh water and marine conditions to provide an indication of overall conditions for salmon survival, specifically for the 2023 returns. Physical changes in fresh water and marine environments affect Pacific salmon through their habitats and food availability, and salmon respond through their behaviour, growth rates, and overall survival (NOAA Fisheries 2021). While we do not have relevant data for all species in all locations, we provide a general description of what is known about environmental conditions experienced by the 2023 returns, in relation to historical conditions.

Salmon populations returning in 2023 will have been exposed to varying fresh water and marine conditions during the years 2018-2023. The specific environmental conditions experienced by each population are determined by their spawning and juvenile rearing distributions, age of return, and other characteristics such as migration timing. Additional factors can also contribute to salmon productivity, including habitat alteration from natural and human activities, particularly in fresh water, hatchery contributions, disease, contaminants, predation, competition, and other local environmental conditions.

Given the environmental changes already being observed, and those predicted for the future in B.C. and the Yukon, we do not anticipate that long-term salmon survival patterns will return to what we have seen historically. Climate change vulnerability assessments for Pacific salmon on the west coast of the U.S. indicate that vulnerability to climate change varies across Pacific salmon species and populations, determined by their unique combinations of geographical distribution and life history characteristics (Crozier et al. 2019). Climate vulnerability is largely higher for southern and interior populations, and this interacts with fresh water and estuary residence times (Crozier et al. 2019). These patterns corroborate some of the general trends that have already been observed across Pacific salmon populations in Canada (Grant et al. 2019).

As environmental conditions continue to change, climate change vulnerability assessments will be a valuable tool for providing a longer-range outlook for Canadian Pacific salmon. Such assessments will provide a more detailed understanding of the distribution of climate vulnerabilities across Pacific salmon populations in Canada, to better inform current and future management decisions and support efforts to adapt to the changing salmon landscape.

Fresh Water Indicators of Health for Spawning, Egg Incubation, and Juvenile Rearing Life Stages between 2018-2021

Air Temperature: Air temperature is an important determinant of river temperature, and therefore an important indicator of health for salmon in the fresh water stages of their lifecycle. Canadian Pacific salmon returning in 2023 lived during two of the five hottest years on record globally (2020 & 2019) (NOAA National Centers for Environmental Information 2022). Locally, air temperatures

have been warmer than average in recent decades (Streicker 2016; White et al. 2016). British Columbia warmed by 1.9°C between 1948 to 2016, while northern Canada warmed by 2.3°C, and some areas of northwestern Canada warmed by over 3°C (Bush and Lemmen 2019).

Spring months were warmer than average in B.C. in both 2018 and 2019, due to extremely warm May conditions. Summer 2018 was also warm, while summer 2019 was more variable and at times cooler than average (PCIC 2020). In 2020, B.C. experienced near normal maximum daily temperatures and above normal minimum daily temperatures, though warm conditions were prevalent in southeast B.C. in August 2020. In 2021, while spring months were closer to average, summer daily minimum and maximum temperatures were some of the warmest on record (Anslow and Sobie 2022). The summer of 2021 began with an extreme heatwave that blanketed Western Canada in late June, sending temperatures soaring well above all-time heat records across the region (Di Liberto 2021). This heatwave was found to be “virtually impossible” in the absence of human-caused climate change (Philip et al. 2021).

River Temperatures: Salmon have challenges migrating upstream to their spawning grounds when rivers are too warm. Annual river temperatures are not available for most BC/Yukon systems, but in the Fraser River system, where data are available, summer temperatures regularly exceeded upper thermal thresholds for salmon in 2018, 2019, and 2021.

Fisheries and Oceans Canada Fraser River environmental watch reports: <https://www.pac.dfo-mpo.gc.ca/science/habitat/frw-rfo/reports-rapports/archives-eng.html>. [Accessed December 10, 2020 & December 21, 2022]

In 2020, river temperatures were relatively average, except for a short period at the end of July where they exceeded 18°C.

Fisheries and Oceans Canada Fraser River environmental watch reports: <https://www.pac.dfo-mpo.gc.ca/science/habitat/frw-rfo/index-eng.html>. [Accessed October 12, 2021]

Peak summer water temperatures in the Fraser River increased by greater than 1.8 °C in the fifty years preceding 2008 (Farrell et al. 2008). It is now common each year to have days where river temperatures exceed 18°C at some point in the spring/summer. Temperatures above 18°C can result in decreased adult salmon swimming performance, and above 20°C can increase adult mortality, adult disease, egg viability, and cause legacy effects that have negative impacts on juvenile condition (Tierney et al. 2009; Burt et al. 2011; Eliason et al. 2011; Sopinka et al. 2016). High in-river spawning and incubation temperatures can have population-specific negative effects on fertilization success and embryo survival, affect timing of hatch (Whitney et al. 2014), emergence (Macdonald et al. 1998), and reduce swimming endurance and impair swimming behaviour of fry

(Burt et al. 2012). For juveniles that rear in fresh water, warmer temperatures can improve juvenile growth rates when prey are not limiting (Brett 1971, Edmundson & Mazumder 2001), and also increase the length of the growing season in some areas (Schindler et al. 2005). The exposure of a salmon population to these various temperature-related fresh water conditions will vary by system. However, as temperatures continue to increase from global climate change, the net effect is expected to be negative (Crozier et al. 2019).

Snowpack: The timing and rate of snowpack loss are significant factors in the volume and timing of spring freshets. The size and melting rate of winter snowpack in the mountains is a strong indicator of river water volume, flow rates and temperature in the summer months (Patterson and Hague 2007). Early loss of snowpack reduces the cool water inputs into rivers and lakes from snowmelt in warmer summer months.

In 2018 and 2019, the onset of snowmelt began several weeks earlier than normal. In these years, most regions of BC had below-average snowpacks by the second week of May. The 2020 season had a mix of snowmelt conditions, with early melt in low and mid-elevation areas and a delay in the melt of high elevation snowpacks. Snowpack in 2021 was average to well above average until April. Snowmelt began earlier than normal, particularly at lower elevations. By the end of May snowpack was below average in southeast B.C. and Vancouver Island, and well below average in some parts of Interior B.C.

Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, River Forecast Center, Snow Conditions & Water Supply Bulletin:

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/river-forecast-centre/snow-survey-water-supply-bulletin>

Spring freshets were close to normal in 2017, 2018, 2019. In 2020, earlier seasonal melt and lower peak snow accumulation in some areas of the province saw some rivers trend towards an earlier freshet and below seasonal stream flow, while others remained close to normal or slightly above. Snowmelt began early at low and mid elevations in 2021.

Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, River Forecast Center, Snow Conditions & Water Supply Bulletin:

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/river-forecast-centre/snow-survey-water-supply-bulletin>

Summer drought

Drought can result in lower river and lake levels, deteriorate water quality, block access to spawning habitat, strand salmon, increase exposure to predators and increase the risk of low

oxygen levels in some fresh water systems. Recent years hit records for summer droughts in B.C. In 2018, a heatwave in early spring depleted snowpacks, and lack of precipitation from July to November created extensive dry to extremely dry conditions from July to November that affected the entire coast of B.C., including the northwest. In 2019, a spring heatwave created dry conditions across the province, and drove down stream flows. Heavy rains in July helped to relieve the drought. Most of the province experienced wet conditions in early summer 2020. However, Vancouver Island and some southern B.C. watersheds became very dry by late summer. In both 2019 and 2020, most of the province had returned to average conditions by October. In 2021, below average precipitation in spring and summer months combined with very warm summer temperatures, punctuated by several heatwaves. This led to severe drought conditions in southern B.C. that lasted from July to September (Anslow and Sobie 2022).

British Columbia Drought Information Portal:

<https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=838d533d8062411c820eef50b08f7ebc>

Fall Floods

Flooding and high river flows can scour spawning beds or bury salmon eggs in sediment (Holtby and Healey 1986; Lisle 1989; Lapointe et al. 2000; Pike et al. 2010; Cloutier et al. 2017; Crozier et al. 2019). In Fall 2021, extended periods of extreme rainfall caused unprecedented flooding in southwestern B.C. and Washington State.

Marine indicators of Health for Juvenile Rearing to Adulthood Life Stages between 2020-2023

Ocean Temperature: Salmon metabolic demands increase with temperature. Without a concurrent increase in prey quality or quantity, salmon growth and productivity will decrease under warming conditions (Holsman et al. 2018). In recent years Chinook body weight for a given length declined (Daly et al. 2017). Sizes of mature Fraser River sockeye declined from the 1970s to the early 1990s, increased in the early 2000s, then again decreased through the 2010s. Lake-type Fraser Sockeye were amongst the smallest on record in 2019, 2020, and 2021 (Latham et al. 2021, 2022). Predation also can intensify in warmer ocean conditions, increasing salmon mortality (Holsman et al. 2012).

Sea surface temperatures have been warmer than average in the Northeast Pacific Ocean in recent decades (Figure) and have increased linearly by 0.87°C over the past 100 years (Chandler 2022). Following “The Blob”, the notable North Pacific marine heatwave of 2013 to 2016, there was a return to near-average sea-surface temperatures in 2017 and 2018. However, this was likely due to the cooling effect of the La Niña that persisted until the second half of 2018 (Ross and Robert 2018,

2019). New heatwaves were observed in the late summer and fall of 2018 and throughout most of 2019 and 2020 (Hannah et al. 2019; Ross and Robert 2020, 2021). The 2019 and 2020 heat waves were the second and third most expansive, respectively, in recorded history (NOAA Fisheries 2020), though neither reached the water column depths of The Blob. The 2020 marine heatwave persisted into the latter half of 2020, despite the emergence of La Niña conditions (Ross and Robert 2021).

Sea surface temperatures in the northeast Pacific were generally cooler in 2021 than in 2020 (Ross and Robert 2022). Near average, or slightly warm temperatures were observed in 2021, likely due to the influence of strong cool phases of climate oscillations (ENSO & PDO) layered on top of long-term warming due to climate change (Ross and Robert 2022). However, multiple marine heatwaves were observed in 2021, including a short-lived heatwave observed in the waters surrounding Vancouver Island during the early summer heat dome event (Hilborn and Hannah 2022).

At the time of writing, we are entering into our third consecutive La Niña winter. Moving into January-March 2023 there is a 50-50 chance of continued La Niña or ENSO-neutral conditions. By February-April 2023 there is a 71% change of ENSO-neutral conditions (NOAA National Weather Service 2022).

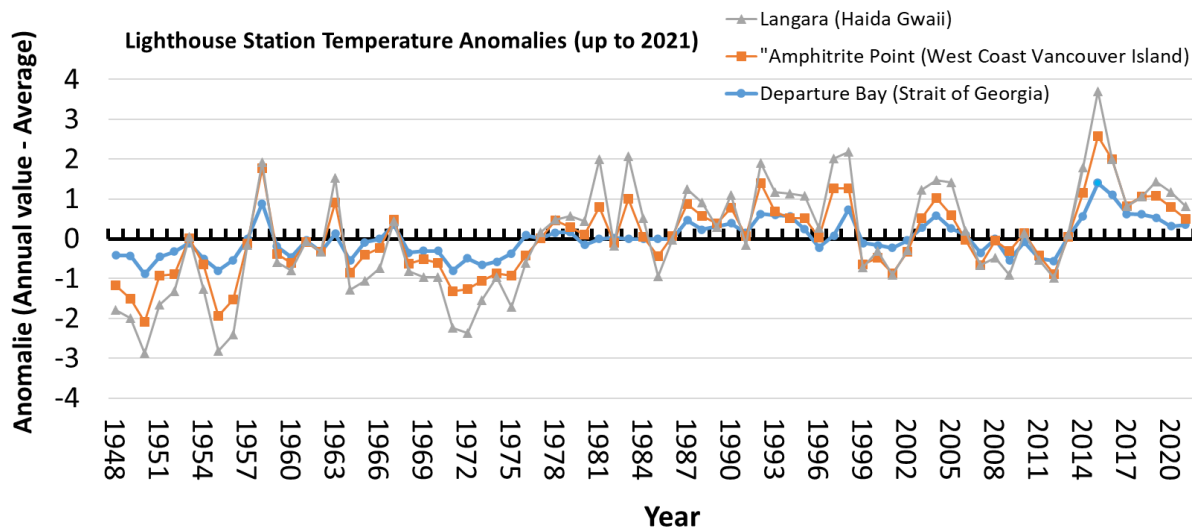


Figure 3. Annual average sea-surface-temperature anomalies from Fisheries & Oceans Canada lighthouse stations: <https://www.dfo-mpo.gc.ca/science/data-donnees/lightstations-phares/index-eng.html>. Anomalies represent the departure from a mean reference period (1948-2021). Temperature anomalies are expressed as degree Celsius (C).

Physical oceanography: Deep water convection is one of the major processes driving open-ocean primary productivity in the Pacific Ocean. Strong winter mixing brings more nutrients to the surface. Mixing in the winter of 2019/20 was weak. This suggests that surface nutrients were low, though they were likely not as low as they were in 2019 (Ross and Robert 2021). Winter mixing in 2020/21 was closer to normal than the previous two years, and nutrient supply was likely average in spring 2021 (Ross and Robert 2022).

Food Web - Phytoplankton: Phytoplankton are the base of the aquatic food web, feeding a host of other animals, such as zooplankton. The size and composition of phytoplankton communities affect the zooplankton that are able to feed on them, causing impacts further up the food chain (Batten and Ostle 2020).

Off the west coast of B.C. (along Line P), phytoplankton biomass was relatively low in 2020 (Peña and Nemcek 2021). Phytoplankton community composition was similar to 2015 (a marine heatwave year) in the winter of 2020, but in the summer it was similar to pre-marine heatwave years (Boldt et al. 2021). Phytoplankton community composition appeared to be returning to pre-marine heatwave conditions in the 2021 offshore surveys (Ostle and Batten 2022).

Food Web - Zooplankton Zooplankton play a key role in the food web, supporting higher trophic levels. Boreal and sub-Arctic copepods are lipid-rich and very nutritious species of zooplankton that occur along the outer B.C. coast. Sub-arctic copepods are more abundant in relatively cool years (Hipfner et al. 2020). Southern copepods are smaller, comparatively lipid-poor zooplankton that are less nutritious and have their distributions centered off California. Warmer ocean temperatures, such as those seen in marine heatwaves like The Blob, cause northward shifts in the distribution of southern copepod species to occupy habitats otherwise too cold for them (Mackas et al. 2004). Such shifts in zooplankton composition are a key pathway potentially linking reduced salmon productivity to warmer temperatures in the Northeast Pacific Ocean (Mackas et al. 2007).

In 2020, the biomass of gelatinous zooplankton, characterized by high water content and low nutritional value, declined compared to the anomalous highs observed since the 2014 marine heatwave (Galbraith and Young 2021). In 2021 gelatinous biomass returned to the long-term average (Galbraith and Young 2022). Crustacean biomass anomalies were generally close to average in both 2020 and 2021 (Galbraith and Young 2021, 2022).

Among the crustaceans, sampling in the coastal waters of Vancouver Island (North and South) and Hecate Strait showed declining trends in southern copepods since 2017/18, with a brief uptick in 2020 in the Southern Vancouver Island region. In 2021 southern copepod abundances were below or close to average on the shelf (Galbraith and Young 2022). Southern copepods were comparatively more abundant in offshore areas than on the shelf in both 2020 and 2021 (Galbraith

and Young 2021, 2022). Boreal and subarctic copepods were closer to average in 2020 than in previous years (Galbraith and Young 2021). In 2021 boreal and subarctic copepods generally increased, and were above average in all areas apart from one (average in offshore SVI) (Galbraith and Young 2022).

In the Strait of Georgia, zooplankton biomass has been trending upwards since 2011 (Perry et al. 2021), and was above average in both 2020 and 2021 (Young et al. 2021, 2022). Zooplankton biomass was dominated by medium and large bodied copepods and larger crustaceans (Young et al. 2021, 2022), which tend to be the preferred prey for several species of juvenile fish of commercial interest (Perry et al. 2021).

References

- Anslow, F., and Sobie, S. 2022. Land temperature and hydrological conditions in 2021. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 18–22.
- Batten, S., and Ostle, C. 2020. Lower trophic levels in the Northeast Pacific. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2019. *Edited by* J.L. Boldt, A. Javorski, and P.C. Chandler. Can. Tech. Rep. Fish. Aquat. Sci. 3377. pp. 58–62.
- Boldt, J.L., Javorski, A., and Chandler, P.C. (Editors). 2021. State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. Can. Tech. Rep. Fish. Aquat. Sci. 3434: vii + 231. Available from https://publications.gc.ca/collections/collection_2021/mpo-dfo/Fs97-6-3434-eng.pdf.
- Brett, J.R. 1971. Energetic responses of salmon to temperature. A study of some thermal relations in the physiology and freshwater ecology of sockeye salmon (*Oncorhynchus nerka*). *Am. Zool.* **11**(1): 99–113. doi:198.103.39.129.
- Burt, J.M., Hinch, S.G., and Patterson, D.A. 2011. The importance of parentage in assessing temperature effects on fish early life history: a review of the experimental literature. *Rev. Fish Biol. Fish.* **21**: 377–406. doi:10.1007/s11160-010-9179-1.
- Burt, J.M., Hinch, S.G., and Patterson, D.A. 2012. Developmental temperature stress and parental identity shape offspring burst swimming performance in sockeye salmon (*Oncorhynchus nerka*). *Ecol. Freshw. Fish* **21**(2): 176–188. doi:10.1111/j.1600-0633.2011.00535.x.
- Bush, E., and Lemmen, D.S. (Editors). 2019. Canada's changing climate report; Government of Canada, Ottawa, ON. Government of Canada, Ottawa, ON. Available from www.ChangingClimate.ca/CCCR2019.
- Chandler, P.C. 2022. Sea surface temperature and salinity observed at shore stations and weather bouys along the B.C. coast in 2021. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 42–46.
- Cloutier, C., Locat, J., Geertsema, M., Jakob, M., and Schnorbus, M. 2017. Potential impacts of climate change

on landslides occurrence in Canada. *In Slope Safety Preparedness for Impact of Climate Change. Edited by K. Ho, S. Lacasse, and L. Picarelli. CRC Press, Leiden, The Netherlands. pp. 71–104. doi:10.1201/9781315387789-5.*

- Crozier, L.G., McClure, M.M., Beechie, T., Bograd, S.J., Boughton, D.A., Carr, M., Cooney, T.D., Dunham, J.B., Greene, C.M., Haltuch, M.A., Hazen, E.L., Holzer, D.M., Huff, D.D., Johnson, R.C., Jordan, C.E., Kaplan, I.C., Lindley, S.T., Mantua, N.J., Moyle, P.B., Myers, J.M., Nelson, M.W., Spence, B.C., Weitkamp, L.A., Williams, T.H., and Willis-Norton, E. 2019. Climate vulnerability assessment for Pacific salmon and steelhead in the California Current Large Marine Ecosystem. *PLoS One* **14**(7): e0217711. doi:10.1371/journal.pone.0217711.
- Daly, E.A., Brodeur, R.D., and Auth, T.D. 2017. Anomalous ocean conditions in 2015 : impacts on spring Chinook salmon and their prey field. *Mar. Ecol. Prog. Ser.* **566**: 169–182. doi:10.3354/meps12021.
- Dorner, B., Catalano, M.J., and Peterman, R.M. 2018. Spatial and temporal patterns of covariation in productivity of Chinook salmon populations of the northeastern Pacific Ocean. *Can. J. Fish. Aquat. Sci.* **75**(7): 1082–1095. doi:10.1139/cjfas-2017-0197.
- Edmundson, J.A., and Mazumder, A. 2001. Linking growth of juvenile sockeye salmon to habitat temperature in Alaskan lakes. *Trans. Am. Fish. Soc.* **130**: 644–662. doi:10.1577/1548-8659(2001)130<0644:LGOJSS>2.0.CO;2.
- Eliason, E.J., Clark, T.D., Hague, M.J., Hanson, L.M., Gallagher, Z.S., Jeffries, K.M., Gale, M.K., Patterson, D.A., Hinch, S.G., and Farrell, A.P. 2011. Differences in thermal tolerance among sockeye salmon populations. *Science (80-.)*. **332**(6025): 109–112. doi:10.1126/science.1199158.
- Farrell, A.P., Hinch, S.G., Cooke, S.J., Patterson, D.A., Crossin, G.T., Lapointe, M., and Mathes, M.T. 2008. Pacific salmon in hot water: applying aerobic scope models and biotelemetry to predict the success of spawning migrations. *Physiol. Biochem. Zool.* **81**(6): 697–708. doi:10.1086/592057.
- Galbraith, M., and Young, K. 2021. West Coast British Columbia zooplankton biomass anomalies 2020. *In State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. Edited by J.L. Boldt, A. Javorski, and P. Chandler. Can. Tech. Rep. Fish. Aquat. Sci. 3434. pp. 75–80.*
- Galbraith, M., and Young, K. 2022. West Coast British Columbia zooplankton biomass anomalies 2021. *In State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. Edited by J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 77–82.*
- Gillett, N.P., Cannon, A.J., Malinina, E., Schnorbus, M., Anslow, F., Sun, Q., Kirchmeier-Young, M., Zwiers, F., Seiler, C., Zhang, X., Flato, G., Wan, H., Li, G., and Castellan, A. 2022. Human influence on the 2021 British Columbia floods. *Weather Clim. Extrem. Elsevier B.V.* doi:10.1016/j.wace.2022.100441.
- Grant, S.C.H., MacDonald, B.L., Lewis, D., G.J., N.L.W.C., and Michielsens, C.G.J. 2021. State of Canadian Pacific salmon in 2020. *In State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2020. Can. Tech. Rep. Fish. & Aquat. Sci. 3434. pp. vii + 231. Edited by J.L. Boldt, A. Javorski, and P.C. Chandler.*
- Grant, S.C.H., Macdonald, B.L., and Michielsens, C.G.J. 2020. State of Canadian Pacific salmon in 2019. *In State of the Physical , Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2019. Can. Tech. Rep. Fish. Aquat. Sci. 3377. pp. x + 288. Edited by J.L. Boldt, A. Javorski, and P.C.*

Chandler. pp. 86–91. Available from <https://www.dfo-mpo.gc.ca/oceans/publications/soto-rceo/2019/index-eng.html>.

- Grant, S.C.H., MacDonald, B.L., and Winston, M.L. 2019. State of the Canadian Pacific salmon: responses to changing climate and habitats. *Can. Tech. Rep. Fish. Aquat. Sci.* **3332**: ix + 50 pp. Available from <http://www.dfo-mpo.gc.ca/species-especes/publications/salmon-saumon/state-etat-2019/abstract-resume/index-eng.html>.
- Hannah, C., Page, S., and Ross, T. 2019. Ocean surface temperatures in 2018: another marine heat wave? *In* State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018. *Can. Tech. Rep. Fish. Aquat. Sci.* 3314. *Edited by* J.L. Boldt, J. Leonard, and P.C. Chandler. pp. 31–36. Available from <https://dfo-mpo.gc.ca/oceans/publications/soto-rceo/2018/index-eng.html>.
- Hilborn, A., and Hannah, C. 2022. Sea surface temperature during 2021: heat waves and heat domes. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. *Can. Tech. Rep. Fish. Aquat. Sci.* 3482. pp. 47–54.
- Hipfner, J.M., Galbraith, M., Bertram, D.F., and Green, D.J. 2020. Basin-scale oceanographic processes, zooplankton community structure, and diet and reproduction of a sentinel North Pacific seabird over a 22-year period. *Prog. Oceanogr.* **182**: 102290. Elsevier. doi:10.1016/j.pocean.2020.102290.
- Holsman, K., Hollowed, A., Shin-Ichi, I., Bograd, S., Hazen, E., King, J., Mueter, F., and Perry, R.I. 2018. Climate change impacts, vulnerabilities and adaptations: North Pacific and Pacific Arctic marine fisheries. *In* Impacts of climate change on fisheries and aquaculture: synthesis of current knowledge, adaptation and mitigation options. *Edited by* M. Barange, T. Bahri, M.C.M. Beveridge, K.L. Cochrane, S. Funge-Smith, and F. Poulain. FAO Fisheries and Aquaculture Technical Paper, No. 627. FAO, Rome. pp. 113–138. Available from <http://www.fao.org/3/i9705en/i9705en.pdf>.
- Holsman, K.K., Scheuerell, M.D., Buhle, E., and Emmett, R. 2012. Interacting effects of translocation, artificial propagation, and environmental conditions on the marine survival of Chinook salmon from the Columbia River, Washington, U.S.A. *Conserv. Biol.* **26**(5): 912–922. doi:10.1111/j.1523-1739.2012.01895.x.
- Holtby, L.B., and Healey, M.C. 1986. Selection for adult size in female coho salmon (*Oncorhynchus kisutch*). *Can. J. Fish. Aquat. Sci.* **43**(10): 1946–1959. doi:10.1139/f86-240.
- Hyatt, K., Stiff, H., and Stockwell, M. 2021. Coast-side sockeye salmon performance indicators, regional overview of trends, 2020 returns, and 2021–2023 outlook. *In* State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2020. *Can. Tech. Rep. Fish. & Aquat. Sci.* 3434. pp. vii + 231. *Edited by* J.B. P. Chandler, A. Javorski. pp. 112–116.
- IPCC. 2014. Climate change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. *Edited By* C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 1132 pp. Available from <https://www.ipcc.ch/report/ar5/wg2/>.
- IPCC. 2018. Summary for policymakers. *In* Global warming of 1.5°C. An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission

pathways, in the context of strengthening the global response to the threat of climate change. *Edited By* V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield. World Meteorological Organization, Geneva, Switzerland. 32 pp. Available from <http://www.ipcc.ch/report/sr15/>.

- IPCC. 2022. Summary for policymakers. [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. *In* Climate change 2022: impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. *Edited by* H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, and A. Okem. Cambridge University Press. In press. Available from https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_TechnicalSummary.pdf.
- Lapointe, M., Eaton, B., Driscoll, S., and Latulippe, C. 2000. Modelling the probability of salmonid egg pocket scour due to floods. *Can. J. Fish. Aquat. Sci.* **57**(6): 1120–1130. doi:10.1139/cjfas-57-6-1120.
- Latham, S., Phung, A., Brkic, D., Ball, C., Sellars, J., Dailey, C., and Taylor, E. 2021. Size and age trends of mature Fraser River Sockeye salmon (*Oncorhynchus nerka*) through 2020. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. *Edited by* J.L. Boldt, A. Javorski, and P. Chandler. *Can. Tech. Rep. Fish. Aquat. Sci.* 3434. pp. 122–126.
- Latham, S., Phung, A., Brkic, D., Sellars, J., Ball, C., Taylor, E., Dailey, C., Wong, S., Hague, M., and Nowak, B. 2022. Size of mature Fraser River Sockeye and Pink salmon. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. *Can. Tech. Rep. Fish. Aquat. Sci.* 3482. pp. 108–111.
- Di Liberto, T. 2021. Astounding heat obliterates all-time records across the Pacific Northwest and Western Canada in June 2021. Available from <https://www.climate.gov/news-features/event-tracker/astounding-heat-obliterates-all-time-records-across-pacific-northwest> [accessed 25 November 2021].
- Lisle, T.E. 1989. Sediment transport and resulting deposition in spawning gravels, north coastal California. *Water Resour. Res.* **25**(6): 1303–1319. doi:10.1029/WR025i006p01303.
- Macdonald, J.S., Scrivener, J.C., Patterson, D.A., and Dixon-Warren, A. 1998. Temperatures in aquatic habitats: the impacts of forest harvesting and the biological consequences to sockeye salmon incubation habitats in the interior of B.C. *In* Forest-fish conference: land management practices affecting aquatic ecosystems. Proc. Forest-Fish Conf., May 1-4, 1996, Calgary, AB. *Edited by* M.K. Brewin and D.M.A. Monita. Natural Resources Canada, Edmonton, AB. pp. 313–324.
- Mackas, D.L., Batten, S., and Trudel, M. 2007. Effects on zooplankton of a warmer ocean: recent evidence from the Northeast Pacific. *Prog. Oceanogr.* **75**(2): 223–252. doi:10.1016/j.pcean.2007.08.010.
- Mackas, D.L., Peterson, W.T., and Zamon, J.E. 2004. Comparisons of interannual biomass anomalies of zooplankton communities along the continental margins of British Columbia and Oregon. *Deep Sea Res. Part II Top. Stud. Oceanogr.* **51**(6–9): 875–896. doi:10.1016/j.dsr2.2004.05.011.
- NOAA Fisheries. 2020. String of marine heatwaves continues to dominate Northeast Pacific. Available from <https://www.fisheries.noaa.gov/feature-story/string-marine-heatwaves-continues-dominate-northeast-pacific> [accessed 12 October 2021].

- NOAA Fisheries. 2021. Literature review of climate change impacts on Pacific salmon and steelhead. Available from <https://www.fisheries.noaa.gov/west-coast/climate/literature-review-climate-change-impacts-pacific-salmon-and-steelhead> [accessed 29 November 2021].
- NOAA National Centers for Environmental Information. 2022. Climate at a glance: global time series. Available from https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/global/time-series/globe/land_ocean/12/12/1880-2022 [accessed 29 December 2022].
- NOAA National Weather Service. 2022. El Nino/Southern Oscillation (ENSO) diagnostic discussion, December 8, 2022. Available from https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml [accessed 28 December 2022].
- Ostle, C., and Batten, S. 2022. Lower trophic levels in the Northeast Pacific. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 83–86.
- Patterson, D.A., and Hague, M.J. 2007. Evaluation of long range summer forecasts of lower Fraser River discharge and temperature conditions. Can. Tech. Rep. Fish. Aquat. Sci. **2754**: vii + 34. Available from <https://science-catalogue.canada.ca/record=4027137~S6>.
- PCIC. 2019. Seasonal Anomaly Maps. Available from <https://www.pacificclimate.org/analysis-tools/seasonal-anomaly-maps> [accessed 10 January 2020].
- Peña, A., and Nemcek, N. 2021. Nutrients and phytoplankton along Line P and West Coast of Vancouver Island. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. *Edited by* J.L. Boldt, A. Javorski, and P.C. Chandler. Can. Tech. Rep. Fish. Aquat. Sci. 3434. pp. 64–67.
- Perry, I.R., Young, K., Galbraith, M., Chandler, P., Velez-Espino, A., and Baillie, S. 2021. Zooplankton variability in the Strait of Georgia, Canada, and relationships with the marine survivals of Chinook and Coho salmon. *In* PLoS ONE. doi:10.1371/journal.pone.0245941.
- Peterman, R.M., and Dorner, B. 2012. A widespread decrease in productivity of sockeye salmon (*Oncorhynchus nerka*) populations in western North America. Can. J. Fish. Aquat. Sci. **69**(8): 1255–1260. doi:10.1139/f2012-063.
- Philip, S.Y., Kew, S.F., Oldenborgh, G.J. Van, Yang, W., Vecchi, G.A., Anslow, F.S., Li, S., Seneviratne, S.I., Luu, L.N., Arrighi, J., Singh, R., Aalst, V., Hauser, M., Schumacher, D.L., Marghidan, C.P., Ebi, K.L., Vautard, R., Tradowsky, J., Coumou, D., Lehner, F., Rodell, C., Stull, R., Howard, R., Gillett, N., and Otto, F.E.L. 2021. Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021. Available from <https://www.worldweatherattribution.org/wp-content/uploads/NW-US-extreme-heat-2021-scientific-report-WWA.pdf>.
- Pike, R.G., Redding, T.E., Moore, R.D., Winkler, R.D., and Bladon, K.D. (editors). 2010. Compendium of forest hydrology and geomorphology in British Columbia, Volume 2 of 2. B.C. Min. For. Range, For. Sci. Prog., Victoria, B.C. and FORREX Forum for Research and Extension in Natural Resources, Kamloops, B.C., Land Manag. Handb. 66. pp. 401–806. Available from <https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh66.htm>.
- Ross, T., and Robert, M. 2018. La Niña and another warm year. *In* State of the Physical, Biological and

- Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2017. Can. Tech. Rep. Fish. Aquat. Sci. 3225. *Edited by* P.C. Chandler, S.A. King, and J.L. Boldt. pp. 27–32. Available from <https://dfo-mpo.gc.ca/oceans/publications/soto-rceo/2017/index-eng.html>.
- Ross, T., and Robert, M. 2019. Another warm, but almost normal, year in the Northeast Pacific Ocean. *In* State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018. Can. Tech. Rep. Fish. Aquat. Sci. 3314. *Edited by* J.L. Boldt, J. Leonard, and P.C. Chandler. Can. Tech. Rep. Fish. Aquat. Sci. 3314. pp. 15–20. Available from <https://dfo-mpo.gc.ca/oceans/publications/soto-rceo/2018/index-eng.html>.
- Ross, T., and Robert, M. 2020. Are marine heatwaves the new normal for the Northeast Pacific Ocean? *In* State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2019. Can. Tech. Rep. Fish. Aquat. Sci. 3377. *Edited by* J.L. Boldt, A. Javorski, and P.C. Chandler. pp. 21-25. Available from <https://waves-vagues.dfo-mpo.gc.ca/Library/40884569.pdf>.
- Ross, T., and Robert, M. 2021. Marine heatwave persists despite growing La Niña. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. *Edited by* J.L. Boldt, A. Javorski, and P. Chandler. Can. Tech. Rep. Fish. Aquat. Sci. 3434. pp. 24–28.
- Ross, T., and Robert, M. 2022. Normal temperatures despite strong cool climate indices and an emerging freshening trend. *In* State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. *Edited by* J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier. Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 23–30.
- Schindler, D.E., Rogers, D.E., Scheuerell, M.D., and Abrey, C.A. 2005. Effect of changing climate on zooplankton and juvenile sockeye salmon growth in Southwestern Alaska. *Ecology* **86**(1): 198–209. doi:10.1890/03-0408].
- Sopinka, N.M., Middleton, C.T., Patterson, D.A., and Hinch, S.G. 2016. Does maternal captivity of wild, migratory sockeye salmon influence offspring performance? *Hydrobiologia* **779**(1): 1–10. doi:10.1007/s10750-016-2763-1.
- Streicker, J. 2016. Yukon climate change indicators and key findings in 2015. Northern Climate ExChange, Yukon Research Centre, Yukon College, 84 pp. Available from https://www.yukoncollege.yk.ca/sites/default/files/inline-files/Indicator_Report_Final_web.pdf.
- Tierney, K.B., Patterson, D.A., and Kennedy, C.J. 2009. The influence of maternal condition on offspring performance in sockeye salmon *Oncorhynchus nerka*. *J. Fish Biol.* **75**(6): 1244–1257. doi:10.1111/j.1095-8649.2009.02360.x.
- United Nations Environment Programme. 2019. Emissions gap report 2019. UNEP, Nairobi. doi:10.18356/ff6d1a84-en.
- White, T., Wolf, J., Anslow, F., and Werner, A. 2016. Indicators of climate change for British Columbia: update 2016. Victoria, B.C. doi:ISBN 0-7726-4732-1.
- Whitney, C.K., Hinch, S.G., and Patterson, D.A. 2014. Population origin and water temperature affect development timing in embryonic sockeye salmon. *Trans. Am. Fish. Soc.* **143**(5): 1316–1329. doi:10.1080/00028487.2014.935481.
- Young, K., Galbraith, M., Perry, R.I., and Sastra, A. 2021. Zooplankton status and trends in the central and

northern Strait of Georgia, 2020. *In State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2020. Edited by J.L. Boldt, A. Javorski, and P. Chandler.* Can. Tech. Rep. Fish. Aquat. Sci. 3434. pp. 186–190.

Young, K., Galbraith, M., Sastri, A., and Perry, R.I. 2022. Zooplankton status and trends in the central and northern Strait of Georgia, 2021. *In State of the physical, biological and selected fishery resources of Pacific Canadian marine ecosystems in 2021. Edited by J.L. Boldt, E. Joyce, S. Tucker, and S. Gauthier.* Can. Tech. Rep. Fish. Aquat. Sci. 3482. pp. 176–179.

3.5 INDIGENOUS KNOWLEDGE (IK)

The term Indigenous knowledge may not be universally used, and other terms such as Indigenous Knowledge Systems, Traditional Knowledge, Traditional Ecological Knowledge, or Aboriginal Traditional Knowledge, which all convey similar concepts, may be used instead.

In 2019, the *Fisheries Act* was amended to include provisions for the where the Minister may or shall consider provided Indigenous knowledge in making decisions pertaining to fisheries, fish and fish habitat. Section 61 of the act ensures this knowledge is protected and can only be provided with consent. There are also provisions under the *Species At Risk Act* (s.10.2, s.15.2, s.16, s.18.1) that support inclusion of Indigenous knowledge to inform the assessment and protection of species at risk. Likewise, the *Oceans Act* (s.42) allows the Minister to consider Indigenous knowledge in oceans-related decisions.

The Government of Canada and the scientific community acknowledge the need to incorporate Indigenous knowledge in meaningful and respectful ways. Work is underway at a National level to develop processes for how DFO receives Indigenous knowledge and applies it to inform decision-making. Many outstanding questions remain on how to move forward in a way that respects, meaningfully incorporates, and protects the knowledge that may be shared with DFO, to mutual benefit. For example, how to engage knowledge holders, and how to ensure that the knowledge can be shared and considered in a mutually acceptable manner by both knowledge holders and the broader community of First Nations, stakeholders, managers, and policy makers involved in the fisheries. Given the diversity of knowledge and relationships, regional work will involve an iterative process in collaboration with First Nations, Indigenous groups and knowledge holders, to ensure appropriate inclusion and protection of the knowledge provided. The Department is committed to finding a way forward that respects the knowledge and the knowledge holders, and upholds the Principles respecting the Government of Canada's relationship with Indigenous peoples, which are available online at:

<https://www.justice.gc.ca/eng/csj-sjc/principles-principes.html>.

More information on the updates to the *Fisheries Act*: <https://www.dfo-mpo.gc.ca/campaign-campagne/fisheries-act-loi-sur-les-peches/reconciliation-eng.html>

See Sections 2.5, 34.1, and 61.2 in the *Fisheries Act* (2019): <https://laws-lois.justice.gc.ca/eng/acts/f-14/>.

Section 61.2 protections for Indigenous knowledge have also been included in the *Access to Information Act*, Schedule 2: <https://laws-lois.justice.gc.ca/eng/acts/a-1/page-15.html#h-1230>

The *Wild Salmon Policy* (WSP) (2005) and *Wild Salmon Policy Implementation Plan* (2018) both acknowledge the importance of integrating Indigenous Knowledge (IK) and Traditional Ecological Knowledge (TEK) into the strategic planning process. The Department may identify potential partnerships with First Nations organizations to develop an approach for integrating IK into the WSP, particularly in planning initiatives.

The *Species at Risk Act* makes a special reference to the inclusion of Traditional Knowledge in the recovery of species at risk. The Department has developed an operational guidance document for SARA practitioners (*Guidance on Considering Traditional Knowledge in Species at Risk Implementation*, 2011). Indigenous groups have participated in the development and implementation of Interior Fraser River Coho and Cultus Lake Sockeye salmon species management actions.

3.6 STOCK ASSESSMENT

Since 2009, a sonar program located at Eagle, Alaska (immediately downstream of the Canadian border) has been the main means of assessing both Chinook and chum salmon returning to the Yukon River (mainstem) in Canada and provides the border passage estimates necessary to confirm spawning escapement and harvest share obligations in the Treaty. This sonar program replaced a long-standing mark-recapture assessment project. In the Porcupine River drainage, since 2011 a sonar program on the Porcupine River (near Old Crow) has provided information on return of Chinook and chum salmon to the Canadian Porcupine watershed and a weir on the Fishing Branch River provides information on escapement of chum salmon to the drainage's main spawning grounds. Both projects provide occasional information about later running coho salmon.

In addition to these border passage assessments there are several other assessment programs that provide information on spawning escapement in select tributaries. Aerial surveys of select index areas in the upper Yukon River are conducted in some years. The Whitehorse Rapids Fishway provides information on the escapement of wild and hatchery-origin returns into the upper Yukon drainage above the Whitehorse hydroelectric dam. Additional escapement enumeration projects

are conducted by other parties including First Nations and independent contractors supported by the Yukon River Restoration and Enhancement Fund. Most catch and escapement monitoring programs also include a sampling component to determine the age, size and sex composition of the fish being monitored.

Considerable effort has been spent on collecting tissue samples from major spawning populations throughout the Yukon drainage to develop the genetic baselines for genetic stock identification (GSI) and to increase the capability to monitor specific stocks and/or groups of stocks that lack escapement data. GSI baseline sampling is being incorporated into many existing stock assessment projects (both agency and non-agency funded projects) throughout the drainage. The Chinook and chum baselines are well developed to assign to major sub drainage stocks, but due to the many individual spawning stocks in remote locations, finer resolution assignment would require additional baseline samples.

3.7 PRECAUTIONARY APPROACH

Generally, scientific advice to Fisheries Managers considers data quality and incorporates uncertainty (i.e., stock status forecasts presented as a statistical distribution rather than point estimate). WSP benchmarks of biological status will inform the continuation of the precautionary approach to management of salmon resources. Decisions on recovery and fisheries objectives will consider the Strategic Planning Process described under WSP Strategy 4.

3.8 RESEARCH

An overview of the science and research in the Pacific region is available on the regional website: <http://www.pac.dfo-mpo.gc.ca/science/index-eng.html>

Current research projects on salmon and environmental and human induced factors affecting their status include:

- Climate change impacts on Pacific salmon are being investigated by multiple sectors within DFO and in collaboration with external partners. In 2011, DFO implemented a science-based climate change program focused on adaptation in decisions and activities to consider the vulnerabilities, risks, impacts, and opportunities associated with a changing climate.

<https://www.dfo-mpo.gc.ca/science/oceanography-oceanographie/index-eng.html>

- An example of this work is the Aquatic Climate Change Adaptation Services Program (ACCASP) which has an emphasis on the development of new science knowledge to support the development of adaptation tools and strategies that will enable the integration of climate change considerations into the delivery of the Department's programs and policies. More information on this program is available at: <http://www.dfo-mpo.gc.ca/science/rp-pr/accasp-psaccma/index-eng.html>
- State of Salmon Program (SOS): this program integrates information on Pacific salmon (abundance, productivity, size, fecundity, run timing, etc.) and their freshwater and marine ecosystems (water temperatures, river discharge, ocean upwelling, etc.) to understand the state of Pacific salmon, and the factors that contribute to these states. Collaboration across DFO Science, DFO Areas, and other Sectors is foundational to this program.
- Salmon in Regional Ecosystems (SIRE) program investigates the mechanisms controlling recruitment variations and changes in productive capacity of salmon stocks within freshwater and/or marine ecosystems.
- On-going research related to improving forecasting ability for salmon stocks and CUs is being conducted by DFO Stock Assessment and the Fisheries & Oceanography Working Group. The annual State of the Pacific Ocean Reports was published by the Canadian Science Advisory Secretariat (CSAS) until 2012. Recent reports are available at: <http://www.dfo-mpo.gc.ca/oceans/publications/index-eng.html>.
- The Fraser River Environmental Watch program provides scientific advice on the impact of different environmental factors on the migration success of Pacific salmon in fresh water. <http://www.pac.dfo-mpo.gc.ca/science/habitat/frw-rfo/index-eng.html>
- DFO scientists are studying salmon production, distribution and survival in the North Pacific Ocean including the Salish Sea, and developing leading indicators of salmon returns in collaboration with other organizations, including the North Pacific Anadromous Fisheries Commission (NPAFC), the Pacific Salmon Commission (PSC), and the Pacific Salmon Foundation (PSF) .
- Annual juvenile salmon surveys monitor the distribution, migration, and survival of salmon in their freshwater and early marine life history.

- Ongoing collaborative research between DFO and aquaculture industry to investigate the interactions between wild and cultured salmon through the Program for [Aquaculture Regulatory Research](#) (PARR) and [Aquaculture Collaborative Research and Development Program](#) (ACRDP)
- Ongoing development of quantitative tools to inform rebuilding plans for depleted (red-status) CUs given climate/oceanographic change and variability and constraints from mixed-CU fisheries.

Information on many Yukon River research projects can be found on the Yukon River Panel's website at:

<http://yukonriverpanel.com/salmon/publications/reports/>

4 SOCIAL CULTURAL AND ECONOMIC IMPORTANCE

4.1 ABORIGINAL PARTICIPATION

Fisheries and Oceans Canada recognizes that the following section does not reflect Indigenous perspectives on the economic, social and cultural importance of salmon fisheries to First Nations, and is considering how Indigenous perspectives may be better reflected in future Integrated Fisheries Management Plans for salmon.

First Nation culture recognizes the importance of stewardship and responsibility to care for salmon, a responsibility that has been handed down over time. Part of this stewardship responsibility is to ensure that salmon are available for future generations. Through their fishing activities, First Nation communities are able to maintain a linkage to the salmon and gain knowledge of the salmon stock's abundance and health. This continued awareness allows First Nation people to contribute to supporting the development of effective management strategies through the provision of information on local and regional observations. Consultation and engagement with First Nations includes participation on a number of levels and in a variety of ways. These exchanges and involvement may include bilateral consultations, advisory processes, management boards, technical groups and other roundtable forums.

Generally, DFO manages aboriginal fisheries to meet treaty provisions (e.g., *Yukon First Nation Final Agreements*), to provide access for First Nation subsistence and food, social, ceremonial (FSC) fisheries, and for commercial purposes. With respect to FSC and subsistence treaty fisheries, DFO manages these fisheries to ensure that after conservation needs are met, they have priority over other fisheries.

In the Yukon, the Umbrella Final Agreement (UFA) between the Government of Canada, the Council for Yukon Indians and the Government of the Yukon was signed in May 1993. Subsequent to this, the following Final and Self-Government Agreements have been reached with 11 of the 14 Yukon First Nations:

- Champagne and Aishihik First Nations (1995)
- Teslin Tlingit Council (1995)
- First Nation of Na-Cho Nyäk Dun (1995)
- Vuntut Gwitchin First Nation (1995)
- Little Salmon/Carmacks First Nation (1997)

- Selkirk First Nation (1997)
- Tr'ondëk Hwëch'in (1998)
- Ta'an Kwäch'än Council (2002)
- Kluane First Nation (2004)
- Kwanlin Dün First Nation (2005)
- Carcross/Tagish First Nation (2006)

4.2 PUBLIC ANGLING SECTOR

Public angling for salmon may occur to provide food for personal use, as a leisure activity, or as a combination of the two. These activities provide non-quantified benefits to the individual participants as well as contribute directly and indirectly to the economy through fishery related expenditures. This section focuses on economic activity rather than the economic benefits to individual anglers or businesses. Harvest levels in the public angling fishery are managed using area specific openings and retention levels.

Economic benefits from the anglers include, but are not limited to the purchase of: angling licences, Salmon Conservation Catch Cards, angling equipment, accommodation, travel, and air charter services. In addition to economic benefits, angling also has social and cultural benefits as it is considered a tradition and lifestyle for many people. Fishing provides people with the opportunity to interact with the natural environment and increases their awareness of salmon resources. The increased awareness is commonly associated with an enhanced sense of stewardship as well as overall social value.

4.3 COMMERCIAL SECTOR

Commercial fishers benefit from the salmon fishery economically, socially and culturally. The economic elements are often assessed through financial gains associated with commercial fishing activities, although the social and cultural benefits are not as easily quantified. Fishers may also derive benefits from the social aspects of the fishery, such as interactions with other fishers and fishery managers.

5 MANAGEMENT ISSUES

5.1 CANADA – U.S. INTERNATIONAL AGREEMENT: YUKON RIVER SALMON AGREEMENT

In March 2001, Canada and the U.S. concluded the Yukon River salmon negotiations, which had been ongoing since 1971. The comprehensive *Yukon River Salmon Agreement* (YRSA) was ratified by the Parties and incorporated into the PST in 2002. The YRSA contains specific obligations for the Parties to manage fisheries to achieve conservation and harvest sharing objectives for Canadian-origin Yukon River Salmon stocks.

5.2 UNCERTAINTY REGARDING RUNS

There have been significant swings in the production of Yukon River salmon in recent years. Chinook salmon have experienced generally poor runs from 1998 through 2002 and since 2007. The 1998-2001 period for Yukon River mainstem fall Chum salmon experienced poor runs while the Fishing Branch River / Porcupine fall Chum salmon have been returning in low numbers since 2008. More recently, drainage wide fall chum returns to the Yukon River in 2020, 2021 and 2022 have been the lowest on record.

It is believed that changes in marine survival play a significant role in these abundance fluctuations and it is reasonable to expect these situations may continue in the foreseeable future. Changes in marine conditions have proven challenging to monitor and forecast while the resulting effects on salmon survival and production has been difficult to predict.

5.3 UNCERTAIN MARKET CONDITIONS

Low fish volumes and the lack of a major local buyer/processor have hindered the Yukon River commercial fishery for over a decade. The availability of viable markets due to remoteness and the timing of the fishery is anticipated to continue to be a significant limiting factor.

6 OBJECTIVES

6.1 CONSERVATION OBJECTIVES

The Conservation Objectives are to restore and maintain healthy and diverse salmon populations and their habitat for the benefit and enjoyment of the people of Canada in perpetuity.

The objective listed above will be advanced by safeguarding the genetic diversity of wild salmon populations, maintaining habitat and ecosystem integrity, and managing fisheries for sustainable benefits.

The fisheries management approach defined within the *Yukon River Salmon Agreement* of the PST is abundance-based. This approach defines resource conservation as the paramount objective, with harvest fluctuating according to actual abundance rather than to pre-determined (guaranteed) levels. Abundance-based management (ABM) approaches have been developed for upper Yukon Chinook and fall Chum salmon as well as Porcupine (Fishing Branch) River fall Chum salmon.

After considering recommendations from the YRP and YSSC the Department establishes escapement goals for the Chinook and fall Chum salmon returns prior to each fishing season. The Yukon River In-Season Fishery Management Decision Matrices were developed following extensive consultations with Yukon First Nations, fishers, and the YSSC. These matrices provide pre-defined specific reference (trigger) points and associated management actions. The trigger points are separated into three management zones: the RED ZONE where no harvest opportunities are available; the YELLOW ZONE where reductions to First Nation subsistence fisheries are implemented and no harvest opportunities through other fisheries exist; and, the GREEN ZONE where fishing opportunities for all fisheries are considered. Conservation concerns are foremost in years with low run sizes.

For 2023 the YRP recommended a spawning escapement goal range for chum salmon, however the YRP did not reach consensus on a recommendation for Chinook salmon.

| | |
|---|-------------------|
| Chinook salmon – Yukon River Mainstem in Canada | No recommendation |
| Chum salmon – Yukon River Mainstem in Canada | 70,000 – 104,000 |
| Chum salmon – Fishing Branch River (Porcupine Drainage) in Canada | 22,000 – 49,000 |

6.2 FIRST NATION FISHERIES OBJECTIVES

The First Nation Fisheries Objectives are to manage fisheries in recognition of *Section 35* of the Canadian Constitution, recognizing both aboriginal and treaty rights.

An Allocation Policy for Pacific Salmon provides that after requirements for conservation, the first priority in salmon allocation is to treaty rights for subsistence harvest opportunities for domestic purposes (consistent with *First Nation Final Agreements*) and FSC, for harvest opportunities under communal FSC licences issued to First Nations.. Specific treaty obligations and considerations are described within individual *First Nation Final Agreements*.

While these opportunities will be provided on a priority basis, it does not necessarily mean that fishery targets for First Nations will be fully achieved before other fisheries can proceed. The general guideline is that fishing plans must adequately provide for the First Nations' FSC and/or domestic Treaty harvests over a reasonable range of potential run sizes.

The objective is to manage fisheries to ensure that, after conservation needs are met, First Nations' food, social and ceremonial requirements and treaty obligations to First Nations have first priority in salmon allocation in accordance with the *Allocation Policy for Pacific Salmon* and *Yukon First Nation Final Agreements*.

6.3 INTERNATIONAL OBJECTIVES

The International Objectives are to manage Canadian fisheries on the Yukon River to ensure that obligations within the YRSA are achieved.

In addition to meeting the domestic escapement, management, allocation and conservation targets described in this IFMP, Canada has an overarching international obligation to manage its harvest within agreed harvest sharing arrangements as defined within the YRSA.

6.4 DOMESTIC ALLOCATION OBJECTIVES

The Domestic Allocation Objectives are to manage fisheries in a manner that is consistent with *An Allocation Policy for Pacific Salmon*.

An Allocation Policy for Pacific Salmon can be found on-line at: <http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/pol/index-eng.html>. The *Allocation Policy for Pacific Salmon* identifies the priority for allocation of salmon harvest amongst fisheries. The allocation priorities are described below:

Priority 1: Attain spawning escapement goals and maintain fish habitat that will result in optimum production of the stocks;

Priority 2: First Nation subsistence (or FSC) fisheries, and in accordance with *Yukon First Nation Final Agreements* (as applicable);

Priority 3: Provide salmon harvesting opportunities for licenced public angling. The fishery is provided opportunities to harvest only if a full allocation is available to the First Nation fishery; and,

Priority 4: Provide salmon harvesting opportunities for domestic and commercial fishers. Fisheries are provided opportunities to harvest only if a full allocation is available to the First Nation fishery.

International allocations are specified in the YRSA, whereas domestic allocations may, following consultation with stakeholders, be recommended by the YSSC. These recommendations are frequently influenced by the historical performance of respective fisheries.

Achieving these objectives in the Yukon drainage is difficult due to many factors such as: the biological complexity of the stocks, the wide distribution of spawning streams, wide fluctuations in run sizes, increasing efficiency and demands of user groups, and the requirement for a precautionary approach to fisheries management that protects and conserves wild stocks.

6.5 COMMUNICATION OBJECTIVES

The communication objectives are to provide timely information to harvesters, fishers, communities and the public regarding the status of salmon runs and management decisions.

To achieve this objective a number of communications practices, tools, and procedures are implemented annually:

Pre-season

- Outlooks for major stocks (including Yukon River stocks) are published on DFO's website (<http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/index-eng.html>)
- Outlooks for Yukon River stocks are provided to the Yukon Salmon Sub-Committee, Yukon First Nations government representatives, and are available to the public who attends or views the Yukon River Panel meetings and are available in Yukon River Panel press releases (<http://www.yukonriverpanel.com/meetings/past-meetings/>)
- Together with the YSSC, DFO provides information on the upcoming salmon season to First Nations, other fishery participants, and the general public during meetings in many Yukon communities (typically held in May each year).

- The Yukon Salmon Information Line is updated with information on fishery expectations for all Yukon fisheries.
- This IFMP is available online through the Federal Science Library (<http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>).
- Information is available directly from DFO staff at the Yukon/Transboundary Rivers Area office.

In-season

- DFO hosts conference calls with Canadian First Nation representatives and the YSSC. The purpose of the calls is to disseminate and exchange information on the status of Canadian-origin salmon runs, assessment programs, and the in-season management strategy.
- The Yukon River Drainage Fisheries Association (YRDFA) hosts weekly conference calls with fishery participants along the entire length of the river in Alaska and Yukon. Information is provided by U.S. and Canadian managers about fishery and run status throughout the season. The calls are intended for individuals from communities along the Yukon River and are held once a week from June through to August.
- Fisheries and Oceans Canada distributes a weekly run status update that includes the latest stock assessment information based on the Lower Yukon River Test Fishery, Pilot Station Sonar, Eagle Sonar and Porcupine River Sonar and Fishing Branch Weir assessment programs, catch information and fishery management information (i.e. openings/closures) in both Canada and the U.S.. These are also available online (<http://www.pac.dfo-mpo.gc.ca/yukon/season-saison-eng.html>).

Post-season

- Post-season reviews for Yukon River stocks are provided to the Yukon Salmon Sub-Committee, Yukon First Nations government representatives, and are presented to the public at Yukon River Panel meetings (and available in Yukon River Panel press releases) (<http://www.yukonriverpanel.com/meetings/past-meetings/>).
- The Joint Technical Committee of the Yukon River Panel prepares an annual report that includes a season summary and outlooks for the coming year. These reports are available through DFO, the Alaska Department of Fish and Game or the YRP website (<http://www.yukonriverpanel.com/publications/yukon-river-joint-technical-committee-reports>).

6.6 ENFORCEMENT OBJECTIVES

The Enforcement Objectives are to ensure compliance with Acts and Regulations associated with the management of Pacific salmon.

The *Yukon Territory Fishery Regulations*, the *Fishery (General) Regulations* and the *Aboriginal Communal Fishing Licences Regulations*, established pursuant to the *Fisheries Act*, are the main pieces of legislation for salmon fisheries in the Yukon. The Conservation and Protection (C&P) program of Fisheries and Oceans Canada is responsible for monitoring and enforcing compliance with the *Fisheries Act* and the associated regulations in relation to anadromous fish in both lakes and river systems, and to ensure compliance with habitat provisions in all water frequented by fish. C&P will continue to work cooperatively with First Nations and other Federal and Territorial agencies and departments to deliver services.

Fishery officers work closely with other management and enforcement agencies such as the Canadian Food Inspection Agency, RCMP, Conservation Officers, Parks Canada, Canada Border Services Agency and First Nation management bodies. These partners assist fishery officers in carrying out their mandate. Where possible, the sharing of human resources and equipment reduces the occurrence of overlapping patrols and shows a concerted effort to manage cost-effectively within a budget. Due to the remoteness and extensive size of the patrol area, patrol efforts are undertaken in a strategic manner based on pre-identified priorities or, where appropriate, as a result of complaints or identified concerns rather than on random/routine patrols.

7 ACCESS AND ALLOCATION

Allocation decisions are made in accordance with the accepted recommendations from the YSSC, First Nation Final Agreements and the *Allocation Policy for Pacific Salmon*. The allocation policy is based upon a hierarchy of priorities. At low run sizes, subject to abundance and conservation concerns, the only fisheries that are provided an allocation are First Nations' subsistence and FSC fisheries. At larger run sizes, fishing opportunities for public angling, commercial and domestic fisheries will be considered as long as the projected run abundance is sufficient to meet spawning escapement objectives and First Nation requirements.

The Basic Needs Allocations (BNA) of Chum, Chinook, and Coho salmon for the Vuntut Gwitchin First Nation (VGFN) in the Porcupine River is specified in the VGFN Final Agreement (16.10.7.4). The BNA for First Nations that harvest mainstem Yukon River salmon have yet to be finalized. Nonetheless, a primary objective of this management plan is to address the requirements of the First Nation fisheries in Yukon.

7.1 LONG TERM OBJECTIVES FOR THE FISHERIES

There are four key long-term objectives:

- a) Achieve the obligations contained in the *Canada/U.S. Yukon River Salmon Agreement*
- b) Conserve and restore spawning stocks and habitats
- c) Provide for the Basic Needs Allocation for First Nations
- d) Develop and/or maintain sustainable and viable Canadian fisheries

7.1.1 MEETING OBLIGATIONS OF THE YUKON RIVER SALMON AGREEMENT

The YRP meets twice a year, for a pre-season meeting and a post-season meeting. Principal items addressed in the pre-season YRP meeting include reviewing pre-season run outlooks, making recommendations to management agencies, reviewing and approving projects to be funded under the Restoration and Enhancement Fund and establishing escapement goals for Canadian-origin Yukon River salmon stocks. Principal items addressed in the post-season YRP meeting include reviewing management and assessment outcomes.

The Yukon Joint Technical Committee also meets twice a year and prepares an annual report that includes a season summary and outlooks for the coming year. These reports are available through Fisheries and Oceans Canada, the Alaska Department of Fish and Game or the YRP website (<http://www.yukonriverpanel.com/publications/yukon-river-joint-technical-committee-reports>).

Since 2002, Canadian Yukon River salmon management plans have been developed to ensure consistency with harvest sharing provisions of the YRSA. Extensive communications occur during each season between Canadian and U.S. fishery managers to exchange updated in-season data and fishery information.

7.1.2 CONSERVING AND RESTORING SALMON SPAWNING STOCKS AND HABITAT

Management measures taken to address conservation concerns for Yukon salmon stocks include closures and/or delayed openings of the commercial, domestic, and recreational fisheries. If conservation concerns exist, these fisheries are generally not opened until in-season assessments indicate that escapement targets and First Nation requirements will be achieved. Reduction or removal of the total allowable catch allocations to First Nation subsistence fisheries will occur through receipt of recommendations from the YSSC or in emergency situations as described within *Yukon First Nation Final Agreements*.

7.1.3 PROVIDE FOR THE BASIC NEEDS ALLOCATION FOR FIRST NATIONS

Although final Basic Needs Allocations (BNA) of Yukon River salmon for the majority of Yukon First Nations have yet to be finalized, progress on this initiative has been accomplished through engagement between Fisheries and Oceans Canada and First Nation government representatives. *Yukon First Nation Final Agreements* set out how the BNA is to be determined. As an initial step, the Yukon River Harvest Study was conducted 1996 through 2002. Subsequently, engagement and exploratory workshops were held in 2006, 2007, 2009 and 2018. In absence of the determination of the final BNA, an interim allocation of 10,000 Chinook salmon is reserved for Yukon First Nation fisheries within the current Canadian fishery management strategy. Fisheries and Oceans Canada remains committed to continuing discussions with Yukon First Nation Governments to seek to establish the BNA for Yukon River salmon.

7.1.4 DEVELOPING AND/OR MAINTAINING SUSTAINABLE AND VIABLE CANADIAN FISHERIES

Implementation of an abundance-based management approach and harvest sharing, rebuilding and restoration and enhancement provisions within the YRSA are intended to facilitate viable fisheries. As a result of a prolonged period of reduced productivity, fishery allocations and harvest opportunities experienced pre-2000 levels is unlikely to occur for the foreseeable future. The Pacific Salmon Strategy *Harvest Transformation* “pillar” is intended to evaluate fishery viability.

8 RUN OUTLOOKS, DECISION GUIDELINES, AND MANAGEMENT MEASURES

A comprehensive overview of the pre-season run forecasts and outlooks can be found in section 10 of the Joint Technical Committee's *Yukon River Salmon 2022 Season Summary and 2023 Season Outlook* (<http://www.yukonriverpanel.com/publications/yukon-river-joint-technical-committee-reports>). Brief summaries of the outlooks are presented below for each stock.

The comprehensive decision guidelines detailed below outline the management responses to a range of circumstances and the general rationale applied when making management decisions. Decision guidelines are meant to capture general management approaches that contribute to multi-year management planning.

For Yukon River fisheries in Canada, the management regime at the beginning of the season is guided by the pre-season run outlooks. Pre-season outlooks provide initial indication of run size and are used to set expectations for the year (e.g., the run is unlikely to be large enough to support a commercial fishery in Canada).

Pre-season decisions are made during the development of fishing plans and are based on pre-season run outlooks. These decisions are the result of technical analyses and are based on advice received during consultations and YRP meetings. Following consultations with Yukon First Nations, with commercial, domestic, and recreational fishery participants, and with members of the public, the YSSC provided recommendations to the Minister of Fisheries and Oceans Canada. Those recommendations that were accepted are incorporated into this management plan.

In-season assessment of Canadian-origin Yukon River Chinook and chum salmon occurs primarily in the lower Yukon River in Alaska (Lower Yukon Test Fishery and the Pilot Station Sonar) and at the Eagle Sonar assessment program located just downstream of the U.S./Canada border. As the season progresses, information from lower river assessments provides revised information on which Canadian management decisions may be made. This early-season information is often available in mid- to late-June and by mid to late July it can provide improved certainty over pre-season information. This information serves to identify deviations from pre-season forecasts and allows time to prepare Canadian managers and fishers for potential changes to fishing plans. However, due to challenges in accurately assessing salmon abundance in the lower river, estimates of Canadian-origin salmon are not known with certainty.

In-season assessment information available from the Eagle Sonar is highly representative however the timing that this information is available limits it's use to confirming performance against spawning escapement goals and YRSA harvest share arrangements post-season.

8.1 YUKON RIVER MAINSTEM CHINOOK SALMON MANAGEMENT

8.1.1 2023 PRE-SEASON CONSIDERATIONS

The pre-season outlook for Canadian-origin Yukon River Chinook salmon is for a weak run of 34,000 with a range of 26,000 to 43,000 fish. It is highly unlikely that the run will come in at the upper end of the range. This outlook is in stark contrast to the runs in the 1980s and 1990s of 150,000 Canadian-origin Chinook.

For 2023, and in absence of a consensus recommendation from the International Yukon River Panel, the Canadian Management objective for Canadian-origin Yukon River mainstem Chinook salmon will remain at 55,000 (as in 2021 and 2022). This is the target number of Chinook salmon to reach the spawning grounds in the upper Yukon drainage in Canada. Following a series of years where the lower end of the escapement goal had not been achieved (2008, 2010, 2012, 2013, 2019, 2020, 2021 and 2022), ensuring that a sufficient number of adult Chinook salmon reach spawning grounds in Canada is of paramount importance to sustaining the health of this stock into the future. This is also in consideration that Chinook salmon are currently experiencing a period of reduced productivity and it is unlikely that there will be significant change in run sizes of Canadian-origin Chinook salmon in the near future.

Based on the weak pre-season outlook of 34,000 Chinook salmon, and recognizing the Management Objective of 55,000, the expected Total Allowable Catch (TAC) for Canadian-origin Yukon River mainstem Chinook salmon in Canada is 0 fish.

The considerations for the development of the 2023 Chinook salmon management strategy were:

1. A pre-season outlook for a below-average run (34,000).
2. In 6 of the past 10 years minimum spawning escapement was not achieved resulting in concern over the sustainability of the run and potentially affected brood years.
3. The productivity of the run has been low over the last decade when compared to the long-term average.
4. Interest within some First Nations to suspend all fishing activity until such time as runs increase
5. The run is comprised of fewer large, older fish than there were historically present.

6. Significant fishery conservation measures have been implemented in both Yukon and Alaska in recent years to support rebuilding and future recovery of the stock
7. In the unlikely event there is a harvest opportunity for Canada, there is an interest within some First Nations to fish early in the run, based on traditional practices and knowledge.
8. The importance of considering the 2023 management approach in the context of a long-term stock sustainability objective and the longer term commercial and domestic fishery closures for Chinook and chum salmon.
9. The failure of the Yukon River Panel to achieve consensus on a recommended escapement and/or management objective for the 2023 season and the Canadian delegation interest in establishing a long-term spawning escapement objective founded on “maximum sustainable recruitment” as opposed to “yield” for precautionary purposes and to facilitate long-term stock rebuilding.
10. Recent empirical evidence of potentially significant mortality of migrating adult Chinook salmon between the period of entry into the river and arrival at headwater spawning areas.
11. The management approach may be further refined by the recommendations from the Yukon Salmon Sub-committee to the Minister for 2023.

Further information may be found in the *Yukon River Salmon 2022 Season Summary and 2023 Season Outlook* at: <https://www.yukonriverpanel.com/publications/yukon-river-joint-technical-committee-reports/>

8.1.2 PRE-SEASON MANAGEMENT CONSIDERATIONS AND PLANNING

The Pre-Season period is considered to occur prior to mid-June. Based on the pre-season forecast, no harvest opportunities are anticipated to be available to First Nation and public angling (recreational) fisheries. Commercial and domestic fishery opportunities will not be provided in 2023 consistent with the longer-term Pacific Salmon Strategy Initiative commercial fishery closures measures first implemented in 2021 and confirmed in 2022. For the 2023 season, the Yukon Salmon Sub-Committee has recommended:

- In light of the historic low runs experienced for Chinook salmon over recent years and the projected low 2023 abundance, the Yukon Salmon Sub-committee recommends no harvest of any Yukon River (including Porcupine River) Chinook salmon in 2023.

As confidence in in-season abundance estimates improve, fishery management actions will proceed according to the *In-season fishery management decision matrix*.

8.1.3 EARLY-SEASON MANAGEMENT

The Early-Season period is considered to occur between mid-June and mid-July. The pre-season management approach may be adjusted in the early-season period based on information available from the lower river Pilot Station Sonar. Unless assessment information available during the early-season period provides a high degree of confidence that the run is considerably stronger than anticipated, no changes to pre-season management measures will be made.

8.1.4 IN-SEASON MANAGEMENT

The In-Season period is considered to occur between mid-July and early-September. In-season management decisions in Canada are guided by the spawning escapement objectives and inseason run abundance information for Canadian-origin Chinook salmon. Decisions proceed according to the *In-season fishery management decision matrix for Yukon River mainstem Chinook salmon in Canada* (Table 1) in which the management zones are defined in relation to the border passage estimate and the management escapement objective of 55,000. Canada's harvest share is calculated as 20 to 26 percent of the Total Allowable Catch (TAC) and is managed in-season to the midpoint (23%). TAC is calculated as the total run size minus the management objective of 55,000 fish. The total Canadian run size is estimated as the number of Canadian-origin Chinook salmon passing the Pilot Station sonar. The component of Canadian-origin Chinook salmon is determined by applying in-season genetic composition to the total estimated number of Chinook passing by the sonar. Because final / official harvest estimates from U.S. fisheries are not available until post-season, in-season harvest is estimated based on interpretation and projection of the effect of fishery management actions on harvest levels. Consequently, in-season estimates of total run size, TAC, and Canadian allowable harvest (CAH) are made using imperfect information.

The *In-season fishery management decision matrix for Yukon River mainstem Chinook salmon in Canada* summarizes the management reference points and anticipated management responses under different run size estimates. Within each fishery, the Red Allowable Harvest Zone indicates there are no harvestable salmon available to that fishery. In the Yellow Allowable Harvest Zone there are some salmon available to harvest but restrictions or conservation measures are necessary to limit harvest within that fishery. In the Green Allowable Harvest Zone there are sufficient salmon available to support normal or full harvest opportunities.

The CAH zones within each fishery are based on the premise that First Nation harvest opportunities are second only to conservation and other fishery opportunities (Public Angling, Commercial and Domestic) are only considered after First Nation allocations and conservation objectives are projected to be met. Additionally, consideration of the precision to which regulatory

instruments and management tools can facilitate the orderly administration of a specific fishery are also factored into decisions.

The *In-season fishery management decision matrix for Yukon River mainstem Chinook salmon in Canada* must be interpreted with the following considerations in mind:

- **Consistent with Yukon River Panel Recommendations.**

In-season management will continue to incorporate the recommendations of the Yukon River Panel as required.

- **The Canadian management objective for 2023 is 55,000.** Management of fishery harvest to facilitate a spawning escapement of 55,000 is intended to support re-building and long-term recovery of Canadian-origin Yukon River Chinook salmon. Canadian harvest of Chinook salmon will be limited to First Nation fisheries when the spawning escapement is likely to exceed 55,000.

- **Sex ratio informs management actions.**

Management of Yukon River Chinook salmon is based on the premise that not all Chinook salmon contribute equally to reproduction. The long-term historical ratio of males to females is approximately 55% males to 45% females. The sex ratio is also a proxy for the size and age of fish with smaller 4 year old fish being ~90% male and larger 7 year old fish being ~25% male. Sex ratio is determined in-season by the data collected in the test netting associated with the Eagle Sonar. Size of Chinook salmon serves as a strong proxy for both age and sex.

- **Canadian allowable harvest is determined by YRSA harvest shares , estimates of abundance at Pilot Station, and Canadian Conservation objectives, but does not include Eagle Sonar estimates.** Border Passage estimates are one component of Canadian fishery management considerations. Run Size “zones” within the Canadian fishery management matrix assume that a full U.S. harvest of downstream of the international border sonar assessment program has occurred. In the case where U.S. fisheries catch less than the U.S. allowable harvest, a portion of the salmon that cross the border are not available for allocation to Canadian fisheries. In the case where U.S. fisheries catch more than the U.S. Allowable Harvest, Eagle Sonar passage may incorrectly indicate a lower allowable harvest. Actual determination of the allowable harvest is made based on applying the *Yukon River Salmon Agreement* harvest shares to the total run size estimate (i.e. prior to any harvest occurring).

- **Priority to First Nation fisheries.** Opportunity for the public angling, domestic, and commercial fisheries are considered only once First Nations subsistence fishery needs are met and the upper end of the escapement goal is expected to be achieved.

Table 1. In-season fishery management decision matrix for Yukon River mainstem Chinook salmon in Canada, 2023.

| Border Passage Projection ¹ | Fishery Opportunities ² | | |
|--|------------------------------------|----------------|-------------------------|
| | First Nation | Public Angling | Commercial and Domestic |
| < 55,000 | No Opportunity | No Opportunity | Long Term Closure |
| 55,000+ | Limited Opportunity | No Opportunity | Long Term Closure |
| | | | |

 = No Fishery Opportunity

 = Limited Fishery Opportunity

 = Increased Fishery Opportunity

¹Border Passage Projection is the Pilot Station estimate minus estimated US harvest between Pilot Station sonar and the US/Canada border.

²The red, yellow, and green colours reflect the Canada Allowable Harvest zone and the notion to which a specific fishery may be restricted or liberalized in accordance to the colour.

8.2 YUKON RIVER MAINSTEM CHUM SALMON MANAGEMENT

8.2.1 PRE-SEASON MANGEMENT CONSIDERATIONS AND PLANNING

The preliminary pre-season outlook for Canadian-origin Yukon River mainstem Chum salmon is 62,750 with a range from 28,000 to 150,000 fish. The pre-season outlook will be revised in-season

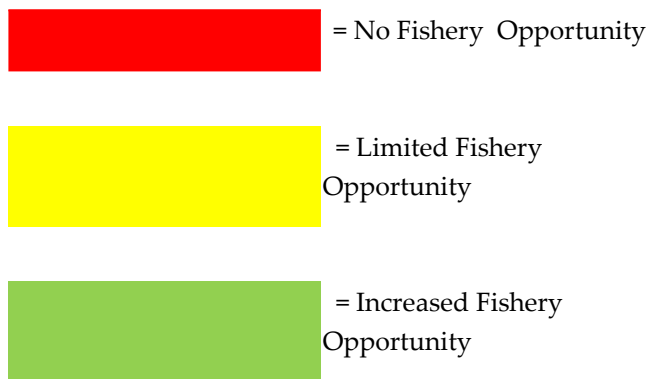
(mid-July) after considering the summer chum and fall chum relationship to provide for a more robust run-size estimate which will better inform management decision making. The 2023 spawning escapement goal for Canadian-origin Yukon River mainstem Chum salmon is 70,000 to 104,000; this is the target number of Chum salmon intended to reach the spawning grounds in the upper Yukon drainage in Canada.

Table 2. In-season fishery management decision matrix for Yukon River mainstem Chum salmon in Canada.

| Border Passage Projection ¹ | Fishery Opportunities ² | | |
|--|------------------------------------|----------------|-------------------------|
| | First Nation | Public Angling | Commercial and Domestic |
| < 70,000 | No Opportunity | No Opportunity | Long Term Closure |
| 70,000 – 104,000 | Limited Opportunity | No Opportunity | Long Term Closure |
| >104,000 | Increased Opportunity | No Opportunity | Long Term Closure |

¹Border Passage Projection is the Pilot Station estimate minus estimated US harvest between Pilot Station sonar and the US/Canada border.

²The red, yellow, and green colours reflect the Canada Allowable Harvest zone and the notion to which a specific fishery may be restricted or liberalized in accordance to the colour.



If run abundance is confirmed in-season to be at the pre-season point estimate outlook run size, public angling, commercial and domestic fisheries will be closed and opportunities may be limited for First Nation fisheries. This pre-season management approach will be modified based on early-

season and in-season information. Early-season information (based on the summer chum/fall chum relationship and Pilot Station Sonar) will be used to modify and update these recommendations. If early season information does not suggest to a high degree of likelihood either a stronger or weaker run than anticipated then no changes to management will be made. In-season assessment of run strength (based on the Pilot Station Sonar) will be used to inform management decisions in Canada. For the 2023 season, the Yukon Salmon Sub-Committee has recommended:

- In light of the historic low runs experienced for chum salmon over recent years and the projected low 2023 abundance, the Yukon Salmon Sub-committee recommends no harvest of any Yukon River (including Porcupine River) chum salmon in 2023.

8.2.2 IN-SEASON MANAGEMENT

In-season fishery management decisions are based on the *In-season fishery management decision matrix for Yukon River mainstem Chum salmon in Canada* (Table 2). The matrix summarizes the management reference points, general allocation plans and anticipated management responses under different run size scenarios (as indicated by border passage):

RED ZONE < 70,000

No harvest – removal of all Chum salmon harvest allocations. Run sizes this low represent a high conservation risk.

YELLOW ZONE 70,000 to 104,000

Run supports some First Nation subsistence fishing. The harvest target varies in accordance with projected run abundance. Harvest targets are met using voluntary harvest reductions in each First Nation.

GREEN ZONE > 104,000

Opportunity for normal (full) First Nation subsistence harvest (i.e., no voluntary harvest reductions sought). Harvest opportunities for recreational, commercial, and domestic fisheries are provided in proportion to run abundance and are considered only when opportunities for First Nation harvests have not been restricted.

It should be noted that while the Eagle Sonar passage estimates are helpful in confirming the migration of salmon across the international border, Fisheries and Oceans Canada primarily relies on: the total run size estimates generated by the Pilot Station Sonar, information on the proportion of Canadian-origin chum salmon returning to the mouth of the Yukon River watershed; and,

corresponding harvest shares defined within the *Yukon River Salmon Agreement* to inform fishery allocation and management decisions.

8.3 PORCUPINE RIVER CHINOOK SALMON MANAGEMENT

8.3.1 PRE-SEASON MANAGEMENT CONSIDERATIONS AND PLANNING

Currently, the limited availability of reliable data precludes the development of a formal (stock-specific) forecast or outlook for Chinook salmon returning to the Porcupine River in Canada. In the absence of stock specific information, the general outlook for Porcupine River Chinook salmon is based on the Yukon River mainstem Chinook salmon outlook. Given this, the 2023 run of Chinook salmon to the Porcupine River is expected to be low. Over the past 10 years the average Vuntut Gwitchin annual harvest has been approximately 163 Chinook salmon, however in 2022 just 32 Chinook were harvested. The BNA identified in the *Vuntut Gwitchin First Nation Final Agreement* is 750 Chinook salmon.

Based on pre-season information, the Chinook salmon return is not anticipated to be of a magnitude that will support harvest opportunities sufficient enough to meet the BNA. The pre-season management approach may be modified based on early-season and in-season information. Early-season information (based on the Pilot Station Sonar) may be used to modify and update the management approach. If early season information does not suggest a high degree of likelihood for either a stronger or weaker run than anticipated then no changes to management strategy will be made. In-season assessment of run strength (based on the Old Crow Sonar) may be used to inform management decisions in Canada. For the 2023 season, no public angling harvest opportunities will be provided for Porcupine River Chinook salmon.

8.3.2 EARLY-SEASON AND IN-SEASON MANAGEMENT

In-season fishery management decisions are based on information from Pilot Station sonar and to a limited extent, the Old Crow sonar. The Old Crow sonar passage projection is the main indicator used to inform in-season management decisions, however harvest in Alaska before the fish reach Canada is also considered when making management decisions.

In light of the very low pre-season abundance forecast, Vuntut Gwitchin Government (VGG) will be working with their citizens on a closure of the Chinook salmon subsistence fishery on the Porcupine River in 2023.

8.4 PORCUPINE (FISHING BRANCH) RIVER CHUM SALMON MANAGEMENT

8.4.1 PRE-SEASON CONSIDERATIONS AND DECISIONS

The preliminary pre-season outlook for Fishing Branch chum salmon is 10,000 with a range of 4,500 to 24,000 fish. The 2023 spawning escapement goal for Fishing Branch River chum salmon, established pursuant to the Yukon River Salmon Agreement, is 22,000 to 49,000. This is the internationally recognized target for the number of chum salmon intended reach the spawning grounds in the Fishing Branch River. Based on the 2022 stock composition, approximately 77% of the chum salmon that migrate past Old Crow are comprised of the Fishing Branch River stock, with the remainder originating from other spawning areas in the upper Porcupine River watershed.

Harvest sharing provisions for Canadian-origin Porcupine River chum salmon stocks are not yet specified within the YRSA. Based on the pre-season outlook range, there may be Fishing Branch origin chum salmon available for harvest in Canada. As 77% of the chum salmon that migrate past Old Crow are comprised of the Fishing Branch River stock, the recommended (total) Porcupine River chum salmon Canadian fishery guideline harvest range is 0 to 2,000.

Over the past decade the average Vuntut Gwitchin harvest is approximately 1315 chum salmon, however, in 2022 just 20 chum salmon were harvested. The BNA identified in the *Vuntut Gwitchin First Nation Final Agreement* is 6,000 chum salmon.

The considerations for the development of the 2023 management strategy were:

1. The escapement goal for Fishing Branch River chum salmon has not been achieved in 6 of the last 10 years.
2. Alaskan Commercial and subsistence fisheries harvest Fishing Branch River chum salmon co-migrating with all other U.S. and Canadian-origin chum salmon stocks.
3. The variability in productivity of Fishing Branch chum salmon is not well understood.
4. The outlook for Fishing Branch chum salmon is highly uncertain.
5. The YSSC recommendations

For the 2023 season, the Yukon Salmon Sub-Committee has recommended:

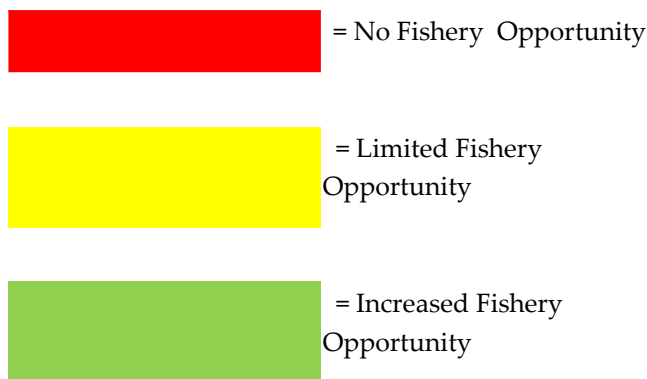
- In light of the historic low runs experienced for chum salmon over recent years and the projected low 2023 abundance, the Yukon Salmon Sub-committee recommends no harvest of any Yukon River (including Porcupine River) chum salmon in 2023.

Table 3. In-season fishery management decision matrix for Fishing Branch River chum salmon in Canada.

| Border Passage Projection ¹ | Fishery Opportunities ² | | | |
|--|------------------------------------|----------------|------------|----------|
| | First Nation | Public Angling | Commercial | Domestic |
| < 22,000 | No Opportunity | No Opportunity | n/a | n/a |
| 22,000 - 49,000 | Limited Opportunity | No Opportunity | n/a | n/a |
| >49,000 | Increased Opportunity | No Opportunity | n/a | n/a |

¹Border Passage Projection is the Pilot Station sonar estimate minus estimated US harvest between the sonar and US/Canada border.

²The red, yellow, and green colours reflect the Canada Allowable Harvest zone and the notion to which a specific fishery may be restricted or liberalized in accordance to the colour.



To begin the season, the First Nation fishery will be closed. This conservative approach is intended to promote chum salmon returns to the Porcupine River (Fishing Branch) during the early part of the run until such time as a more robust in-season estimate may be derived from information

collected through the Porcupine River sonar located near Old Crow. As confidence in the run abundance is gained, fishery management actions would proceed in accordance with abundance. For the 2023 season, no public angling harvest opportunities will be provided for Porcupine River chum salmon.

This pre-season management approach will be modified based on early-season and in-season information. Early-season information (based on Pilot Station Sonar) will be used to modify and update these recommendations. If early season information does not suggest a high degree of likelihood either a stronger or weaker run than anticipated then no changes to management will be made. In-season assessment of run strength (based on the Porcupine River sonar) will be used to inform management decisions in Canada.

8.4.2 IN-SEASON MANAGEMENT

In-season fishery management decisions are based on information from the Porcupine River sonar. Projection of the chum run size at Old Crow will be combined with estimates of the proportional return of Porcupine River chum salmon to the Fishing Branch River (approximately 77%) to develop a projection for return of chum salmon to the Fishing Branch River. This will be compared to the spawning escapement goal.

The Porcupine River sonar passage projection is the main indicator used to inform in-season management decisions. Harvest in Alaska before the fish reach Canada is also considered in management decisions.

8.5 PORCUPINE RIVER COHO SALMON MANAGEMENT

8.5.1 PRE-SEASON CONSIDERATIONS AND DECISIONS

Currently, limits on information preclude the development of a formal forecast or outlook for coho salmon returning to the Porcupine River in Canada. In the absence of stock specific information, the general outlook for Porcupine River coho salmon is based on the drainage-wide outlook which projects an average to below average return in 2023. The BNA identified in the *Vuntut Gwitchin First Nation Final Agreement* is 900 coho salmon.

To begin the season, the First Nation fishery will be open. This approach is intended to provide an opportunity for subsistence harvest in accordance with the pre-season run size information. As information on the run abundance is gained, fishery management actions would proceed in accordance with abundance.

8.5.2 IN-SEASON MANAGEMENT

In-season fishery management decisions are based on information from the Pilot Station sonar in the lower Yukon River. Assessment information may provide in-season modifications to the estimated run strength of Yukon River coho salmon that can be used to modify management recommendations for Porcupine River coho salmon fisheries.

8.6 SELECTIVE FISHERIES

Selective fishing is defined as the ability to avoid non-targeted fish (and could include specific sizes and/or sexes within species), invertebrates, birds, and mammals or, if encountered, to release them alive and unharmed. Selective fishing technology and practices will be adopted, where appropriate, in all fisheries in the Pacific Region, and there will be attempts to continually improve selective harvesting gear and related practices.

Selective harvesting standards will be set in the context of the *Policy for Selective Fishing in Canada's Pacific Fisheries* and the *Allocation Policy for Pacific Salmon*. In the future, priority will be given to those who have demonstrated the ability to meet or exceed the selective fishing standards. The Department encourages the incorporation of selective fishing experiments into regular fisheries where appropriate.

In the context of the Yukon River salmon fisheries, there is an interest in undertaking initiatives that use selective fishing gear which could allow for the release of larger-sized Chinook salmon, and the release of female Chinook salmon, or the ability to target smaller male fish. Traditional knowledge, anecdotal information, and recent scientific information, suggest that the average size and age of Yukon River Chinook salmon has decreased over time. Two potential explanations for the decrease are historical fishing practices (which targeted larger-sized fish for many years) or variation in environmental conditions.

A selective fishery demonstration program using fish wheels received funding from the YRP in 2006, 2007, and 2008. In 2006, a fish wheel equipped with holding pens was operated during commercial fishery openings near a commercial fishing site to facilitate a comparison between the selective gear and the commercial catch in the same area during the same time period. The project demonstrated that fish wheels could catch as many fish as nets and allow successful release of females and larger fish. Unfortunately, few opportunities for commercial fisheries directed at Chinook salmon have not occurred due to poor returns over the past several year

8.7 MARINE FISHERY BY-CATCH MANAGEMENT

The *Allocation Policy for Pacific Salmon* describes priorities and considerations for the directed harvest of target stocks. However, these opportunities may have to be constrained due to conservation concerns for species, stocks or stock aggregates also encountered during these directed fisheries. The inadvertent harvest of different species of concern is referred to as by-catch. The inadvertent harvest of stocks of concern within the same species is referred to as incidental harvest. Both by-catch and incidental harvest are factored into the calculation of exploitation rates on various stocks, and therefore, fishing plans are designed to be consistent with existing policies and to keep exploitation rates on stocks of concern within the limits described in the conservation objectives.

Yukon River salmon migrate into the Bering Sea during the spring and summer after spending 0 or 1 (or 2) winters rearing in fresh water, depending on the species. Information on stock origin from tag recoveries and genetic analysis indicate that Yukon River salmon are present throughout the Bering Sea, and occasionally in regions of the North Pacific Ocean south of the Aleutian chain and the Gulf of Alaska during their ocean migration.

The by-catch of Chinook salmon in both the Alaskan Bering Sea - Aleutian Islands (BSAI) (BSAI) and the Gulf of Alaska (GOA) groundfish fisheries rose significantly in the late 1990s and early 2000s, peaking in 2007. Since then, due to the implementation of a number of fishing strategies intended to minimize the interception of salmon, by-catch levels have been reduced considerably. For example, since 2009 it is estimated that fewer than 1,000 adult equivalent upper Yukon River Chinook salmon were incidentally intercepted in the Bering Sea groundfish fishery. Salmon by-catch in all Bering Sea and Gulf of Alaska groundfish fisheries is monitored through an on-board independent observer program. Except for donations to food banks, salmon cannot be retained or sold. In past years, concerns over the escalating by-catch have been expressed by the YRP to the North Pacific Fishery Management Council, which oversees the management of these groundfish fisheries. The primary concern expressed was that interception of Yukon salmon in these fisheries is inconsistent with the YRSA, which obliges the Parties to decrease the marine catch and by-catch of Yukon River salmon. Although the situation has improved considerably over recent years, ongoing monitoring and reporting on salmon by-catch in BSAI and GOA groundfish fisheries is imperative in ensuring that interception of Yukon River stocks continues to be minimized.

9 SHARED STEWARDSHIP ARRANGEMENTS

Stewardship refers to the care, supervision or management of something, especially the careful and responsible management of something entrusted to one's care.² In the context of fisheries management, stewardship is often considered in terms of "shared stewardship", whereby First Nations, fishery participants and other interests are effectively involved in fisheries management decision-making processes at appropriate levels, contributing specialized knowledge and experience, and sharing in accountability for outcomes.

Moving toward shared stewardship is a strategic priority for DFO. This is reflected in a number of policies and initiatives, including the WSP, the Resource Management Sustainable Fisheries Framework (SFF), Fisheries Reform, Aboriginal Aquatic Resource and Oceans Management (AAROM) Program and the AFS.

Also referred to as "co-management," DFO is advancing shared stewardship by promoting collaboration, participatory decision making and shared responsibility and accountability with resource users and others. Essentially, shared stewardship means that those involved in fisheries management work cooperatively—in inclusive, transparent and stable processes—to achieve conservation and management goals.

Consultation and engagement with First Nations is central to DFO's approach to fisheries management (including the development of management strategies described within this IFMP) and fulfilling the Department's mandate. In addition to supporting good governance, sound policy and effective decision-making, Canada has statutory, contractual and common-law obligations to consult with Aboriginal groups. For example, The Crown has a legal duty to consult and, if appropriate, accommodate, when the Crown contemplates conduct that might adversely impact *Fisheries Act Section 35* rights (established or potential).

Consultation and engagement with First Nations takes place at a number of levels and through a variety of processes. For example, a significant amount of consultation and dialogue takes place through direct, bilateral meetings between DFO and First Nations at a local level. This can include specific engagement during the pre-season, in-season or post-season planning and reporting processes.

² As defined in the Atlantic Fisheries Policy Review (AFPR)

9.1 CONSULTATIVE PROCESSES

The development of decision guidelines and specific management measures involves consultation with various First Nation government representatives, groups, individuals as well as coordinated efforts through the YSSC. In the Yukon, consultative processes have been established for some time, particularly through implementation of First Nation Final Agreements. International consultation has been established through the YRSA and the YRP. The consultative processes for these and other initiatives are described below.

9.1.1 YUKON SALMON SUB-COMMITTEE

The YSSC is a public advisory body established under Chapter 16 of the UFA. The mandate of the YSSC is to provide for the public input into matters related to salmon through their authority to make official recommendations to the Minister of Fisheries and Oceans and Yukon First Nations. These recommendations, although focusing on salmon harvest management, may pertain to legislation, research, policies, and programs.

The members of the YSSC come from all parts of the Yukon and are comprised of both First Nation and non-First Nation people. The composition of the ten-member Committee is laid out in the UFA and is carefully structured to ensure diversity and balance. YSSC members consist of Yukon Fish and Wildlife Board appointees, nominees from Fisheries and Oceans Canada and the First Nations of the Alsek, Porcupine, and Yukon River drainage basins.

The YSSC established the Yukon River and Porcupine River working groups to gather input and comment on matters related to salmon. Participants in the working groups may include First Nation representatives, commercial, domestic and recreational fishers, Renewable Resource Council members, selected members of the YSSC and technical staff from Fisheries and Oceans Canada. Additionally, community and public meetings are convened annually by the YSSC to discuss run outlooks, present an allocation framework and decision matrix, and receive public input. The results of these efforts is an official recommendation from the YSSC to the Minister of Fisheries and Oceans Canada on the allocation of total allowable catch as outlined in *s 16.10.1, 16.10.2 and s 16.7.17.12 (f) of Yukon First Nation Final Agreements*.

9.1.2 YUKON RIVER PANEL

The Yukon River Panel (YRP) was established pursuant to the YRSA and consists of six Canadian members and six United States members. Each party is responsible for the appointment of its

members. As per section 16.7.17.13 of *Yukon First Nation Final Agreements*, YSSC members must constitute the majority of the Canadian section of the YRP.

To implement the YRSA, the YRP may make recommendations to the management agencies regarding various topics including: conservation, restoration, rebuilding and management of salmon stocks originating in the Yukon River in Canada; the coordination of management plans and actions of the Yukon River fisheries that affect Canadian-origin salmon stocks; and projects to be funded under the REF.

The YRP is supported by its Joint Technical Committee (the JTC) which prepares and reviews post-season summaries, stock status, escapement goal analyses, research project reports including Chinook size trend analyses, research planning initiatives, and restoration and enhancement proposals.

9.1.3 FIRST NATION ABORIGINAL FISHERIES STRATEGY CONSULTATIONS

Engagement relating to the AFS occur throughout the year with Yukon First Nations that have not yet concluded Final Agreements. These meetings help to inform the content of DFO/First Nation Fisheries Agreements. The Agreements may contain details pertaining to fisheries activities and programs occurring in First Nation traditional territories such as communications, management of First Nation fisheries, stock assessment, habitat and enhancement programs, enforcement protocols and communal licences. The AFS agreement documents, as well as records of consultation sessions and progress on action items, are maintained by the AFS Coordinator.

10 COMPLIANCE PLAN

10.1 COMPLIANCE AND ENFORCEMENT OBJECTIVES

CONSERVATION AND PROTECTION PROGRAM DESCRIPTION

Conservation and Protection (C&P) is mandated to protect fisheries, waterways, aquatic ecosystems and resources from unlawful exploitation and interference. Fishery officers provide compliance promotion and enforcement services in support of legislation, regulations and management measures implemented to achieve the conservation and sustainable use of Canada's aquatic resources, the protection of species at risk, fish and fish habitat, and oceans.

In carrying out activities associated with the compliance and enforcement of Pacific salmon fisheries, outlined in this management plan, C&P will utilize intelligence-led and principle-based approaches and practices consistent with the *Three Pillars of the C&P National Compliance Framework* and the *DFO Compliance Model*:

- I. Voluntary **compliance promotion** through education, shared stewardship and user engagement;
- II. Intelligence-led **monitoring, control and surveillance** activities;
- III. Management of **major cases /special investigations** in relation to complex compliance issues.

10.2 REGIONAL COMPLIANCE PROGRAM DELIVERY

C&P utilizes a broad scope of activities to deliver compliance and enforcement services within Pacific Region salmon fisheries. The main activities of C&P include:

- Prioritizing compliance and enforcement measures that support DFO management objectives which aim to sustain the salmon stocks and fisheries;
- Developing and maintaining positive relationships with First Nations communities, recreational groups and commercial interests through dialogue, education and shared stewardship;
- Ensuring the development and supporting of a professional fishery officer complement that is skilled, well-equipped, well-informed, safe and effective;
- Ensuring that salmon fisheries participants are aware of their obligations to comply with licence conditions;

Inspecting fishers vessels, vehicles, totes and containers, fish processors, cold storage facilities, restaurants and retail outlets to verify compliant product and compliance with Federal and Provincial Acts and Regulations;

- Conducting high-profile fishery officer presence during patrols by vehicle, vessel and aircraft to detect and deter violations;
- Maintaining a violation reporting 24-hour hotline to facilitate the reporting of violations;
- Supporting traceability initiatives within the salmon fishery for enhanced accountability, e.g., monitoring and verifying salmon catches and offloads to ensure accurate and timely catch reporting and accounting, including coverage of dual-fishing opportunities;
- Collecting and utilizing intelligence to identify and target repeat and more serious offenders for enforcement effort, including laundering and illegal sales of salmon;
- Utilization of enhanced surveillance techniques, technology and covert surveillance techniques as a means to detect violations and gather evidence in salmon fisheries-of-concern;
- Responding to the most serious habitat violations identified by inspections, ORR's or the DFO Fish and Fish Habitat Protection Program;
- Continue to utilize restorative justice forums to reduce harm to fisheries, species-at-risk, and fisheries habitat.

10.3 CONSULTATION

Education, information and shared stewardship activities are the foundation for achieving voluntary compliance. C&P fishery officers regularly participate in consultations with resource users and the general public. C&P participates in all levels of the advisory process and is committed to including local fishery officers to provide users and the community-at-large with specific information related to compliance and enforcement perspectives. C&P will continue to meet with individual First Nations at the local level through the First Nations Liaison Program and with First Nations planning committee meetings where many First Nations gather. C&P works closely with the Fisheries and Aquaculture Management sector to ensure that fishery management measures are enforceable and implemented in a controlled and fair manner.

On a day-to-day basis, fishery officers are often the most visible faces of the Department. When the fishing community and general public provide comments, they are shared with C&P managers, fisheries managers and fisheries protection staff. Public feedback is critical in identifying issues of concern and providing accurate feedback on emerging issues. C&P encourages the timely

reporting of suspicious behaviour and violations to a local office or the Observe, Record, Report hotline.

10.4 COMPLIANCE STRATEGY

Specific objectives for the salmon fishery will focus compliance management efforts on:

- Supporting the development and implementation of the Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries;
- Monitoring in-river waters utilizing intelligence to target priority fisheries and compliance issues;
- Working with resource users to improve voluntary compliance.

Salmon fishery compliance and enforcement continues to be a significant priority for C&P. Concurrent to the salmon season, compliance and enforcement attention may be required to address violations related to fish habitat and the protection of species at risk. In order to balance multiple program demands, C&P applies a risk-based integrated work planning process at the Regional and Area levels. This process identifies priorities so that resources are allocated to the areas of greatest need.

II APPENDIX I: 2022 POST-SEASON REVIEW AND STOCK STATUS

II.1 2022 POST-SEASON REVIEW

At the conclusion of each season, the Yukon River Panel's Joint Technical Committee meet to review the fishing season and prepare an annual report which contains a description and results of fishing activities, management strategies, total run size, historical catch, and escapement information for Canadian-origin salmon stocks designated by the *Yukon River Salmon Agreement* (YRSA). The "*Yukon River Salmon 2022 Season Review and 2023 Outlook*" is available through the Yukon River Panel's website: <http://www.yukonriverpanel.com/publications/yukon-river-joint-technical-committee-reports/>

Performance of 2022 fisheries and management measures in both Canada and the U.S. are assessed based on harvest data submitted by subsistence, recreational, commercial and domestic fisheries. For the Canadian portion of the Yukon River watershed, recreational catch information is collected via the Yukon Salmon Conservation Catch Card while First Nation fisheries provide harvest monitoring data through monitoring completed by individual First Nations. Domestic and commercial catches are evaluated through mandatory harvest reporting.

Appendix B of the U.S. / Canada Joint Technical Committee (JTC) report contains a 'report card' that outlines escapement goals, run size, allowable and actual catches in the U.S. and Canada, and the spawning escapement for Canadian-origin Chinook and Chum salmon. This report is the best sources of data on the 2022 (and previous) Yukon River salmon runs.

II.2 HISTORIC AND CURRENT STOCK STATUS - CHINOOK SALMON

Through the 1980s, Chinook escapements in the Canadian section of the Yukon River drainage were in a state of decline. A plan to prevent further declines, while formulating rebuilding plans, was developed jointly in the Canada/U.S. Yukon River salmon negotiations and adopted as part of the *Interim Yukon River Salmon Agreement* (IYRSA), which was signed in February 1995. In this plan, a stabilization spawning escapement goal of 18,000 Canadian-origin upper Yukon Chinook was established for the period 1990 through 1995. A target escapement goal range of 33,000 to 43,000 Chinook salmon was also agreed to for rebuilt runs.

In accordance with the YRSA, the parties were tasked with developing a Chinook rebuilding plan and providing recommendations regarding the implementation of such a plan after the 1995 season. In April 1996, the Yukon River Panel agreed to implement an upper Yukon Chinook rebuilding plan by establishing a revised interim minimum escapement target of >28,000 Chinook salmon for 1996 through 2002. In 2003, the escapement target was 25,000 Chinook salmon, but was to be increased to 28,000 in the event a U.S. commercial fishery was initiated. In 2004, the escapement target for Canadian-origin upper Yukon Chinook salmon was >28,000 Chinook salmon. If the run was sufficiently strong, the escapement target could range up to 38,000 Chinook salmon, although the Panel did not describe what constituted a “strong run”. In 2005 and 2006, the escapement target for Canadian-origin upper Yukon Chinook salmon remained unchanged at >28,000 Chinook salmon as the run was not yet considered to be rebuilt. The arrangement for 2007 was consistent with the *Yukon River Salmon Agreement*. Since the 2007 run was deemed to be rebuilt (since the primary brood year escapements achieved the escapement goal range for rebuilt stocks), the long-term escapement target of 33,000 to 43,000 was in effect. In 2008 and 2009, the escapement goal was changed to > 45,000 upper Yukon Chinook salmon to make it consistent with the new method of assessing border escapement and spawning escapement (i.e. sonar). In 2010, an escapement range was established (42,500 to 55,000 Canadian-origin Chinook salmon). In early 2022 the Yukon River Panel received the results of the Joint Technical Committee’s Chinook salmon biological escapement goal scientific analysis. Although the Panel acknowledged the scientific basis for the recommendation, further consideration, as well as, work by the Panel and its Traditional Knowledge Sub-Committee was required to inform the establishment of a long-term escapement goal. The Panel did not reach consensus on a new recommendation for a spawning escapement objective for the 2022 season. As a result, in order to facilitate coordinated management and following consultation with the Pacific Salmon Commission Executive Secretary on international Pacific Salmon Treaty protocol, the long-standing Interim Management Escapement Goal most recently renewed by the Panel in April 2021 remained in effect (42,500 – 55,000) for 2022. For 2023, the Joint Technical Committee recommended an escapement goal range of 42,500 - 62,500 and a management objective of 52,500. The Yukon River Panel was unable to achieve consensus on a management objective for 2023, as a result, Canada has adopted a conservative management objective of 55,000 Canadian-origin Chinook salmon.

11.3 HISTORIC AND CURRENT STOCK STATUS – CHUM SALMON

As with Yukon River Chinook salmon, chum salmon are the target of numerous fisheries located throughout the river and in approach areas in marine waters. For example, in addition to the U.S. in-river harvest, catches of Yukon-origin chum salmon are believed to occur in U.S. fisheries along the Aleutian Islands chain in some years, particularly near False Pass. Throughout the 1980s, Canadian chum escapements appeared to be depressed. As per the YRSA, Canada and the U.S. agreed to rebuild the chum spawning escapements to more than 80,000 fish in the upper Yukon and to the 50,000-120,000 range in the Fishing Branch River. Currently, the Interim Spawning Escapement Goals for these stocks are 70,000 to 104,000 for mainstem Yukon River and 22,000 to 49,000 for Fishing Branch River chum salmon.

APPENDIX 2: LONGER TERM COMMERCIAL FISHERY CLOSURES OR MITIGATION

In 2021, as part of immediate conservation measures under the [Pacific Salmon Strategy Initiative \(PSSI\)](#), the Minister announced several new commercial fishery closures to protect stocks of conservation concern. These closures were implemented on an interim basis in 2021 with a commitment to review longer term closures for 2022 and beyond after additional consultation with affected groups.

For 2022 and beyond, the Department will continue to take a more precautionary approach to managing fisheries that interact with stocks of conservation concern to help stabilize and support rebuilding of these depressed populations. The Department identified commercial fisheries where there is a high risk of interception of stocks of conservation concern in targeted fisheries and/or by-catch. For these fisheries, the Department sought feedback from February through May of 2022 on the approach for managing the identified stocks of concern including:

1. Longer term closure; or,
2. No longer term closure and implementation of additional mitigation measures.

Beginning in 2022, the Department implemented longer term closures for fisheries identified in Appendix Table 1. These closures are expected to remain in place for at least 1 salmon generation (4-5 years) or until there is clear evidence of stock growth and abundance is above levels associated with the critical zone or Wild Salmon Policy red zone.

For any commercial fisheries that are closed, the allocations will remain with the original fleet and fish will be allowed to pass to spawning grounds. Opportunities for additional commercial harvest may be considered in locations where stocks of concern will not be encountered.

All other commercial fisheries not identified as longer term closures will remain closed unless conditions are met for an opening based on harvest decision rules and conservation criteria identified in this Integrated Fisheries Management Plan.

The impacts from the long-term closures will be mitigated by a commercial licence retirement program and a First Nations communal commercial licence alternation program, that are both expected to run from 2022-2025. As well, additional initiatives to support transformation of the fishery will help to mitigate impacts of reduced harvest opportunities.

Appendix Table 1: Yukon Longer Term Commercial Closures or Mitigation

| Fishery | Area | Group |
|---------|-------------|-----------------|
| Chinook | Yukon River | N/A - Aggregate |
| Chum | Yukon River | N/A - Aggregate |

13 APPENDIX 3: LANDINGS AND MARKETS

13.1 LANDINGS

In recent years, Canadian harvest of Yukon River Chinook salmon has largely been driven by annual run abundance. Since 2007, the primary harvest of Chinook salmon has occurred through Aboriginal subsistence fisheries, although in most years the extent of these fisheries has been limited due to concerns over achieving sufficient spawning escapement. Canadian harvest of Chinook salmon in Yukon River fisheries since 1993 is summarized in Appendix Table 1.

Harvest of fall Chum salmon in Canadian Yukon River fisheries since 1993 are summarized in Appendix Table 2. Although abundance and resulting harvest levels have fluctuated in recent years, market conditions have had the greatest effect on commercial harvest.

Historically the majority of harvest of Canadian-origin Yukon River salmon occurs in Alaskan subsistence and commercial fisheries. For Chinook salmon, ADF&G estimates the catch of Canadian-origin Chinook salmon by Alaskan fishers through genetic stock analyses. On average, approximately 50% of Chinook salmon harvested in the lower Yukon River (U.S. waters) were Canadian-origin fish.

13.2 MARKETS FOR COMMERCIAL FISH

The Han Fish Plant in Dawson City began operation in 1981 and became the largest Canadian market for commercially caught Yukon salmon. Products included fresh/frozen Chinook and fall Chum salmon as well as roe. Some experimentation with smoked products also occurred however due to a number of factors (primarily lack of sustained harvest opportunities for commercial fisheries) the plant has not operated since 1996. (Appendix Tables 1 and 2).

Appendix Table 2. Canadian harvest of Yukon River Chinook salmon: 1993 to 2022.

| Year | Yukon River Mainstem | | | | | Total | Porcupine River | Canadian Total |
|------|----------------------|------------|--------------|----------|--------------|--------|-----------------|----------------|
| | Aboriginal | Commercial | Recreational | Domestic | Test Fishery | | Aboriginal | |
| 1993 | 5,576 | 10,350 | 300 | 243 | | 16,469 | 142 | 16,611 |
| 1994 | 8,069 | 12,028 | 300 | 373 | | 20,770 | 428 | 21,198 |
| 1995 | 7,942 | 11,146 | 700 | 300 | | 20,088 | 796 | 20,884 |
| 1996 | 8,451 | 10,164 | 790 | 141 | | 19,546 | 66 | 19,612 |
| 1997 | 8,888 | 5,311 | 1,230 | 288 | | 15,717 | 811 | 16,528 |
| 1998 | 4,687 | 390 | Closed | 24 | 737 | 5,838 | 99 | 5,937 |
| 1999 | 8,804 | 3,160 | 177 | 213 | | 12,354 | 114 | 12,468 |
| 2000 | 4,068 | Closed | Closed | Closed | 761 | 4,829 | 50 | 4,879 |
| 2001 | 7,421 | 1,351 | 146 | 89 | 767 | 9,774 | 370 | 10,144 |
| 2002 | 7,139 | 708 | 128 | 59 | 1,036 | 9,070 | 188 | 9,258 |
| 2003 | 6,121 | 2,672 | 275 | 115 | 263 | 9,446 | 173 | 9,619 |
| 2004 | 6,483 | 3,785 | 423 | 88 | 167 | 10,946 | 292 | 11,238 |
| 2005 | 6,376 | 4,066 | 436 | 99 | | 10,977 | 394 | 11,371 |
| 2006 | 5,757 | 2,332 | 606 | 63 | | 8,758 | 314 | 9,072 |
| 2007 | 4,175 | Closed | Closed | Closed | 617 | 4,794* | 300 | 5,094 |
| 2008 | 2,885 | Closed | Closed | Closed | 513 | 3,399* | 314 | 3,713 |
| 2009 | 3,791 | 364 | 125 | 17 | | 4,297 | 461 | 4,758 |
| 2010 | 2,455 | Closed | Closed | Closed | | 2,456* | 250 | 2,706 |
| 2011 | 4,550 | Closed | 40 | Closed | | 4,594* | 290 | 4,884 |
| 2012 | 2,000 | Closed | Closed | Closed | | 2,000 | 200 | 2,200 |
| 2013 | 1,902 | Closed | Closed | Closed | | 1,904* | 242 | 2,146 |
| 2014 | 100 ^a | Closed | Closed | Closed | | 100 | 3 | 103 |
| 2015 | 1,000 | Closed | Closed | Closed | | 1,000 | 204 | 1,204 |
| 2016 | 2,768 | Closed | Closed | Closed | | 2,769* | 177 | 2,946 |
| 2017 | 3,500 | Closed | Closed | Closed | | 3,500 | 131 | 3,631 |
| 2018 | 2,789 | Closed | Closed | Closed | | 2,789 | 308 | 3,097 |
| 2019 | 2,764 | Closed | Closed | Closed | | 2,764 | 340 | 3,104 |
| 2020 | 2,364 | Closed | Closed | Closed | | 2,364 | 180 | 2,543 |
| 2021 | 306 | Closed | Closed | Closed | | 306 | 16 | 322 |
| 2022 | 46 | Closed | Closed | Closed | | 46 | 12 | 58 |

* Totals include any incidental harvest. ^a Data are preliminary.

Appendix Table 3. Canadian harvest of Yukon River Chum salmon: 1993 to 2022.

| Year | Yukon River Mainstem | | | | Porcupine River | Canadian Total |
|------|----------------------|--------------------|----------|--------|--------------------|----------------|
| | Aboriginal | Commercial | Domestic | Total | Aboriginal | |
| 1993 | 4,660 | 7,762 | 0 | 12,422 | 1,668 | 14,090 |
| 1993 | 5,319 | 30,035 | 0 | 35,354 | 2,654 | 38,008 |
| 1995 | 1,099 | 39,012 | 0 | 40,111 | 5,489 | 45,600 |
| 1996 | 1,260 | 20,069 | 0 | 21,329 | 3,025 | 24,354 |
| 1997 | 1,238 | 8,068 | 0 | 9,306 | 6,294 | 15,600 |
| 1998 | 1,795 | Closed | Closed | 1,795 | 6,159 | 7,954 |
| 1999 | 3,234 | 10,402 | 0 | 13,636 | 6,000 | 19,636 |
| 2000 | 2,927 | 1,319 | 0 | 4,246 | 5,000 | 9,246 |
| 2001 | 3,077 | 2,198 | 3 | 5,278 | 4,594 | 9,872 |
| 2002 | 3,167 | 3,065 | 0 | 6,232 | 1,860 | 8,092 |
| 2003 | 1,493 | 9,030 | 0 | 10,523 | 382 | 10,905 |
| 2004 | 2,180 | 7,365 | 0 | 9,545 | 205 | 9,750 |
| 2005 | 2,035 | 11,931 | 13 | 13,979 | 4,593 | 18,572 |
| 2006 | 2,521 | 4,096 | 0 | 6,617 | 5,179 | 11,796 |
| 2007 | 2,221 | 7,109 | 0 | 9,330 | 4,500 | 13,830 |
| 2008 | 2,068 | 4,062 | 0 | 6,130 | 3,436 | 9,566 |
| 2009 | 820 | 293 | 0 | 1,113 | 898 | 2,011 |
| 2010 | 1,523 | 2,186 | 0 | 3,709 | 2,078 | 5,787 |
| 2011 | 1,000 | 5,312 | 0 | 6,312 | 1,851 | 8,163 |
| 2012 | 700 | 3,205 | 0 | 3,905 | 3,118 | 7,023 |
| 2013 | 500 | 3,369 | 18 | 3,887 | 2,283 | 6,170 |
| 2014 | 546 ^a | 2,485 ^a | 19 | 3,050 | 1,983 ^a | 5,033 |
| 2015 | 1,000 | 2,862 | 35 | 3,897 | 556 | 4,453 |
| 2016 | 1,000 | 1,745 | 0 | 2,745 | 3,005 | 5,750 |
| 2017 | 1,000 | 2,404 | 0 | 3,404 | 2,312 | 5,716 |
| 2018 | 1,000 | 1,957 | 0 | 2,957 | 1,874 | 4,831 |
| 2019 | 1,000 | 1,728 | 31 | 2,759 | 1,000 | 3,759 |
| 2020 | 0 | 0 | 0 | 0 | 100 | 100 |
| 2021 | 0 | Closed | Closed | 0 | 21 | 21 |
| 2022 | 0 | Closed | Closed | 0 | 15 | 15 |

^a Data are preliminary.

14 APPENDIX 4: FISHERY PLANS

Plans for each fishery will be based on the in-season fishery management decision matrices (see section 9) and in-season assessments of run strength.

14.1 FIRST NATION FISHERY PLAN

Once conservation (spawning) requirements are achieved, constitutionally protected First Nation subsistence fisheries (for food, social, and ceremonial purposes) are provided priority allocation in management processes. Prior to reducing or removing the total allowable catch allocation available for First Nation subsistence fisheries, all other targeted salmon fisheries (commercial, recreational, and domestic) will be closed or have catch limits varied to zero. The allocation of salmon to First Nation subsistence fisheries can only be removed on either the recommendation of the Yukon Salmon Sub-Committee or in an emergency as specified in *Yukon First Nation Final Agreements*.

Chinook salmon – the opportunity for First Nation harvest of Chinook salmon will not be known until the mid-point of the run at Pilot (3rd week of June). If there is an allocation to First Nations in 2023, it is anticipated to be less than 120 Chinook. If the run abundance is near the low end of the pre-season forecast range, conservation measures will be required. If the run abundance is near the high end of the pre-season forecast range, an opportunity for a very limited fishery will be available, however this is highly unlikely. To ensure that recommendations about harvest level in the First Nation subsistence fisheries are implemented only to the extent reasonably necessary to achieve the conservation objective, DFO will closely monitor the return of Chinook salmon into Canada via in-river assessment programs to determine a run projection as early as possible.

Chum salmon – for mainstem and Porcupine fisheries, opportunities for full First Nation subsistence fisheries are not anticipated but will be confirmed following the in-season revised projection that will be developed in mid-July.

Coho salmon – opportunities for the First Nation subsistence fishery in the Porcupine River are anticipated.

To promote the participation of First Nations in the administration and management of fisheries within respective traditional territories, Fisheries and Oceans Canada will continue to develop co-management initiatives with “Non Final Treaty” Yukon First Nations through the Department’s AFS program. One of the primary avenues for accomplishing this is through the negotiation of annual Project Funding Agreements. In addition, management objectives are achieved through the development of Enforcement Protocols and the issuance of Communal Fishing Licences. Although

communal licences are developed to fit the particular circumstances of each First Nation and reflect Final Agreement provisions, where they are in place, they all must be consistent with the principles set out constitutionally and associated Supreme Court rulings.

14.2 PUBLIC ANGLING FISHERY PLAN

Chinook salmon – Based on the pre-season forecast for Yukon River Chinook salmon, the public angling fishery will be closed in 2023. Given this, a precautionary approach will be taken to managing harvest with the permitted retention of Chinook salmon varied to 0 (zero). Area-specific or regional angling closures may also be implemented to provide protection for spawning salmon during sensitive periods.

The last time a public angling fishery was permitted to retain Chinook salmon in the Yukon River in Canada was in 2006 (with a small opportunity in 2009). Since then there have been significant conservation measures - both required and voluntary – in the priority First Nation fisheries (and full closures in the commercial and domestic fisheries). Many First Nations have made considerable voluntarily restrictions in their fisheries and demonstrated leadership and commitment to the long term recovery and sustainability of Yukon River Chinook.

Given the intermittent nature of fishery opportunities, and in order to ensure that the fishery is administered and conducted in an orderly manner, Fisheries and Oceans Canada intends to work with the YSSC, Yukon First Nations and the public to develop a framework to guide public angling for Chinook salmon before harvest opportunities are provided. In general, the strategy is anticipated to include a structured approach that will identify periods of time (windows), specific locations, and specific controls under which Chinook salmon angling and retention could be permitted. It will also likely include consideration for communication and angler engagement as well as on-the-ground monitoring of harvest and provision of education when angling is occurring. The overarching objective of the framework will be to provide public opportunity to participate in the Yukon River salmon fishery, when abundance permits, in a manner that respects conservation objectives and minimize the likelihood of conflict between fisheries. The goal is to develop a public angling fishery framework that will facilitate a structured and transparent approach to administering a public angling fishery in future years.

Chum salmon – With low anticipated fall Chum salmon returns, and as a result, the closure of Fall Chum salmon fishing, public angling will not occur in 2023.

DFO fishery officers will conduct in-season monitoring of the public angling fisheries through enforcement patrols. All anglers fishing for salmon must have a valid Yukon Angling Licence as

well as a Salmon Conservation Catch Card. A Regulation Summary is provided out when licences are issued and includes information on area-specific closures, hook sizes and other fishing gear limitations that must be adhered to when fishing for salmon. Anglers are advised to consult the *Yukon Territory Fishery Regulations* for further details (<http://lois.justice.gc.ca/en/showtdm/cr/C.R.C.-c.854>). All salmon anglers are reminded that the completed Salmon Catch Card must be returned to Fisheries and Oceans Canada by November 30.

14.3 DOMESTIC FISHERY PLAN

Chinook salmon – Due to the long term closure of Yukon River Chinook salmon domestic fisheries, no domestic harvest opportunities for Yukon River Chinook salmon will occur in 2023.

Chum salmon – Due to the long term closure of Yukon River chum salmon domestic fisheries, no domestic harvest opportunities for Yukon River Chinook salmon will occur in 2023.

In years when openings are provided, fishers would be required to report catches, tag recovery and associated data within eight hours after the closure of each fishery. Information can be mailed in to the Fisheries and Oceans Canada office in Whitehorse, or telephoned to the toll free number: 1-877-salmon2 (1-877-725-6662). Further information on reporting requirements can be received by contacting Fisheries and Oceans Canada. DFO fishery officers would conduct monitoring of the domestic fishery.

14.4 COMMERCIAL FISHERY PLAN

In years where commercial fishery opportunities exist for either Chinook or chum salmon, gill net mesh size will be restricted to 152.4 mm (6-inch) mesh or smaller to reduce the interception of larger, older (often female) Chinook salmon.

Chinook salmon – Due to the long term closure of Yukon River Chinook salmon commercial fisheries, no directed commercial harvest opportunities for Yukon River Chinook salmon will occur in 2023.

Chum salmon – Due to the long term closure of Yukon River chum commercial salmon, no directed commercial harvest opportunities for Yukon River chum salmon will occur in 2023.

In years when openings are provided, weekly fishing times would be based on in-season assessments of run strength and run timing, escapement projections and the status of the cumulative catch relative to the Total Allowable Catch. Therefore, week-to-week adjustments in fishing time would be expected. DFO endeavours to announce weekly fishing times 48 hours prior

to the proposed opening date; however, announcements of extensions and emergency closures may be made on shorter notice.

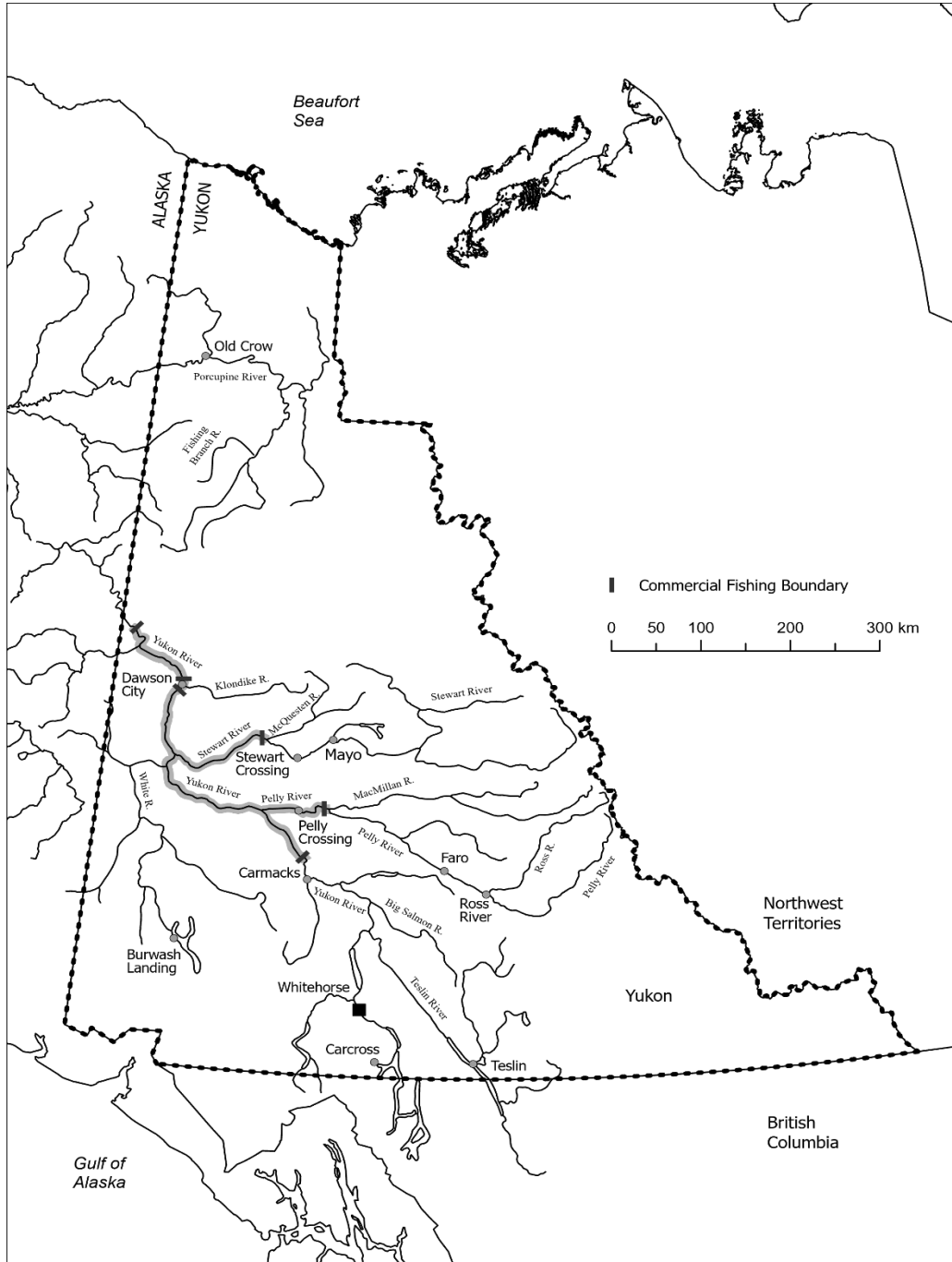
Announcements of openings/closures would be made via Fisheries and Oceans Canada's fishery notification system (<http://www-ops2.pac.dfo-mpo.gc.ca/fns-sap/index-eng.cfm>).

DFO fishery officers and stock assessment personnel would conduct monitoring of commercial fishing activities in years when they occur. There is an increasing responsibility for commercial fishers to accurately document catches and report this information weekly. These responsibilities would be outlined in conditions attached to commercial licences. Gear allowances are unchanged from previous years and as described in the *Yukon Territory Fishery Regulations*.

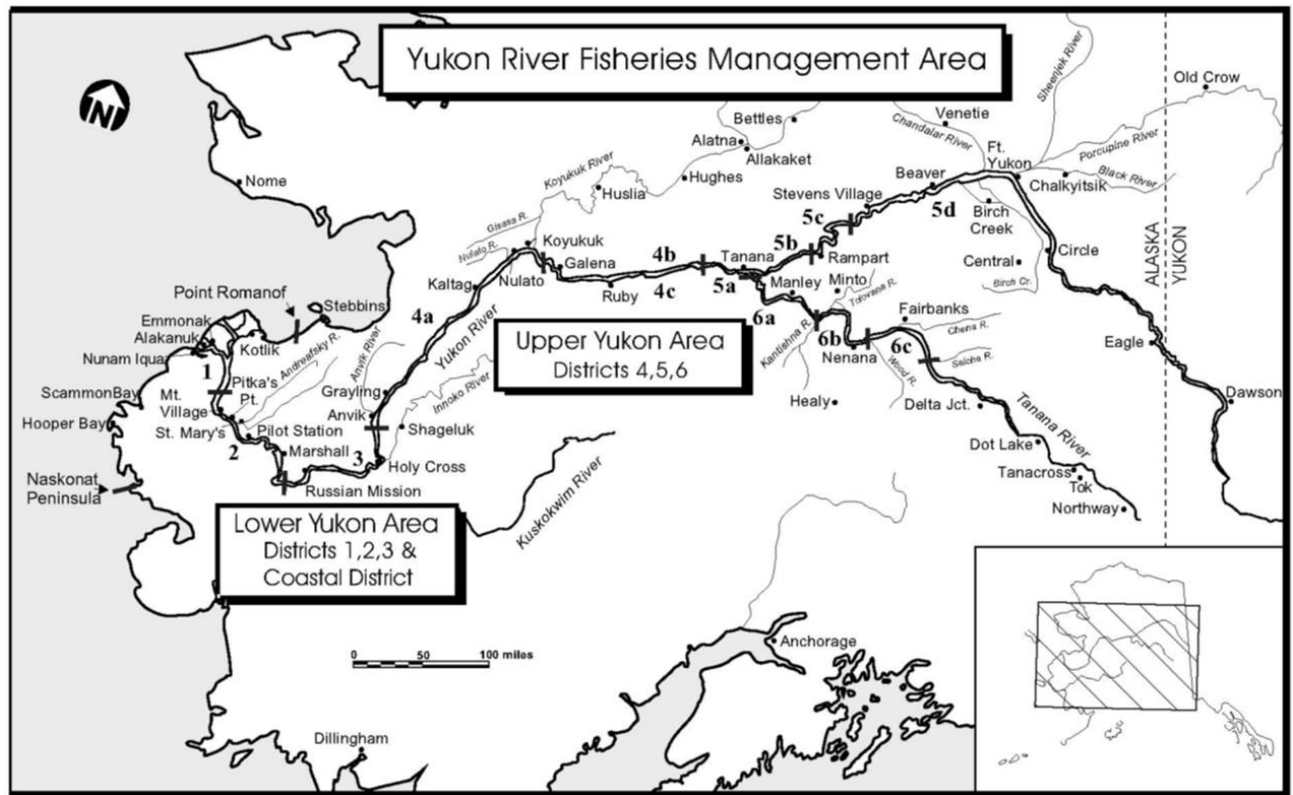
Commercial fishers must keep records of daily catch and tag recovery data, tabulated on forms provided by Fisheries and Oceans Canada. Within eight hours of the closure of each weekly fishing period, fishers would be required to report this information by:

- a. Phoning in their daily catch and tag recovery information to the Fisheries and Oceans Canada toll free catch line: 1-877-salmon2 (1-877-725-6662). Phoned-in information shall include:
 - The name of the fisher;
 - The catch of each species per day broken down by numbers of males and females; and,
 - The number of tags recovered from each species each day broken down by tag colour.
- b. And, fishers are also required to mail their information no later than 10 business days after a weekly fishery closure to: Fisheries and Oceans Canada, Suite 100 – 419 Range Road, Whitehorse, Yukon. Y1A 3V1.

15 APPENDIX 5: MAPS OF FISHING AREAS



Appendix Figure I. Yukon River Watershed (Canada) - Dark bars delineate commercial and domestic fishing boundaries (shaded grey areas are fishing zones).



Appendix Figure 2. Yukon River drainage in Alaska (dark bars and numbers delineate fishing districts).

16 APPENDIX 6: LEGISLATION

The following Acts, Regulations and Agreements inform the management of Yukon River salmon:

- Fisheries Act
- Pacific Salmon Treaty – Yukon River Salmon Agreement
- Yukon First Nation Final and Self-Government Agreements
- Yukon Territory Fishery Regulations (pursuant to Fisheries Act)
- Fishery (General) Regulations
- Aboriginal Communal Fishing Licence Regulations
- Management of Contaminated Fisheries Regulations

17 APPENDIX 7: GLOSSARY

Aboriginal Traditional Knowledge (ATK) or Traditional Ecological Knowledge (TEK): Knowledge that is held by, and unique to Aboriginal peoples. It is a living body of knowledge that is cumulative and dynamic and adapted over time to reflect changes in the social, economic, environmental, spiritual and political spheres of the Aboriginal knowledge holders. It often includes knowledge about the land and its resources, spiritual beliefs, language, mythology, culture, laws, customs and medicines.

Abundance: Number of individuals in a stock or a population, usually at a certain point in time.

Age Composition: Proportion of individuals of different ages in a stock or in the catches.

Anadromous: An anadromous species, such as salmon, spends most of its life at sea but returns to fresh water grounds to spawn in the river it comes from. All Pacific salmon die after spawning.

ASL: Age, Sex, Length. A typical standard for information collected on any salmon handled in stock assessment projects. Genetic tissues samples are often also collected, typically from a small piece from a fin.

Border Passage: The number of adult, upstream migrating salmon that escape all U.S. fisheries and reach the Canada/U.S. border. Typically used in reference to the mainstem of the Yukon River.

Brood Year: The year to which a salmon was born. A returning run of salmon consists of salmon from multiple brood years.

By-catch: The unintentional catch of one species when the target is another.

Catch per Unit Effort (CPUE): The amount caught for a given fishing effort. Ex: tons of shrimp per tow, kilograms of fish per hundred longline hooks.

Coded Wire Tag (CWT): A small metal tag inserted into the nose of a juvenile salmon (usually hatchery stock) prior to release or migration to the ocean. The tag has encoded information that indicates the origin and year of release of the fish. Fish with a CWT are also adipose clipped before release.

Communal Commercial Licence: Licence issued to Aboriginal organizations pursuant to the *Aboriginal Communal Fishing Licences Regulations* for participation in the general commercial fishery.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Committee of experts that assess and designate which wild species are in some danger of disappearing from Canada.

Discards: Portion of a catch thrown back into the water after they are caught in fishing gear.

Ecosystem-Based Management: Taking into account of species interactions and the interdependencies between species and their habitats when making resource management decisions.

Escapement: A group or number of fish that pass (or escape) a threshold. (e.g. *Spawning Escapement*).

Fishing Effort: Quantity of effort using a given fishing gear over a given period of time.

Fixed Gear: A type of fishing gear that is set in a stationary position. These include traps, weirs, gillnets, longlines and handlines.

Food, Social and Ceremonial (FSC): A fishery conducted by Aboriginal groups for food, social and ceremonial purposes.

Genetic Stock Identification (GSI): Using genetics to determine which spawning population a salmon is from, usually applied in a mixed stock (many salmon in the river, migrating to different spawning locations) context.

Gillnet: Fishing gear: netting with weights on the bottom and floats at the top used to catch fish. Gillnets can be set at different depths.

Mark-Recapture Program: A method of estimating fish abundance. Fish are first captured, marked, released, and allowed to mix with the unmarked population. In a second event (at a later date, or upstream location in the case of migrating salmon) fish are again captured. Knowing the number of fish released with marks, and ratio of marked to unmarked fish in the second capture event, scientists can estimate the total abundance of fish.

Maximum Sustainable Yield (MSY): Largest average catch that can continuously be taken from a stock.

Mesh Size: Size of the mesh of a net. Different fisheries have different minimum mesh size regulation.

Otolith: Structure of the inner ear of fish, made of calcium carbonate. Also called "ear bone" or "ear stone". Otoliths can be used to determine the age of fish: annual rings can be observed and counted. Daily increments are visible as well on larval otoliths.

Population: Group of individuals of the same species, forming a breeding unit, and sharing a habitat.

Precautionary Approach: Set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resource, the

environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong. In general, about being cautious when scientific information is uncertain, unreliable, or inadequate and not using the absence of adequate scientific information as a reason to postpone or fail to take action to avoid serious harm to the resource. (<https://dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm>)

Productivity: The ability of a stock to rebuild itself when the numbers of spawners get very small. Not the same as recruitment or return per spawner.

Quota: Portion of the total allowable catch that a unit such as vessel class, country, etc. is permitted to take from a stock in a given period of time.

Recruitment: Amount of individuals becoming part of the exploitable stock (e.g., that can be caught in a fishery). The total number of salmon (production) produced from a single brood year.

Research Survey: Survey at sea, on a research vessel, allowing scientists to obtain information on the abundance and distribution of various species and/or collect oceanographic data. For example may be a bottom trawl survey, plankton survey, or hydro acoustic survey.

Return per spawner: the average number of mature adult salmon produced from one spawning salmon.

Run Size: All fish (by species) which are estimated to return to a drainage. This includes all fish which reach the spawning grounds, and fish which enter the river but do not reach spawning grounds due to harvest and other forms of mortality.

SARA: The *Species at Risk Act* is a federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides the legal protection of wildlife species and the conservation of their biological diversity.

Scale Pattern Analysis: Different freshwater rearing conditions may be reflected in different growth rates that can create varying/unique scale patterns that allow general point of origin assessments to be made.

Sonar: Sonars emit high frequency sound waves into the water and produce images of swimming fish. Since sonars rely on sound instead of light, they can be used to count fish in murky water. Newer sonar units also record video and can be used to determine fish size and direction of travel. Sonar imaging enables technicians to monitor activity around the clock, and later count fish passage in recordings. Sonar provides robust estimates of salmon passage. Two applications in the Yukon River drainage are the Eagle Sonar and the Porcupine River Sonar.

Spawner: Sexually mature individual.

Spawning Escapement: All salmon by species which are estimated to have reached their spawning grounds.

Spawning Stock: Sexually mature individuals in a stock.

Stock: Describes a population of individuals of one species found in a particular area, and is used as a unit for fisheries management. Ex: NAFO area 4R herring.

Stock Assessment: Scientific evaluation of the status of a species belonging to a same stock within a particular area in a given time period.

Subsistence Fishery: A fishery that fills a need for food purposes. In Canada, it is not to be confused with the aboriginal fishery, which is restricted to First Nation members. In Alaska, the subsistence fishery involves both aboriginal and non-aboriginal Alaskan residents.

Test Fishing: Stock assessment method that usually takes place as part of sonar enumeration projects. Different mesh sizes are typically fished (drift and or set netting, depending on the site and the species) in a daily rotation through the project. Salmon and freshwater fish captured are measured for relevant ASL data, and live released. This provides information both on species age, size, and length, as well as what species are passing.

Total Allowable Catch (TAC): The amount of catch that may be harvested from a stock or the amount of fish that can be harvested after accounting for a specified spawning escapement target and U.S. and Canadian harvest shares.

Traditional Ecological Knowledge (TEK): A cumulative body of knowledge and beliefs handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

Tonne: Metric tonne, which is 1000kg or 2204.6lbs.

Year-class: Individuals of a same stock born in a particular year. Also called "cohort".