Fisheries and Oceans Canada | Pêches et Océans Canada
Ecosystems and Oceans Science | Sciences des écosystèmes et des océans

Canadian Science Advisory Secretariat
Pacific Region | Science Response 2025/030

FRASER SPRING 1.3 (5_2) CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*) STOCK ASSESSMENT IN 2024

CONTEXT

This Science Response Report results from the regional peer review of April 29–May 3, 2024 on the Fraser Spring 5-2 Chinook Salmon (*Oncorhynchus tshawytscha*) Stock Assessment in 2024.

BACKGROUND

The Fisheries Management Branch of Fisheries and Oceans Canada (DFO) has requested that the Fraser Spring 1.3 (5_2) Chinook Salmon (*Oncorhynchus tshawytscha*) Stock Management Unit (SMU) be assessed relative to reference points that are consistent with the DFO Precautionary Approach (PA) and provide science advice to inform management objectives for this SMU.

ANALYSIS AND RESPONSE

Fraser Spring 1.3 Chinook SMU spawner escapements were analyzed using the Wild Salmon Policy (WSP) Rapid Status Scanner Approach to assign an SMU and CU-specific statuses. The WSP Rapid Status Scanner Approach approximates the WSP Integrated Status process by using a binary decision-tree algorithm. The statuses were provisional as they did not undergo expert review, which is a critical step in the Rapid Status Approach process.

The remaining analyses for the Fraser Spring 1.3 Chinook SMU estimated CU-specific U_{MSY}, 0.85 S_{MSY} for the SMU, and plotted SMU-level trends in aggregate catch, aggregate relative spawner abundance, aggregate fishery impact, and aggregate pre-fishery abundance. Habitat-based estimates of Ricker stock-recruit model parameters (Parken et al., 2006) were used to estimate CU-specific U_{MSY} and 0.85 S_{MSY}, for which the lowest U_{MSY} may be used as the Removal Reference for the SMU, and the sum of the 0.85 S_{MSY}s is used for the SMU Upper Stock Reference Point. Confidence in the above metrics and trends was very low for several reasons:

1. CU- and SMU-level escapements are indices of absolute abundance;
2. There are insufficient coded wire tag (CWT) releases to estimate CWT-based calendar year exploitation rates (CYERs), thus catch and fisheries mortality are based on genetic stock identification (GSI) and the Fisheries Mortality Index (FMI) which are less precise and less accurate;
3. Ricker stock-recruit curve parameters could not be fit due to data deficiency and/or low-precision methods of estimating spawner escapements, recruits, fisheries mortality, and smolt-to-adult survival, thus estimates of U_{MSY} and S_{MSY} are based on models that approximate these metrics based on information available from other data-rich stocks.

Indicators of the Stock Status

*Table 1. List of Conservation Units (CUs) within the Fraser Summer 1.3 (5_2) Chinook Stock Management Unit with corresponding Designatable Units (DUs), and most recent WSP Integrated stock statuses *Data sources: Dionne et al. (2023); Doutaz et al. (2021); Weir et al. (2022).*

CU name	CTC indicator	CU	DU	WSP Integrated Assessment (2016)*	COSEWIC (2018/2020)
Lower Fraser River SP 1.3	None	CK-04	DU3	NOT ASSESSED	Special Concern
Middle Fraser – Fraser Canyon SP 1.3	None	CK-08	DU7	DATA DEFICIENT	Endangered
Middle Fraser River SP 1.3	None	CK-10	DU9	RED	Threatened
Upper Fraser River SP 1.3	Dome Creek	CK-12	DU11	RED	Endangered
North Thompson SP 1.3	None	CK-18	DU16	RED	Endangered

CONCLUSIONS

The analysis conducted was considered insufficient by participants and reviewers to provide an effective stock assessment. Some objectives in the Terms of Reference (TORs) were not effectively met, and the advice that resulted from the meeting and subsequent reviews are that the paper be rejected, and a new analysis be conducted using a new set of Terms of Reference, different and additional models, and updated data. Specifically, Objectives 3-7 were not met for this SMU. The essential elements of Objective 5 could be met by paraphrasing and referencing Fraser Chinook Recovery Potential Assessments (Dionne et al., 2023; Doutaz et al., 2021; Weir et al., 2022), and Objective 6 could be developed relatively easily by setting a natural disaster trigger (Table A1, Appendix A). However, Objectives 3-4 and 7 cannot be met using previously developed documents and methods due to the data-limited nature of the Fraser Spring 1.3 Chinook SMU. Thus, this SMU requires a research document to develop data-limited methods to assess the stock and provide the information DFO managers require (Table A1, Appendix A).

LIST OF MEETING PARTICIPANTS

Last Name	First Name	Affiliation
Adkison	Milo	Alaska Department of Fish and Game
Allan	Dean	DFO Science
Anderson	Erika	DFO Centre for Science Advice Pacific
Bailey	Colin	DFO Science

Last Name	First Name	Affiliation
Bailey	Richard	Consultant
Bison	Rob	Province of British Columbia
Charbonneau	Michelle	DFO Science
Connors	Brendan	DFO Science
Davies	Shaun	DFO North Coast
Davis	Brooke	DFO Science
Dennert	Allison	Raincoast Conservation Foundation
Dobson	Diana	DFO Science
Fleming	Justin	DFO Science
Freshwater	Cameron	DFO Science
Fuller	Natalie	DFO Science
Gale	Rupert	Sport Fishing Advisory Board
Gill	Jessica	DFO Fisheries Management
Grant	Sue	DFO Science
Greenberg	Dan	DFO Science
Hawkshaw	Mike	DFO Fisheries Management
Holmes	John	DFO Science
House	Patricia	DFO Fisheries Management
Huang	Ann-Marie	DFO Science
Jenewein	Brittany	DFO Science
Kitching	Tor	DFO Science
Lagasse	Cory	DFO Science
Lewis	Dawn	DFO Science
Luedke	Wilf	DFO Science
MacDuffee	Misty	Raincoast Conservation Foundation

Last Name	First Name	Affiliation
Mahoney	Jason	DFO Salmonid Enhancement Program
Messmer	Amber	DFO Fraser River and Interior Stock Assessment
Nowosad	Damon	Q'ul-lhanumutsun Aquatic Resources Society
Pestal	Gottfried	Solv Consulting
Potapova	Anna	DFO Science
Radford	Jeffrey	DFO Fisheries Management
Rosenberger	Andy	Coastland Research
Shepert	Marcel	Converging Voices Corp.
Sneddon	Leah	DFO Species at Risk Program
Staley	Mike	Fraser Salmon Management Council
Straight	Angus	DFO Salmonid Enhancement Program
Tessier	Laura	DFO Science
Thomson	Madeline	DFO Fisheries Management
Trouton	Nicole	DFO Fraser River and Interior Stock Assessment
Tuen	Alex	DFO Canadian Science Advisory Secretariat
Veilleux	Maxime	DFO Fisheries Management
Walsh	Michelle	Huu-ay-aht, Maa-nulth Fisheries Council
Weil	Jacob	DFO Salmonid Enhancement Program

SOURCES OF INFORMATION

Dionne, K., Rachinski, T., Parken, C., Weir, L., Doutaz, D., Ritchie, L., Bailey, R., Jenewein, B., Miller-Saunders, K., Labelle, M., Manson, M., Welch, P., Trouton, N., Mozin, P., and Walsh, M. 2023. Recovery Potential Assessment for Southern British Columbian Chinook Populations, Fraser and Southern Mainland Chinook Designatable Units (1, 6, 13 and 15). DFO Can. Sci. Advis. Sec. Res. Doc. 2023/042. xvii + 291 p.

Doutaz. D., Weir, L., Arbeider, M., Braun, D., Jenewein, , B., Rickards, K., Labelle, M., Curtis, S., Mozin, P., Whitney, C., Parken, C. and Bailey, R. 2021. Recovery Potential Assessment for 11 Designatable Units of Fraser River Chinook Salmon, *Oncorhynchus tshawytscha*, Part 1: Elements 1 to 11. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/063. xiii + 337 p.

DFO. 2020. Recovery Potential Assessment for 11 Designatable Units of Fraser River Chinook Salmon, Oncorhynchus tshawytscha, Part 1: Elements 1 to 11. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/023.

Parken, C.K., McNichol, R.E., and Irvine, J.R. 2006. Habitat-based methods to estimate escapement goals for data limited Chinook salmon stocks in British Columbia, 2004. DFO Can. Sci. Advis. Sec. Res. Doc. 2006/083. vii + 67 p.

Weir, L., Doutaz, D., Arbeider, M., Holt, K., Davis, B., Wor, C., Jenewein, B., Dionne, K., Labelle, M., Parken, C., Bailey, R., Velez-Espino, A., Holt, C. 2022. Recovery Potential Assessment for 11 Designatable Units of Chinook Salmon, *Oncorhynchus tshawytscha*, Part 2: Elements 12 to 22. DFO Can. Sci. Advis. Sec. Res. Doc. 2022/032. x + 125 p.

APPENDIX A

Table A1. Breakdown of success relative to the Terms of Reference for the Fraser Spring 1.3 (5_2) Chinook SMU FSRR from Salmon Sprint Week, April 29 – May 3, 2024. Terms of Reference objectives and details are listed in the second column, success (met/not met) in the third, and an assessment of whether a given Objective could or could not be met using established methods and previous work or not is provided in the fourth column.

#	Terms of Reference Objective	Met/Not Met	Can be Met using established methods and previous work
1	Stock status and trends, taking into account assumptions regarding stock structure and distribution. Include the historical and recent trajectory of both stock and fishing indicators. Stock structure and distribution: Describe the component populations (including hatchery contribution), Conservation Units (CUs), and Designatable Units (DUs) as applicable and demographic features (e.g., age structure, body size, sex ratio, genetics, distribution, and any associated trends). Stock status and trends: include the historical and recent trajectory of stock abundance (spawners and catch) with respect to the stock's reference points (i.e., relative to established Precautionary Approach [PA] references or the candidate PA references). Stock status considering both status as identified under the Wild Salmon Policy (WSP) for each component CU and aggregate abundance-based approaches for the stock management unit (SMU) when evaluating the limit reference point (LRP, as applicable and/or required). Committee on the Status of Endangered Wildlife in Canada (COSEWIC)-assessed status of DU(s) if applicable.	Met	Yes
2	Ecosystem and climate change considerations affecting the stock. Describe how environmental and climate considerations were considered in the assessment (e.g., parameterizing stock-recruit models, simulations, outcome uncertainties, etc.).	Met	Yes

#	Terms of Reference Objective	Met/Not Met	Can be Met using established methods and previous work
3	Evaluate or provide estimates of candidate reference points (e.g., Upper Stock Reference [USR], Target Reference Point [TRP], Removal Reference [RR]) for the stock, including the aggregate abundance component of the LRP for the SMU as requested. The candidate reference points should be relevant to the assessment and management framework (i.e., are consistent with the scale and type of information that is collected and how the assessment is used to support decision making)	Not Met - aggregate LRP not provided. Based on reviews of the IFC FSRR, aggregate FRP-Ls need to be developed to meet this Objective.	No - Aggregate FRP-Ls cannot be developed using simulation methods described by Holt et al. 2023 without estimates of ER and smolt-to-adult survival
4	Evaluate or provide estimates of the impact of candidate harvest and/or other management options on the stock. Work with clients to collaboratively identify specific scenarios to evaluate (e.g., “status quo”, “no fishing”, etc.). Provide advice on the potential impact of the scenarios on the SMU and CU(s) through quantitative or qualitative scenario evaluations. Evaluate the effect of management actions relative to PA reference points (e.g., on probabilities of dropping below LRP; exceeding RR; meeting USR and TRP) Evaluate the effect of management actions on other objectives/values of interest (e.g., potential catch, catch stability, abundance that allows for unrestricted food, social, and ceremonial (FSC) fisheries, spawner distribution, proportion natural index (PNI) values, demographic values, etc.).	Not Met - no management actions evaluated against probability of meeting/exceeding/failing any reference points. Based on reviews of the IFC FSRR, need to evaluate effect of different exploitation rates on likelihood of exceeding FRP-Ls across a range of marine survival scenarios	No - Exploitation rate information is missing, and a relationship between FMI and CWT-based CYER need to be developed before management scenarios can be evaluated. Additionally, smolt-to-adult survival information is missing for these CUs

#	Terms of Reference Objective	Met/Not Met	Can be Met using established methods and previous work
5	If the SMU is below the LRP: Review CU components contributing to SMU status below the LRP Review factors driving (or limiting) production across the species life history and evaluate the potential future impact of climate on those factors and/or succinctly describe gaps in knowledge If applicable, associate limiting factors with anthropogenic threats and provide general recommendations for prioritizing potential mitigation actions and/or succinctly describe gaps in knowledge *If possible*, evaluate the effect of management actions on probabilities of reaching candidate rebuilding targets (e.g., how does increasing/decreasing exploitation rate affect the probability of the SMU reaching the candidate rebuilding target (e.g., some specified % above the aggregate abundance component of the LRP) in three generations and/or the projected timeframe needed to reach the target)	Not Met - The first 3 components of Objective 5 can be met by porting over information from the FIA CN RPAs. The 4th component is "if possible", which was not feasible because new methods would need to be developed to meet the objective.	Yes, with the exception of the 4th component of the objective. To meet the 4th component, new methods are required to translate the Fisheries Mortality Index into a coded wire tag (CWT) Calendar Year Exploitation Rate equivalent that can be used for simulating future CU and SMU spawner abundances under varying exploitation rates. In addition, new methods are required because SAS information is not available, and there is not enough data to parameterize a Ricker curve using traditional methods, which is needed for simulating future population abundances.
6	Describe any exceptional circumstances or assessment triggers for the stock	Not Met - but could easily be met with a smolt-to-adult survival change threshold or a natural disaster trigger	Yes
7	Specific objectives for this SMU, in addition to general objectives #1–6 above include: Develop the aggregate abundance reference point component of LRP, USR and RR if possible, taking into account habitat-based approaches and coverage of existing spawner escapement programs	Not Met - aggregate LRP not provided. Based on reviews of the IFC FSRR, aggregate FRP-Ls need to be developed and aggregate RR set to CU with lowest RR.	No - Aggregate FRP-Ls cannot be developed using simulation methods described by Holt et al. 2023 without estimates of ER and smolt-to-adult survival

THIS REPORT IS AVAILABLE FROM THE:

Center for Science Advice (CSA)
Pacific Region
Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, BC V9T 6N7

E-Mail: DFO.Pacific.CSA-CASPacifique.MPO@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769
ISBN 978-0-660-78945-3 Cat. No. Fs70-7/2025-030E-PDF

Correct Citation for this Publication:

DFO. 2025. Fraser Spring 1.3 (5_2) Chinook Salmon (*Oncorhynchus tshawytscha*) Stock Assessment in 2024. DFO Can. Sci. Advis. Sec. Sci. Resp. 2025/030.

Aussi disponible en français :

*MPO. 2025. Évaluation du stock de saumon chinook (*Oncorhynchus tshawytscha*) du Fleuve Fraser, printemps 1.3 (5_2), en 2024. Secr. can. des avis sci. du MPO. Rép. des Sci. 2025/030.*