FRASER CHINOOK FISHERY MORTALITY INDEX 2014 - 2022

PRESENTED TO THE FORUM JTWG

JANUARY 27, 2025

Photos By: Shane Kalyn

INTRODUCTION

- This presentation compiles information to support Southern BC Chinook harvest planning, specifically fisheries that impact Fraser River Chinook Management Units (MUs).
- Includes updated data and results to that which was presented at meetings in 2020-2023.
- Information will be presented at the FSMC Forum and JTWG and has been reviewed by the JTC.
- Many of the results presented rely on monitoring programs that are implemented in partnership with First Nations and stakeholders (e.g., the ‘Avid Angler’ program).
- **Estimates are considered preliminary and are subject to change**

EVALUATION OF MANAGEMENT OBJECTIVES

Two methods currently available for determining a fishery mortality index for Fraser Chinook:

Exploitation Rate Analysis (ERA)	Run reconstruction plus genetic stock ID (RR+GSI)
Uses CWTs recovered from Canadian and US fisheries to assess fishery mortalities for Chinook indicator stocks	Combines mortality data from the Fraser River Chinook run reconstruction model with GSI and catch estimates from marine mixed-stock fisheries

FISHERIES INCLUDED

FMI Fishery Category	Fisheries Included
Fraser First Nations FSC	Fraser River (Lower, Mid, Upper) – FSC
Fraser Recreational	Fraser River and tributaries – recreational
Fraser Test	Albion, Qualark, Whonnock, Cottonwood, Brownsville Bar
Fraser Commercial/EO	Fraser River Area B, E, H and First Nations EO fisheries
NBC Commercial	Area 1-5 AABM Troll (Area F) Area 1-5 Net
NBC First Nations	Northern Area 1-5 marine FSC
NBC Recreational	Area 1-2 AABM sport (Haida Gwaii) Area 3-5 ISBM sport

Central Coast fisheries are not included in the FMI, all catch is assumed to impact non-Fraser stocks due to the terminal nature of the fisheries.

FISHERIES INCLUDED

FMI Fishery Category	Fisheries Included
SBC Commercial	WCVI Area G Troll
SBC First Nations	A-Tlegay Fisheries Society Klahoose First Nation Tla'amin Nation WCVI AABM FSC catch (Maa-nulth, Nuu-chah-nulth) Five Nations rights-based catch JSt/GSt First Nations catch not included due to gaps in data and lack of genetic samples
SBC Recreational	All recreational fisheries from PFMA 11-29, 121-127
SBC Test	Johnstone Strait Gillnet & Seine Sockeye-directed test fisheries Juan de Fuca Gillnet & Seine Sockeye-directed test fisheries

DATA SOURCES - CATCH

FMI Fishery Category	Data Source
Fraser First Nations FSC	Fraser River Run Reconstruction
Fraser Recreational	Fraser River Run Reconstruction
Fraser Test	Fraser River Run Reconstruction
Fraser Commercial/EO	Fraser River Run Reconstruction
NBC Commercial	Fishery Manager or CTC Catch and Escapement report (landed catch)
NBC First Nations	Fishery Manager or CTC Catch and Escapement report (landed catch)
NBC Recreational	Fishery Manager or CTC Catch and Escapement report (landed catch)
SBC Commercial	FOS or CTC Catch and Escapement report (landed catch)
SBC First Nations	FOS or CTC Catch and Escapement report (landed catch)
SBC Recreational	CREST (Catch and Release Estimation Tool) database – data collected from creel surveys, Avid Anglers, reference fishery (does not include iREC)

DATA SOURCES - STOCK COMPOSITION

FMI Category	Fishery	Base Period	2019	2020	2021	2022	2023
Fraser First Nations FSC		Fraser River Run Reconstruction					
Fraser Recreational							
Fraser Test							
Fraser Commercial/EO							
NBC Commercial	Area F (1-5) AABM Troll	Direct Samples					
NBC Commercial	Area 1-5 Net	Proxy – Area F (1-5) AABM Troll	No catch				
NBC Recreational	Area 1-2 AABM Sport	Direct Samples					
NBC Recreational	Area 3-5 Sport	Proxy - Area 1-5 AABM troll	Direct samples	Proxy – 2019	Direct samples		Proxy – avg 2019, 2021, 2022

DATA SOURCES - STOCK COMPOSITION

FMI Category	Fishery	Base Period	2019	2020	2021	2022	2023
NBC First Nations	Area 1-5 marine First Nations	Proxy – Area F Troll	Proxy – Area 3-5 sport for that year, except 2020 used 2019 data as proxy because no sport sample that year				
SBC Commercial	JSt Net	Proxy - SBC rec in JSt	No catch				
SBC Commercial	JDF Net	Proxy - SBC rec in JDF	No catch				
SBC Commercial	WCVI Area G Troll	Proxy – 5 Nations and/or recreational samples Area 123-127					Direct sample
SBC First Nations	WCVI AABM	Proxy – 2019	Direct samples				Proxy – Area G troll
SBC Test	JSt and JDF SK test	Proxy – Used SBC sport stock comp in same/adjacent area in the same year					

DATA SOURCES - STOCK COMPOSITION

FMI Category	Fishery	Base Period	2019	2020	2021	2022	2023
SBC Rec	All recreational fisheries from PFMA 11-29, 121-127	GSI Direct samples from Avid Anglers, creel surveys, and reference fishery (2023). Applied differently than other fisheries. Calculate catch/sample ratios to get stock composition for specific area-month stratum, then apply to samples to expand catch. Stock composition by area then applied to total catch by area from CREST					

KNOWN ISSUES/UNCERTAINTIES

- CTC reports – using landed catch only (no release/incidental mortality)
  - SBC rec is only place with fishery-related incidental mortality (release & drop-off) incorporated, except sub-legals
- Excluding some catch from analysis based on assumptions and/or missing information (i.e., groundfish trawl fishery, USA fisheries, JSt/GSt marine First Nations fisheries, central coast fisheries)
- Chilliwack and Chehalis Summer 5_2 are a hatchery stock – hard to remove from analysis
- At times, high amount of infilling done for escapement
- GSI data gaps; appropriateness of proxies chosen
- Concerns about representativeness of GSI baselines
- Outputs do not include quantification of uncertainty

NEW FOR 2023 ANALYSIS

- New R Code for SBC Recreational fishery calculations
  - Apply calculated stock comp to total catch from CREST so values align

- Better documentation through Technical Manuscript (Mar/Apr)
  - Collaboration with FSMB JTC

RESULTS

Accompanying word document presents the results in 3 sets of tables – all the same information, viewed in slightly different ways

Table 1 – presents catch of each MU by fishery and fishery mortality index (FMI) estimates for both RR+GSI and CWT methods

Table 2 – presents FMI estimates of each MU by fishery and compares to CWT-based FMI

Table 3 – presents catch and FMI of each MU by fishing sector

KEY HIGHLIGHTS - OVERALL

Stock Management Unit	2014-2018 Avg. CDN Fishery Mortality	2019 CDN Fishery Mortality	2020 CDN Fishery Mortality	2021 CDN Fishery Mortality	2022 CDN Fishery Mortality	2023 CDN Fishery Mortality	2019-2023 Avg. CDN Fishery Mortality
Spring 4_2	24.0%	5.1%	4.4%	3.7%	2.9%	4.3%	4.0%
Spring 5_2	17.2%	10.2%	2.6%	5.6%	2.9%	3.2%	4.6%
Summer 5_2	25.0%	18.7%	13.0%	14.2%	10.9%	10.1%	12.7%
Summer 4_1	46.6%	32.2%	25.6%	25.3%	29.6%	12.8%	21.3%
Fall 4_1	18.3%	18.4%	19.7%	23.3%	31.8%	17.7%	22.5%

- FMI on Spring 4_2 and Spring 5_2 Chinook has averaged less than 5% across 2019-2023.
- FMI on Summer 5_2 and Summer 4_1 Chinook has decreased compared to the base period but not as much as the Spring Chinook
- Fall 4_1 recent average FMI was higher than the base period.

Updated

KEY HIGHLIGHTS - OVERALL

% Change FMI Compared to the Base Period (2014-2018)

Management Unit	2019 % Change	2020 % Change	2021 % Change	2022 % Change	2023 % Change	2019-2023 Avg. % Change
Spring 4_2	-78.5%	-81.7%	-84.6%	-87.3%	-81.9%	-83.1%
Spring 5_2	-40.5%	-84.8%	-67.0%	-83.2%	-80.5%	-72.9%
Summer 5_2	-25.3%	-48.0%	-41.5%	-55.9%	-56.4%	-48.2%
Summer 4_1	-30.2%	-44.4%	-44.6%	-35.6%	-71.8%	-53.5%
Fall 4_1	1.0%	8.0%	27.9%	74.2%	-3.5%	23.0%

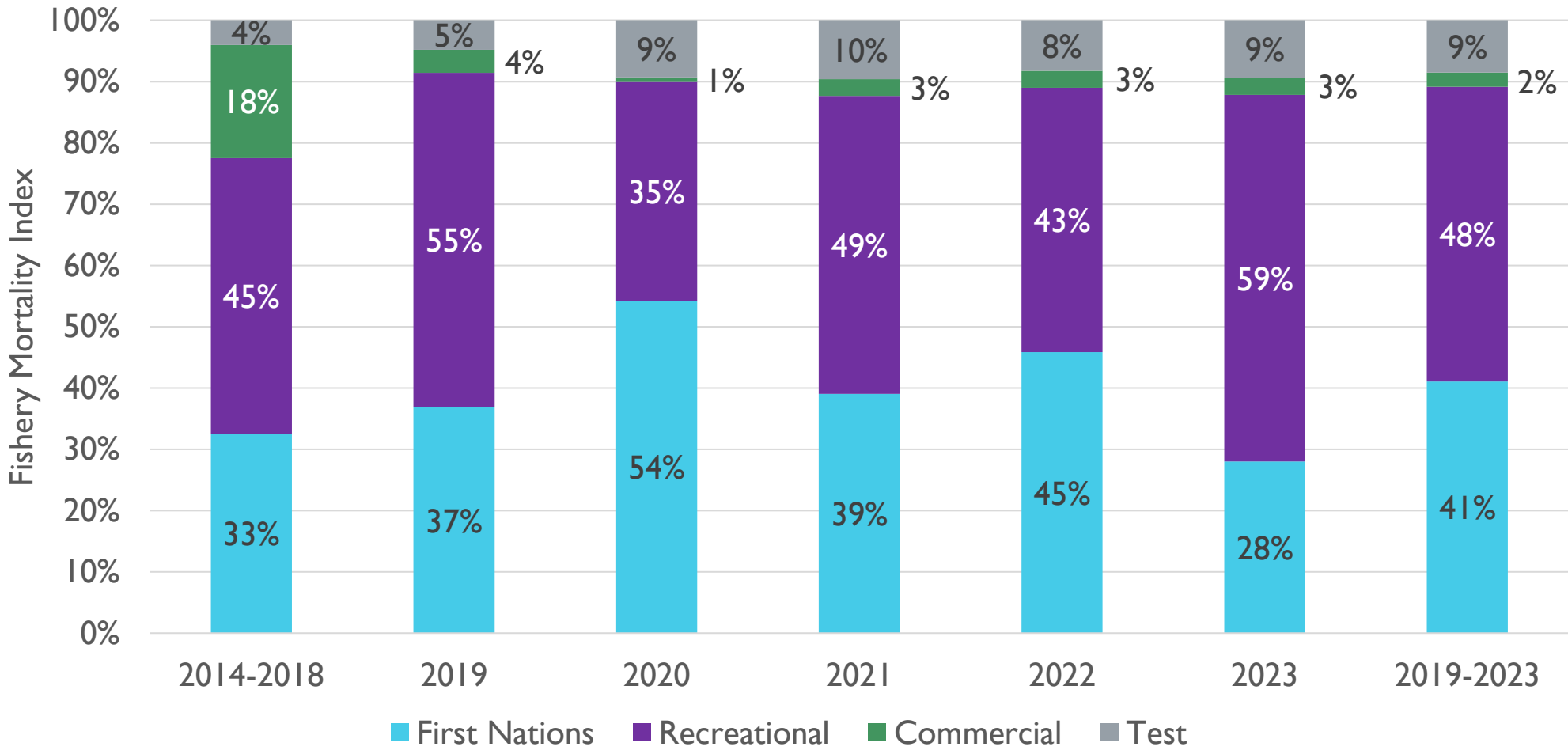
Total Chinook Catch (All SMUs)

	AVERAGE 2014-2018	2019	2020	2021	2022	2023	AVERAGE 2019-2023
RECREATIONAL							
In-river	12,471	11,752	9,682	15,684	35,451	31,782	20,870
Marine	52,185	62,180	31,529	42,093	60,502	69,766	53,214
Total	**64,657**	**73,932**	**41,211**	**57,777**	**95,953**	**101,548**	**74,084**
COMMERCIAL/EO							
In-river	3,791	2	0	0	25	134	32
Marine	31,446	5,914	3,758	10,772	8,348	9,531	7,665
Total	**35,238**	**5,916**	**3,758**	**10,772**	**8,373**	**9,665**	**7,697**
TEST							
In-river	2,374	3,668	2,978	3,483	3,373	5,075	3,715
Marine	20	116	69	160	161	324	166
Total	**2,394**	**3,784**	**3,047**	**3,643**	**3,534**	**5,399**	**3,881**
FIRST NATIONS							
In-river	18,132	28,996	32,680	26,813	23,350	30,125	28,393
Marine	5,601	3,350	1,807	3,788	3,776	8,056	4,155
Total	**23,733**	**32,346**	**34,487**	**30,601**	**27,126**	**38,181**	**32,548**
Total CDN Fishing Mortality Index	126,022	115,979	82,502	102,793	134,986	154,793	118,211
Run Size Index	409,941	447,244	387,802	446,766	498,358	1,104,490	576,932

Summer 5_2 FMI

	AVERAGE 2014-2018	2019	2020	2021	2022	2023	AVERAGE 2019-2023
RECREATIONAL							
In-river	2.5%	1.7%	2.3%	1.7%	1.3%	1.6%	1.7%
Marine	8.7%	8.5%	2.3%	5.4%	3.4%	4.8%	4.5%
Total	**11.2%**	**10.1%**	**4.7%**	**7.1%**	**4.8%**	**6.5%**	**6.2%**
COMMERCIAL/EO							
In-river	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Marine	4.2%	0.7%	0.1%	0.4%	0.3%	0.3%	0.3%
Total	**4.6%**	**0.7%**	**0.1%**	**0.4%**	**0.3%**	**0.3%**	**0.3%**
TEST							
In-river	1.0%	0.9%	1.2%	1.4%	0.9%	1.0%	1.1%
Marine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	**1.0%**	**0.9%**	**1.2%**	**1.4%**	**0.9%**	**1.0%**	**1.1%**
FIRST NATIONS							
In-river	7.1%	6.2%	7.0%	5.0%	4.7%	2.3%	4.8%
Marine	1.0%	0.7%	0.0%	0.7%	0.3%	0.7%	0.5%
Total	**8.1%**	**6.9%**	**7.0%**	**5.6%**	**5.1%**	**3.0%**	**5.3%**
Total CDN Fishing Mortality Index	**24.9%**	**18.6%**	**13.0%**	**14.6%**	**11.0%**	**10.9%**	**12.9%**
Run Size Index	28,667	18,255	25,312	25,370	43,740	31,426	28,821

% DISTRIBUTION OF FISHERY MORTALITY INDEX (SUMMER 5_2)



CONCLUSIONS

- Management actions in recent years have mainly focused on reducing impacts to stream-type Chinook while providing opportunity to fish on more abundant populations (e.g., Summer 4_1 Chinook)
- While the FMI appears to have decreased in 2019-2023 compared to the base period and the index of escapement for many populations has increased, escapements for stocks of concern have not yet reached recovery targets.
- Domestic fishery management changes in 2019-2023 may be a contributing factor to the observed changes in escapement. Natural variability, measurement error (catch and escapement inputs) and uncertainties present in the assessment tools could be confounding both the inputs and the outputs related to the FMI.

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NEXT STEPS

- Technical Manuscript expected by spring 2025
- A similar analysis of the 2024 fisheries will occur in 2025 when data are compiled and will be assisted by efficiencies made in the process (e.g., R code).
- Discussion of the impact of this analysis on 2025 fisheries management measures will occur during winter and spring consultation meetings with First Nations and stakeholders.
- Further work to be done refining estimates, adding missing data, and using these results to assess performance of pre-season planning tools.

DISCUSSION

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